City of Wrangell

City Boiler Replacement Study

Boiler Replacement Analysis

EPS Project No.: 07-0156

March 27, 2008

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Summary of Changes

Revision Number	Revision Date	Revision Description
1	2007-08-27	Initial Release (Preliminary)
2	2007-09-07	Final
3	2008-27-03	Updated Fuel Information

1 Summary

The City of Wrangell, through Wrangell Municipal Light and Power (WMLP), has been present a fuel displacement electric rate by Four Dam Pool (FDP) of approximately $.05/kW-h. This special rate is due to Tyee Lake Hydro-electric facilities spilling of excess water (water not used in power production).

WMLP, via Steve Henson, solicited Electric Power Systems, Inc. (EPS) to assist the City of Wrangell (COW) in determining what the savings would be per year if the city buildings were converted to electric boilers, develop a rough order magnitude cost estimate (ROM), and provide an estimated engineering design fee for the work of replacing the boilers.

2 Fuel Displacement Analysis

EPS Mechanical engineer, Warren Taylor, PE, performed a site investigation in July 2007 with Mr. Steve Henson, WMLP, and COW Department of Public Works (DOPW). The site investigation collected information at each City owned candidate facility that was eligible for the special FDP electric rate.

2.1 Field Investigation

The FDP fuel displacement rate is accompanied by few stipulations that the COW must follow. These stipulations include:

1. Only facilities that currently utilize fuel oil for heating purposes are eligible.
2. Each facility that is converted to electric heating must also maintain fuel oil fired heating equipment in the event of power or other electric boiler failure.

The following COW facilities were identified, during the field investigation, which qualify for the FDP fuel displacement rate:

- Public Safety Bldg
- Fire Satellite Station
- Public Works Bldg
- Library
- Nolan Center
- Hospital
- High School
- Middle School
- Elementary School
- Harbor Office
- Power Plant

For the development of this study, several items of information were required to be collected from each qualifying facility. This information was collected by EPS, WMLP, and the DOPW during the site investigation.

- Mechanical/boiler room configuration and dimensional information

- Boiler size and configuration,
- Details on other fuel fired heating equipment (water heaters, etc.) where applicable,
- Location of existing building electrical service,
- Photos of existing installation (boilers, mechanical rooms, and electric service where required)
- Fuel oil consumption and fuel oil cost per gal per month data for 1 calendar year

2.2 Fuel Oil Conversion Analysis

The collected fuel consumption data was totaled together to determine the fuel consumed per facility per year. EPS assumed that preceding and future year's fuel consumption per location is similar to the 2006/2007 time frame for this analysis. Fuel consumption data, coupled with the purchase price for fuel per month during the 2006/2007 time frame, allowed EPS to determine a total fuel oil cost for the given year. This cost formed the basis of analysis.

EPS, from the data collected, calculated the equivalent energy in kW/hr at each facility per month and per year. The total electric energy cost calculated was then multiplied by the resulting FDP fuel displacement electric rate plus a WMLP service fee, which resulted in an fuel displacement electric kW/hr cost of $.07 per kW/hr(with a WMLP fee of 2 cents per kW/hr).

In March 2008, EPS received further fuel consumption data and fuel purchase cost information. EPS has updated this analysis to show a more accurate depiction of the COW operating conditions. Additionally, a better fuel cost increase rate was established.

The results for the 2006/2007 time period are as follows:

Fuel Oil Analysis	**2006/2007**	**2007/2008**
Average Fuel Cost:	$2.88	$3.06
Minimum Fuel Cost	$2.73	$2.73
Maximum Fuel Cost	$3.11	$3.48
Deviation Hight/low:	8%/5%	%14/%11

Fuel Oil Consumption	**2006/2007**	**2007/2008**
Fuel Oil Consumed (total):	143,944	132,002
Average Fuel Cost:	$2.88	$3.06
Total Fuel Oil Cost*:	$411,204	$406,692

***** Total fuel cost is based on fuel oil monthly billings per COW, not based on fuel cost average.

Equivalent Electric Energy Consumption	**2006/2007**	**2007/2008**
Electric Energy (total kW/hr):	4,554,757	4,176,897
Electricity Cost (per kW/hr):	$.07	$.07

Estimated Electric Cost:	$318,833	$292,382

	2006/2007	**2007/2008**
Estimated Savings	$92,371 (22%)	114,309 (28%)

EPS estimates that fuel oil prices will increase steadily at a rate of at least 5% per year. This assumption was validated by the Energy Information Administration which is provided by the Department of Energy (DOE) which indicated that the 2007 to 2008 estimated fuel price increases at approximately 7.3 percent. Historically fuel price increases per year are in the 3 to 5 percent range. 5 percent, a typical fuel oil year cost increase was utilized to look at future potential cost savings.

After the receipt of the information from COW in March of 2008, it was apparent that the federally indicated fuel cost increase percentage is in accurate for the area. After further review the DOE stated this number for the entire US. This would be an average of the highs and lows through the US and would most likely not accurately represent actual fuel cost increases for a specific area. This analysis was updated based on the new information, which indicated that a 12 percent, or more, would be realized.

Additionally FDP has indicated that the 5 cent per kW/hr would stay in effect for a minimum of 3 years. Per WMLP at the end of third year, EPS was directed to increase to fuel displacement rate to 7 cents per kW/hr. Future fuel costs and savings are provided in the table below.

Table 1 – Estimated Fuel and Electrical Costs and Savings (Updated for 2007/2008 Data)

Year	*Average Fuel Cost ($/gal)*	*COW Fuel Oil Heating Cost*[2]	*Electric Heating Cost*	*Savings*[3]
2008/2009	$3.43	$452,398	$318,833	**$163,112**
2009/2010	$3.84	$506,686	$318,833	**$217,771**
2010/2011	$4.30	$567,488	$409,928*	**$278,990**
2011/2012	$4.81	$635,711	$409,928*	**$264,017**
2012/2013	$5.39	$711,857	$409,928*	**$340,809**
2013/2014	$6.04	$797,280	$409,928*	**$426,817**
2014/2015	$6.76	$892,953	$409,928*	**$523,146**
2015/2016	$7.58	$1,000,108	$409,928*	**$631,034**

[1]Rate change from 5 cents per kW/hr to 7 cents per kW/hr.

[2]Resultant fuel cost per based on average fuel cost per gallon.

[3]Cost savings is calculated from monthly averages based on monthly fuel oil average.

Lastly, EPS converted the proposed electric rate (FDP plus WMLP service fee) into an equivalent fuel oil cost per gallon, **$2.21 for the first 3 years.** When the guaranteed fix rate expires the approximate equivalent fuel oil cost would be **$2.85** per gallon after the first three

years and assumed every year after. These two rates would also represent the fuel oil/electric rate cost at which no savings are realized for the COW electric/fuel oil conversion.

3 Estimated Construction Estimate

EPS developed a construction cost estimate based on gathered information, preliminary equipment selections, and indicated construction assumptions. The estimating assumptions are due to the lack of a detailed design. More accurate cost estimation would be available with a detailed design package. At this time the developed cost estimate provides a Rough Order of Magnitude (ROM) for the development of a capital improvement budget. The following items were considered/included in the estimate:

1. New Electrical Service to each building which new service is required. Including:
    a. Riser
    b. Underground Primary Cable
    c. 480V, 3 phase transformer (various capacities based on location)
    d. Underground service to building
    e. Metering Panel
    f. Disconnects/Circuit Breakers
    g. Feeder wiring and Protection
    h. Conduit (where required)
2. Mechanical Removals and Installation, Including:
    a. Removal of spare boiler (where required)
    b. Installation of new electric boiler, (480V, 3 phase, size dependent on location)
    c. Pipe, valves, and fittings
    d. Instrumentation
3. Miscellaneous Cost/Multipliers
    a. Wrangell Light & Power electric transmission and distribution system upgrades
    b. Estimate assumes Electrical and Mechanical Contractors are not local to Wrangell.
        i. Camp Days Included
        ii. Travel Costs Included
    c. Contingency: 30%

The final project ROM cost estimate comes to **$3,200,000.00.**

4 Estimated Engineering Fee Estimate

EPS has developed an engineering fee estimate for the development of design/construction drawings and specifications based on the information obtained and analyzed by this study.

The engineering fee is estimated not to exceed **$140,008.**

The fee estimate includes:

- Mechanical Design/Construction Drawings
- Electrical Design/Construction Drawings
- Mechanical Construction Specifications
- Electrical Construction Specifications
- Mechanical/Electrical Calculations
- Pre-bid/Construction Services
- Electrical Field Investigation/Verification

A Fuel vs. Electricity Analysis

Location	BTU/hr	kW (cal)	kW (proposed)	Proposed Boiler	Voltage - Power	kW/Hr (Calculated based on 2007/2008 information) Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec	Total
Public Safety Bldg	1655000	484.6	484.6	Cleaver-Brooks HW-241 504kW	480V, 3 ph, 60hz	87748	68032	93630	52432	56893	83442	0	0	63646	78347	53856	51419	689445
Fire Satelite Station	133000	38.9	38.9	Qmark Unit Heater 20kW	208/240V, 3 ph, 60hz	4199	4240	6993	5632	3639	1297	0	0	0	1187	4882	6423	38493
Public Works Bldg	372000	108.9	108.9	Qmark Unit Heater 20kW	208/240V, 3 ph, 60hz	11708	31927	13796	2436	0	0	0	0	0	5756	8506	10458	84587
Library	236000	69.1	69.1	Cleaver-Brooks HW-121 72kW	480V, 3 ph, 60hz	9392	4335	5221	4114	4430	3164	0	4750	0	3035	3547	7661	49647
Nolan Center	943000	276.1	276.1	Cleaver-Brooks HW-203 300kW	480V, 3 ph, 60hz	57134	42559	41167	16169	25219	21232	13575	9819	12657	16429	41661	38737	336358
Hospital	1201300	351.8	351.8	Cleaver-Brooks HW-203 360kW; Rheem WH	208/240/480V, 3 ph, 60hz	55349	98314	54172	41926	21106	10126	64677	51834	35022	41762	68541	83964	626793
Schools	5733700	1678.9	1930.8	Cleaver-Brooks HW-361, HW-204 420kW, HW-2	480V, 3 ph, 60hz	300972	254628	297251	211151	185299	130684	0	0	0	154448	299940	507389	2341762
Harbor Office	0	0.0	0.0			4091	943	0	1582	0	0	0	0	971	0	0	2224	9812
					kW/hr Total:	530593	504978	512231	335443	296586	249945	78252	66402	112296	300962	480933	708275	4176897
BTU/gal:	130030				$.05 kW/hr ($.07 kW/hr):	$ 37,141.49	$ 35,348.46	$ 35,856.14	$ 23,481.03	$ 20,761.03	$ 17,496.15	$ 5,477.65	$ 4,648.14	$ 7,860.75	$ 21,067.36	$ 33,665.30	$ 49,579.28	**$ 292,382.78**
BTU/gal (corrected):	107,969	(BTU content incorporating average boiler efficiency)			$.07 kW/hr ($.09 kW/hr):	$ 47,753.35	$ 45,448.02	$ 46,100.75	$ 30,189.89	$ 26,692.75	$ 22,495.05	$ 7,042.70	$ 5,976.18	$ 10,106.68	$ 27,086.61	$ 43,283.95	$ 63,744.79	**$ 375,920.72**
kW/Hr Cost:	$ 0.07																	
Total kW Load:	3260.2				2007/2008:	$ 58,353.68	$ 44,365.46	$ 44,193.24	$ 30,742.90	$ 26,525.59	$ 23,302.05	$ 7,443.73	$ 6,568.31	$ 11,037.08	$ 29,770.37	$ 49,852.39	$ 74,537.39	*$ 406,692.19*
Fuel Cost Increase per Year:	12%	Estimated (from this point on)			2008/2009:	$ 65,356.13	$ 49,689.32	$ 49,496.43	$ 34,432.05	$ 29,708.66	$ 26,098.30	$ 8,336.98	$ 7,356.50	$ 12,361.53	$ 33,342.81	$ 55,834.68	$ 83,481.87	*$ 455,495.25*
					2009/2010:	$ 73,198.86	$ 55,652.04	$ 55,436.00	$ 38,563.89	$ 33,273.70	$ 29,230.09	$ 9,337.41	$ 8,239.28	$ 13,844.91	$ 37,343.95	$ 62,534.84	$ 93,499.70	*$ 510,154.68*
					2010/2011:	$ 81,982.72	$ 62,330.28	$ 62,088.32	$ 43,191.56	$ 37,266.54	$ 32,737.70	$ 10,457.90	$ 9,228.00	$ 15,506.30	$ 41,825.22	$ 70,039.02	$ 104,719.66	*$ 571,373.25*
					2011/2012:	$ 91,820.65	$ 69,809.92	$ 69,538.92	$ 48,374.55	$ 41,738.53	$ 36,666.23	$ 11,712.85	$ 10,335.36	$ 17,367.06	$ 46,844.25	$ 78,443.70	$ 117,286.02	*$ 639,938.04*
					2012/2013:	$ 102,839.13	$ 78,187.11	$ 77,883.59	$ 54,179.49	$ 46,747.15	$ 41,066.17	$ 13,118.40	$ 11,575.60	$ 19,451.10	$ 52,465.56	$ 87,856.95	$ 131,360.35	*$ 716,730.60*
					2013/2014:	$ 115,179.83	$ 87,569.56	$ 87,229.62	$ 60,681.03	$ 52,356.81	$ 45,994.11	$ 14,692.60	$ 12,964.67	$ 21,785.24	$ 58,761.43	$ 98,399.78	$ 147,123.59	*$ 802,738.27*
					2014/2015:	$ 129,001.40	$ 98,077.91	$ 97,697.17	$ 67,962.76	$ 58,639.63	$ 51,513.41	$ 16,455.72	$ 14,520.43	$ 24,399.47	$ 65,812.80	$ 110,207.76	$ 164,778.42	*$ 899,066.87*
					2015/2016:	$ 144,481.57	$ 109,847.26	$ 109,420.83	$ 76,118.29	$ 65,676.38	$ 57,695.02	$ 18,430.40	$ 16,262.88	$ 27,327.40	$ 73,710.34	$ 123,432.69	$ 184,551.83	*$ 1,006,954.89*

2007/2008:	$ 21,212.19	$ 9,017.00	$ 8,337.10	$ 7,261.87	$ 5,764.56	$ 5,805.90	$ 1,966.08	$ 1,920.16	$ 3,176.33	$ 8,703.01	$ 16,187.09	$ 24,958.11	**$ 114,309.41**
2008/2009:	$ 28,214.64	$ 14,340.86	$ 13,640.29	$ 10,951.02	$ 8,947.63	$ 8,602.15	$ 2,859.33	$ 2,708.36	$ 4,500.78	$ 12,275.45	$ 22,169.38	$ 33,902.59	**$ 163,112.47**
2009/2010:	$ 36,057.37	$ 20,303.58	$ 19,579.86	$ 15,082.86	$ 12,512.67	$ 11,733.94	$ 3,859.76	$ 3,591.14	$ 5,984.16	$ 16,276.59	$ 28,869.54	$ 43,920.42	**$ 217,771.90**
2010/2011:	$ 44,841.23	$ 26,981.82	$ 26,232.18	$ 19,710.53	$ 16,505.51	$ 15,241.56	$ 4,980.25	$ 4,579.85	$ 7,645.55	$ 20,757.86	$ 36,373.72	$ 55,140.38	**$ 278,990.46**
2011/2012:	$ 44,067.31	$ 24,361.89	$ 23,438.17	$ 18,184.65	$ 15,045.78	$ 14,171.18	$ 4,670.16	$ 4,359.17	$ 7,260.38	$ 19,757.64	$ 35,159.75	$ 53,541.23	**$ 264,017.32**
2012/2013:	$ 55,085.78	$ 32,739.08	$ 31,782.84	$ 23,989.60	$ 20,054.40	$ 18,571.13	$ 6,075.70	$ 5,599.42	$ 9,344.42	$ 25,378.95	$ 44,572.99	$ 67,615.55	**$ 340,809.88**
2013/2014:	$ 67,426.48	$ 42,121.54	$ 41,128.87	$ 30,491.14	$ 25,664.06	$ 23,499.07	$ 7,649.91	$ 6,988.49	$ 11,678.56	$ 31,674.82	$ 55,115.83	$ 83,378.80	**$ 426,817.55**
2014/2015:	$ 81,248.06	$ 52,629.88	$ 51,596.43	$ 37,772.86	$ 31,946.87	$ 29,018.36	$ 9,413.02	$ 8,544.25	$ 14,292.79	$ 38,726.19	$ 66,923.80	$ 101,033.63	**$ 523,146.14**
2015/2016:	$ 96,728.23	$ 64,399.23	$ 63,320.09	$ 45,928.39	$ 38,983.63	$ 35,199.97	$ 11,387.71	$ 10,286.70	$ 17,220.72	$ 46,623.73	$ 80,148.73	$ 120,807.04	**$ 631,034.17**
													$ 2,845,699.90

Fuel Vs. Electric Break Point	2007/2008	Fuel Oil*	2007/2008 Estimated Energy Cost (by Gallon Fuel)	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016
Electricity[1]	$ 292,382.78	132002.3	***$ 2.21***	$ 2.21	$ 2.21	$ 2.21	$ 2.85	$ 2.85	$ 2.85	$ 2.85	$ 2.85
Fuel	$ 403,927.04		$ 3.06	$ 3.43	$ 3.84	$ 4.30	$ 4.81	$ 5.39	$ 6.04	$ 6.76	$ 7.58

* Assumes that the total fuel oil consumption per year is approximately the same as was indicated from information from the City of Wrangell.

[1] The electric cost indicated the price per gallon at which no savings is realized This can be considered an equivalent fuel cost per gallon of the indicate electric rate.

[2] No fuel consumption data was obtained from the Power Plant. Additional fuel savings could be realized.

B ROM Construction Cost Estimate

Item	Description	Quantity	Com. Type	Cost	Labor (Hr)	Cost	Material Total	Labor Total	Total	Shipping Weight (lbs)
Public Safety Building										
1	Boiler: Cleaver-Brooks HW-241 504kW	1	ea.	$ 35,000.00	80	$ 115.00	$ 35,000.00	$ 9,200.00	$ 44,200.00	2450
2	Pipe, valves, and fittings	1	lot	$ 1,000.00	80	$ 115.00	$ 1,000.00	$ 9,200.00	$ 10,200.00	
3	Remove existing boiler & plug exhaust stack	1	lot	$ 500.00	40	$ 115.00	$ 500.00	$ 4,600.00	$ 5,100.00	
4	Primary riser	1	lot	$ 1,500.00	30	$ 125.00	$ 1,500.00	$ 3,750.00	$ 5,250.00	
5	Install Primary UG (Trench, Conduit, and cable)	250	lf	$ 16.00	85	$ 125.00	$ 4,000.00	$ 10,625.00	$ 14,625.00	1000
6	Install padmount transformer (480, 500kva, 3 phase)	1	ea.	$ 15,000.00	35	$ 125.00	$ 15,000.00	$ 4,375.00	$ 19,375.00	4500
7	Install Secondary and service entrance equipment	1	ea.	$ 6,000.00	60	$ 125.00	$ 6,000.00	$ 7,500.00	$ 13,500.00	1500
8	Install Electric Heater Feeder and Protection	1	ea.	$ 3,500.00	60	$ 125.00	$ 3,500.00	$ 7,500.00	$ 11,000.00	
						Section Total:	$ 66,500.00	$ 56,750.00	$ 123,250.00	
					Overhead:	15%	$ 9,975.00			
					Profit:	10%	$ 6,650.00			
						Total:	$ 83,125.00	$ 56,750.00	$ 139,875.00	
Fire Satellite Station										
1	Unit Heaters: Qmark Unit Heater 20kW, 240/208, 3phase	2	ea.	$ 1,315.00	20	$ 115.00	$ 2,630.00	$ 4,600.00	$ 7,230.00	120
						Section Total:	$ 2,630.00	$ 4,600.00	$ 7,230.00	
					Overhead:	15%	$ 394.50			
					Profit:	10%	$ 263.00			
						Total:	$ 3,287.50	$ 4,600.00	$ 7,887.50	
Public Works Bldg										
1	Unit Heaters: Qmark Unit Heater 20kW, 480v 3phase	6	ea.	$ 1,291.00	20	$ 115.00	$ 7,746.00	$ 13,800.00	$ 21,546.00	360
2	Primary riser	1	lot	$ 1,500.00	30	$ 125.00	$ 1,500.00	$ 3,750.00	$ 5,250.00	
3	Install Primary UG (Trench, Conduit, and cable)	250	lf	$ 16.00	85	$ 125.00	$ 4,000.00	$ 10,625.00	$ 14,625.00	1000
4	Install padmount transformer (480, 150kva, 3 phase)	1	ea.	$ 10,000.00	25	$ 125.00	$ 10,000.00	$ 3,125.00	$ 13,125.00	2500
5	Install Secondary and service entrance equipment	1	ea.	$ 5,000.00	50	$ 125.00	$ 5,000.00	$ 6,250.00	$ 11,250.00	1500
6	Install Electric Heater Feeder and Protection	6	ea.	$ 5,500.00	60	$ 125.00	$ 33,000.00	$ 7,500.00	$ 40,500.00	
						Section Total:	$ 61,246.00	$ 45,050.00	$ 106,296.00	
					Overhead:	15%	$ 9,186.90			
					Profit:	10%	$ 6,124.60			
						Total:	$ 76,557.50	$ 45,050.00	$ 121,607.50	
Library										
1	Boiler: Cleaver-Brooks HW-121 72kW	1	ea.	$ 16,000.00	60	$ 115.00	$ 16,000.00	$ 6,900.00	$ 22,900.00	550
2	Pipe, valves, and fittings	1	lot	$ 1,000.00	80	$ 115.00	$ 1,000.00	$ 9,200.00	$ 10,200.00	1000
3	Primary riser	1	lot	$ 1,500.00	30	$ 125.00	$ 1,500.00	$ 3,750.00	$ 5,250.00	
4	Install Primary UG (Trench, Conduit, and cable)	250	lf	$ 16.00	85	$ 125.00	$ 4,000.00	$ 10,625.00	$ 14,625.00	1000
5	Install padmount transformer (480, 75kva, 3 phase)	1	ea.	$ 8,500.00	20	$ 125.00	$ 8,500.00	$ 2,500.00	$ 11,000.00	1500
6	Install Secondary and service entrance equipment	1	ea.	$ 4,000.00	45	$ 125.00	$ 4,000.00	$ 5,625.00	$ 9,625.00	1500
7	Install Electric Heater Feeder and Protection	1	ea.	$ 2,500.00	25	$ 125.00	$ 2,500.00	$ 3,125.00	$ 5,625.00	
						Section Total:	$ 37,500.00	$ 41,725.00	$ 79,225.00	
					Overhead:	15%	$ 5,625.00			
					Profit:	10%	$ 3,750.00			
						Total:	$ 46,875.00	$ 41,725.00	$ 88,600.00	
Nolan Center										
1	Boiler: Cleaver-Brooks HW-203 300kW	1	ea.	$ 25,000.00	80	$ 115.00	$ 25,000.00	$ 9,200.00	$ 34,200.00	1350
2	Pipe, valves, and fittings	1	lot	$ 1,000.00	40	$ 115.00	$ 1,000.00	$ 4,600.00	$ 5,600.00	500
3	Remove existing boiler & plug exhaust stack	1	lot	$ 500.00	40	$ 115.00	$ 500.00	$ 4,600.00	$ 5,100.00	
4	Primary riser	1	lot	$ 1,500.00	30	$ 125.00	$ 1,500.00	$ 3,750.00	$ 5,250.00	
5	Install Primary UG (Trench, Conduit, and cable)	250	lf	$ 16.00	85	$ 125.00	$ 4,000.00	$ 10,625.00	$ 14,625.00	1000
6	Install padmount transformer (480, 1000kva, 3 phase)	1	ea.	$ 25,000.00	45	$ 125.00	$ 25,000.00	$ 5,625.00	$ 30,625.00	9400
7	Install Secondary and service entrance equipment	1	ea.	$ 9,000.00	80	$ 125.00	$ 9,000.00	$ 10,000.00	$ 19,000.00	1500
8	Install Electric Heater Feeder and Protection	1	ea.	$ 6,000.00	80	$ 125.00	$ 6,000.00	$ 10,000.00	$ 16,000.00	
						Section Total:	$ 72,000.00	$ 58,400.00	$ 130,400.00	
					Overhead:	15%	$ 10,800.00			
					Profit:	10%	$ 7,200.00			
						Total:	$ 90,000.00	$ 58,400.00	$ 148,400.00	
Hospital										
1	Boiler: Cleaver-Brooks HW-203 360kW	1	ea.	$ 30,000.00	80	$ 115.00	$ 30,000.00	$ 9,200.00	$ 39,200.00	1350
2	Pipe, valves, and fittings	1	lot	$ 1,000.00	80	$ 115.00	$ 1,000.00	$ 9,200.00	$ 10,200.00	500
3	Remove existing boiler & plug exhaust stack	2	lot	$ 500.00	40	$ 115.00	$ 1,000.00	$ 9,200.00	$ 10,200.00	
4	Primary riser	1	lot	$ 1,500.00	30	$ 125.00	$ 1,500.00	$ 3,750.00	$ 5,250.00	
5	Install Primary UG (Trench, Conduit, and cable)	250	lf	$ 16.00	85	$ 125.00	$ 4,000.00	$ 10,625.00	$ 14,625.00	1000
6	Install padmount transformer (480, 500kva, 3 phase)	1	ea.	$ 15,000.00	45	$ 125.00	$ 15,000.00	$ 5,625.00	$ 20,625.00	4500
7	Install Secondary and service entrance equipment	1	ea.	$ 6,000.00	80	$ 125.00	$ 6,000.00	$ 10,000.00	$ 16,000.00	1500
8	Install Electric Heater Feeder and Protection	4	ea.	$ 3,500.00	80	$ 125.00	$ 14,000.00	$ 10,000.00	$ 24,000.00	
9	Remove existing Amtrol hot water makers & boiler	4	ea.	$ 125.00	6	$ 115.00	$ 500.00	$ 2,760.00	$ 3,260.00	
10	Hot Water Heater: 65 gal, 240 v. 1 phase	4	ea.	$ 656.00	10	$ 115.00	$ 2,624.00	$ 4,600.00	$ 7,224.00	
						Section Total:	$ 75,624.00	$ 74,960.00	$ 150,584.00	
					Overhead:	15%	$ 11,343.60			
					Profit:	10%	$ 7,562.40			
						Total:	$ 94,530.00	$ 74,960.00	$ 169,490.00	
High School										
1	Boiler: Cleaver-Brooks HW-361 990kW	1	ea.	$ 59,000.00	80	$ 115.00	$ 59,000.00	$ 9,200.00	$ 68,200.00	3300
2	Pipe, valves, and fittings	1	lot	$ 1,000.00	80	$ 115.00	$ 1,000.00	$ 9,200.00	$ 10,200.00	500
3	Remove existing boiler & plug exhaust stack	1	lot	$ 500.00	40	$ 115.00	$ 500.00	$ 4,600.00	$ 5,100.00	
4	Primary riser	1	lot	$ 1,500.00	30	$ 125.00	$ 1,500.00	$ 3,750.00	$ 5,250.00	
5	Install Primary UG (Trench, Conduit, and cable)	250	lf	$ 16.00	85	$ 125.00	$ 4,000.00	$ 10,625.00	$ 14,625.00	1000
6	Install padmount transformer (480, 1000kva, 3 phase)	1	ea.	$ 25,000.00	45	$ 125.00	$ 25,000.00	$ 5,625.00	$ 30,625.00	9400
7	Install Secondary and service entrance equipment	1	ea.	$ 9,000.00	80	$ 125.00	$ 9,000.00	$ 10,000.00	$ 19,000.00	1500
8	Install Electric Heater Feeder and Protection	1	ea.	$ 6,000.00	80	$ 125.00	$ 6,000.00	$ 10,000.00	$ 16,000.00	
						Section Total:	$ 106,000.00	$ 63,000.00	$ 169,000.00	
					Overhead:	15%	$ 15,900.00			
					Profit:	10%	$ 10,600.00			
						Total:	$ 132,500.00	$ 63,000.00	$ 195,500.00	

Item	Description	Quantity	Com. Type	Cost	Labor (Hr)	Cost	Material Total	Labor Total	Total	Shipping Weight (lbs)
Middle School										
1	Boiler: Cleaver-Brooks HW-204 420kW	1	ea.	$ 30,000.00	80	$ 115.00	$ 30,000.00	$ 9,200.00	$ 39,200.00	1550
2	Pipe, valves, and fittings	1	lot	$ 1,000.00	80	$ 115.00	$ 1,000.00	$ 9,200.00	$ 10,200.00	500
3	Primary riser	1	lot	$ 1,500.00	30	$ 125.00	$ 1,500.00	$ 3,750.00	$ 5,250.00	
4	Install Primary UG (Trench, Conduit, and cable)	250	lf	$ 16.00	85	$ 125.00	$ 4,000.00	$ 10,625.00	$ 14,625.00	1000
5	Install padmount transformer (480, 500kva, 3 phase)	1	ea.	$ 15,000.00	35	$ 125.00	$ 15,000.00	$ 4,375.00	$ 19,375.00	4500
6	Install Secondary and service entrance equipment	1	ea.	$ 6,000.00	60	$ 125.00	$ 6,000.00	$ 7,500.00	$ 13,500.00	1500
7	Install Electric Heater Feeder and Protection	1	ea.	$ 3,500.00	60	$ 125.00	$ 3,500.00	$ 7,500.00	$ 11,000.00	
8	Relocate Simplex day tank	1	lot	$ 750.00	40	$ 115.00	$ 750.00	$ 4,600.00	$ 5,350.00	
						Section Total:	$ 61,750.00	$ 56,750.00	$ 118,500.00	
					Overhead:	15%	$ 9,262.50			
					Profit:	10%	$ 6,175.00			
						Total:	$ 77,187.50	$ 56,750.00	$ 133,937.50	
Grade School										
1	Boiler: Cleaver-Brooks HW-204 480kW	1	ea.	$ 33,000.00	80	$ 115.00	$ 33,000.00	$ 9,200.00	$ 42,200.00	1550
2	Pipe, valves, and fittings	1	lot	$ 1,000.00	80	$ 115.00	$ 1,000.00	$ 9,200.00	$ 10,200.00	500
3	Remove existing boiler & plug exhaust stack	1	lot	$ 500.00	40	$ 115.00	$ 500.00	$ 4,600.00	$ 5,100.00	
4	Primary riser	1	lot	$ 1,500.00	30	$ 125.00	$ 1,500.00	$ 3,750.00	$ 5,250.00	
5	Install Primary UG (Trench, Conduit, and cable)	250	lf	$ 16.00	85	$ 125.00	$ 4,000.00	$ 10,625.00	$ 14,625.00	1000
6	Install padmount transformer (480, 500kva, 3 phase)	1	ea.	$ 15,000.00	35	$ 125.00	$ 15,000.00	$ 4,375.00	$ 19,375.00	4500
7	Install Secondary and service entrance equipment	1	ea.	$ 6,000.00	60	$ 125.00	$ 6,000.00	$ 7,500.00	$ 13,500.00	1500
8	Install Electric Heater Feeder and Protection	1	ea.	$ 3,500.00	60	$ 125.00	$ 3,500.00	$ 7,500.00	$ 11,000.00	
						Section Total:	$ 64,500.00	$ 56,750.00	$ 121,250.00	
					Overhead:	15%	$ 9,675.00			
					Profit:	10%	$ 6,450.00			
						Total:	$ 80,625.00	$ 56,750.00	$ 137,375.00	
Power Plant										
1	Unit Heaters:Qmark 480v, 3phase, 20kw	8	ea.	$ 1,291.52	30	$ 115.00	$ 10,332.16	$ 27,600.00	$ 37,932.16	480
2	Install Secondary Equipment	1	lot	$ 4,000.00	120	$ 125.00	$ 4,000.00	$ 15,000.00	$ 19,000.00	
3	Install panelboard, breakers, conduit, and branch circuits	1	ea.	$ 15,000.00	80	$ 125.00	$ 15,000.00	$ 10,000.00	$ 25,000.00	1500
4	Install heater feeder and protection	8	lot	$ 2,500.00	30	$ 125.00	$ 20,000.00	$ 30,000.00	$ 50,000.00	
						Section Total:	$ 49,332.16	$ 82,600.00	$ 131,932.16	
					Overhead:	15%	$ 7,399.82			
					Profit:	10%	$ 4,933.22			
						Total:	$ 61,665.20	$ 82,600.00	$ 144,265.20	
Harbor Office										
1	Installation of service drop & meter	1	lot	$ 2,500.00	60	$ 125.00	$ 2,500.00	$ 7,500.00	$ 10,000.00	1500
						Section Total:	$ 2,500.00	$ 7,500.00	$ 10,000.00	
					Overhead:	15%	$ 375.00			
					Profit:	10%	$ 250.00			
						Total:	$ 3,125.00	$ 7,500.00	$ 10,625.00	
Wrangell Municipal Light & Power Utility Upgrades										
1	Distribution Feeder Upgrade	1	ls	$ 400,000.00		$ 125.00	$ 400,000.00	$ -	$ 400,000.00	
2	Feeder Breaker Neutral CT Monitoring	1	ls	$ 60,500.00		$ 125.00	$ 60,500.00	$ -	$ 60,500.00	
3	Generator Control Interface	1	ls	$ 45,000.00		$ 125.00	$ 45,000.00	$ -	$ 45,000.00	
4	TBPA Feeder Monitoring	1	ls	$ 30,000.00		$ 125.00	$ 30,000.00	$ -	$ 30,000.00	
						Section Total:	$ 535,500.00	$ -	$ 535,500.00	
					Overhead:	0%	$ -			
					Profit:	0%	$ -			
						Total:	$ 535,500.00	$ -	$ 535,500.00	
Misc. Charges										
1	Equipment Rental	1	lot	$ 10,000.00		$ 115.00	$ 10,000.00	$ -	$ 10,000.00	
2	SCADA/Controls Modifications	1	lot		320	$ 125.00	$ -	$ 40,000.00	$ 40,000.00	500
3	Camp Days - Mechanical	210	days	$ 200.00		$ 125.00	$ 42,093.35	$ -	$ 42,093.35	
4	Camp Days - Electrical/Controls	355	days	$ 200.00		$ 125.00	$ 71,050.02	$ -	$ 71,050.02	
5	Travel	1	lot	$ 15,000.00		$ 125.00	$ 15,000.00	$ -	$ 15,000.00	
						Section Total:	$ 138,143.37	$ 40,000.00	$ 178,143.37	
					Overhead:	15%	$ 20,721.50			
					Profit:	10%	$ 13,814.34			
						Total:	$ 172,679.21	$ 40,000.00	$ 212,679.21	
								Total (Sections):	$ 2,045,741.91	80860
						Shipping Cost per lb	$ 0.35		$ 28,301.00	
						Prime Overhead:	15%		$ 306,861.29	
						Prime Profit:	10%		$ 204,574.19	
						Contingency:	**30%**		$ 613,722.57	
								Grand Total:	**$ 3,199,200.96**	