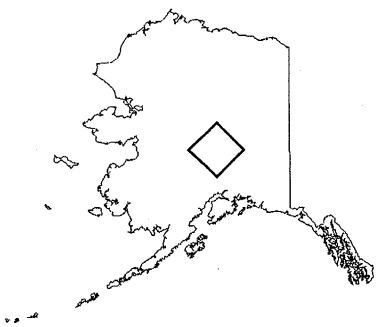
Copper River School District



Chistochina
Copper Center
Gakona
Glennallen
Kenny Lake
Slana

Office of the Superintendent
P.O. Box 108
Glennallen, AK 99588
(907) 822-3234 ext. 223
(907) 822-3949 fax

May 31, 2007

Mr. Robert A. Wilkinson, Chief Executive Officer
Copper Valley Electric Association
Post Office Box 45
Glennallen, Alaska 99588-0045

Dear Mr. Wilkinson:

Please find enclosed a copy of the *Glennallen School Recovered Heat Study.* This study was done by Coffman Engineers for the Copper River School District. Following our meeting this spring, we agreed to keep an open dialogue between our two organizations regarding waste heat, the economic feasibility of using same from the CVEA Glennallen Plant to heat the Glennallen Schools, and, if persuaded mutually of said feasibility, the cooperative procurement of capital funds to finance such a project.

Although the Coffman Engineers' study raises questions about whether a waste heat recovery project makes economic sense, given its costs-benefit analysis, I am hopeful that their study will serve as a basis of further discussions between us.

After you have reviewed the report, I shall be pleased to participate with you in another meeting to decide what course of action, if any, would be in our organizations' mutual best interests.

Yours truly,

James W. Elliott, Ph. D.
Superintendent

GLENNALLEN SCHOOL
RECOVERED HEAT STUDY

PREPARED FOR

COPPER RIVER SCHOOL DISTRICT

May 11, 2007

PREPARED BY

COFFMAN ENGINEERS
800 F Street
Anchorage, Alaska
907•276•6664 (Phone)
907•276•5042 (Fax)

GLENNALLEN SCHOOL
RECOVERED HEAT STUDY

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GLENNALLEN SCHOOL
RECOVERED HEAT STUDY

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EXECUTIVE SUMMARY

This preliminary study evaluates the feasibility of installing a heat recovery system at the Copper Valley Electric Association (CVEA) power plant located in Glennallen, Alaska for the purpose of providing supplemental heat for the Glennallen School. If determined to be feasible, the result would reduce the cost of heating oil for the Glennallen School. The feasibility of implementing a recovered heat system is dependent on four fundamental factors as follows:

1. The quantity of recoverable heat at the CVEA power plant in Glennallen.
2. The cost of installation of the recovery system and integrating it with the school's heating plants.
3. The cost of the recovered heat as negotiated with CVEA.
4. The reduction in fuel oil costs.

This study evaluates the costs and savings based on a simple payback method. This preliminary evaluation is meant to give the Copper Valley School District (CVSD) the basic information in order to determine if a more detailed comprehensive economic analysis is warranted. In order to move ahead with a valid, detailed economic analysis several key issues and must be resolved and technical input data must be formulated. Some of the items that must be quantified for input into a comprehensive economic analysis include the following:

- Source, timing and restrictions of capital for the installation of the system.
- Negotiated cost of the recovered heat from CVEA ($/million BTUH).
- Length of negotiated contract with CVEA.
- Future utilization factors of the CVEA Glennallen power plant.

For the purposes of this study we have used information from the CVEA with regard to quantity of recoverable heat from the power plant. The heating oil consumption history for the school has been provided by the CVSD. A conceptual construction cost estimate has been prepared based on the best assumptions available as to the most effective system. The projected system installation cost is approximately $ 2,080,000. The annual heating cost reduction is estimated to be approximately $155,000. Average fuel oil cost has been projected to be approximately $3.57 per gallon over the next 20 years based on a 5% escalation rate. The above information yields a simple payback of approximately 18 years based on the assumptions used for this study.

For the details related to the above summary, please see the body of this report.

INTRODUCTION

The scope of this study includes a preliminary evaluation of the feasibility of recovering heat from the Copper Valley Electric Association (CVEA) power plant located in Glennallen, Alaska. The recipient of this heat would be the Glennallen Elementary and High Schools. The purpose of this study is to determine the economic feasibility of heating the school buildings with this recovered heat.

The CVEA power plant is essentially a peaking plant and the grid that it is connected to receives most of its power from more economically feasible sources such as hydroelectric generation and co-generation systems located elsewhere on the CVEA grid. The current operation of the Glennallen plant can provide approximately 2 million BTU's per hour of recoverable heat. There are times when there is more capacity; however, there are also times when the output is 0. The best projection of the average available heat is being utilized for this evaluation is 2 million BTU's per hour. The source of this recovered heat is from the cooling water jackets of the engines driving the generators.

A piping loop between the power plant and the school complex will need to be installed in order to transport the heat. Pumps, heat exchangers and a control system will also be required for a complete transport system. In order to utilize the transported heat at the school, the piping loop will need to be extended to the various boiler rooms and connected to the heating piping systems within the school.

When the new elementary school addition is completed there will be a total of 12 boilers located in 5 boiler rooms. The boiler rooms are located in three separate buildings including the existing elementary school, the high school and the vocational shop building. The basis for the cost estimate supporting this evaluation is for a system that will convey 2 million BTU per hour during normal operation, with adequate reserve to convey up to 2.5 million BTU per hour.

AVAILABLE HEAT FROM THE CVEA POWER PLANT

The CVEA Glennallen plant operates approximately 6,000 hours annually out of a maximum of 8,760 total possible hours [24/7/365] this represents a downtime of approximately 30%. The downtime accounts for maintenance and periods when the diesel plant is not needed for peaking. As indicated above, the projected heat recovery system is assumed to recover of 2 million BTU per hour.

When the plant is in operation the available heat can be transported to the school by an interconnecting piping loop. However, the plant is sometimes not in operation for several days at a time during the winter heating season. During the periods when the power plant is not in operation there will be no heat to put into the loop. The piping loop will be protected with a glycol antifreeze solution to prevent damage in the event that it looses heat during cold winter weather. The loop should not be allowed to go 'cold', even with the glycol antifreeze solution, as it would be subjected to excessive cycles of expansion and contraction. There would also be and difficulties in starting up the long cold loop due the thickening of the glycol solution when it gets cold, making it difficult to start pumping. Since the loop must be kept warm, heat will have

to be added at the school's end of the loop to keep the loop warm. This heating of the loop will cause the expenditure of energy and some additional fuel consumption by the boilers in the school complex.

HEATING FUEL CONSUMPTION AND COST

The current fuel consumption for the entire Glennallen School complex is 55,800 gallons annually based on the average for the last 3 years. The current fuel cost is $2.10 per gallon with a current total annual cost of $117,200. The heating fuel is number 1 arctic grade fuel oil. These historic records do not include the fuel consumption for the yet to be constructed elementary school wing. With the addition of the new elementary school wing and the demolition of the old elementary school the projected future fuel consumption is estimated to be 60,000 gallons annually.

SYSTEM DESCRIPTION

The proposed system, as utilized for this study, consists of the connection of a 4-inch buried piping loop between the CVEA power plant and 3 selected boiler rooms in the school complex. The bulk of the piping loop would be buried due to the need to cross roadways and parking lots as well to protect it from damage. Portions of the piping at the school end of the system would be located above grade, under the school structure. The piping would be an arctic pipe system consisting of a welded 4" steel inner carrier pipe. The insulation would be 3" thick high efficiency foam, which would in turn be protected by an outer jacket of high density polyethylene (HDPE). The piping system will be fitted with expansion loops or flexible fittings to allow for the required thermal expansion of the pipes due to changes of temperature.

The piping will be buried with an earth cover of approximately 3 feet. The routing of the piping will utilize areas that are not currently paved or landscaped to the greatest extent possible. See the attached aerial image for the projected routing of the piping, which is contained in Appendix B.

Circulating pumps, a heat exchanger and a BTU meter will be located in a small pump building adjacent to the CVEA end of the loop. The pump building would be a pre-engineered structure with dimensions of approximately 16 feet by 12 feet and constructed on a concrete slab. Each of the primary loop circulating pumps will be sized for the full flow of the system with a second identical backup pump in order to provide 100% redundancy. The primary pumps will be driven by variable frequency drives for control of the system loop temperature and to conserve energy by reducing the flow to balance with available heat from the power plant and the school system's heating requirements.

An additional set of small pumps will also be located in the pumphouse. This set of pumps will provide minimum flow in the piping loop to maintain minimum circulation and heat in the loop during periods when the power plant is not in operation. The pumps will be equipped with variable speed drives to optimize the flow and temperature in the loop during the periods that the power plant is not in operation.

The pumphouse will also house a plate and frame heat exchanger to isolate the power plant from the interconnection loop. The isolation is necessary to prevent the loss of engine coolant in the event that the pipe loop were to be damaged and leak coolant. The BTU meter will measure the actual amount of heat that is being transported from the power plant to the school.

At the school end of the system there will be additional heat exchangers at each boiler room to isolate the piping loop from the school's heating system for protection due to possible leaks. A single, constant speed pump will be added at the link between the heat exchanger and the individual heating loops within the school, at each boiler room. The pumped link from the new heat exchanger in the school will provide heat to the return heating water from the school, prior to entering the boilers. This will extract the largest amount of heat possible from the recovered heat loop and will only need to be supplemented by the boiler if the temperature is too low to heat the building.

Supply water temperature from the power plant will be approximately 180 degrees F and will return at approximately 160 degrees. The recovered heat link at the school's boiler rooms will be controlled to run only when the water is warm enough to add heat to the building return water system, upstream from the boilers. A supplemental heat system will be provided in selected boiler rooms to provide heat to the loop to the power plant from the school boiler system when the power plant is off line and the loop requires heat. During these required supplemental heat time periods the loop would be maintained at approximately 80 to 100 degrees.

A glycol/water feed system will also be located at the school end of the loop, for replenishing glycol heat transfer fluid in the system. Expansion tanks serving the primary loop will also be located in the school complex. Please see the diagrams located in Appendix B for a further description of the potential system configuration.

HEATING FUEL CONSUMPTION AND COST

The average fuel consumption for the entire Glennallen School complex is currently 55,800 gallons annually, based on the average for the last 3 years. The heating fuel is number 1 arctic grade fuel oil. These historic records do not include the fuel consumption for the yet to be constructed elementary school wing. With the addition of the new elementary school wing and the demolition of the old elementary school the projected future fuel consumption is estimated to be 60,000 to 65,000 gallons annually.

The current fuel cost is $2.10 per gallon with a current total annual cost of $117,200. Projecting the future cost of heating fuel is very difficult, for the purposes of this study we have escalated the cost of fuel at 5% per year and are using the average of that fuel cost over the 20 year period for the simple payback.

ECONOMICS ANALYSIS

In order to accommodate items that are either unknown or difficult to determine at this time the following assumptions have been made.

1. Average recoverable heat from the CVEA plant is 2 million BTU per hour when the plant is in operation.
2. The CVEA plant is not in operation approximately 30% of the time.
3. Fuel oil cost is currently $2.10/gallon with an escalation of 5%/year yields an average present cost of $3.57 /gallon over a 20 year period.
4. Annual maintenance costs are 1/2% of the first cost of the system and escalate at 5% per year for a 20 year period.
5. The energy cost for operating the pumps is currently $0.21/kw including demand charges. Escalating the electrical power costs at 5% /year yields a present value cost of approximately $0.36/kw over a 20 year period.
6. The actual dollar savings by the school would be decreased by the amount charged by CVEA for the BTU's delivered to the school. A common method for sharing the installation costs and savings is some method of sharing the installation costs and sharing the savings between CVEA and the CRSD. Since there is no contract in place it is not possible to determine what the shared percentages of cost and savings would be. For this analysis the simple payback assumes that a single entity would pay for the system installation as well as recover the entire potential savings.

The following table represents the average available recoverable heat from the CVEA plant, the amount of heat that can be utilized in heating the school, as well as the savings in oil consumption and the related dollar value of that savings. The payback analysis takes into consideration the cost of energy to operate the various pumps related to the heat recovery system. The analysis also considers the annual maintenance costs related to the heat recovery system.

TABLE 1 - SAVINGS AND PAYBACK ANALYSIS

MONTH	AVE Kw/Hr GENERATED BY CVEA	AVERAGE BTU/Hr OUTPUT FROM CVEA	AVERAGE USABLE BTU/Hr AT SCHOOL	TOTAL USABLE BTU/MONTH AT SCHOOL [1]	EQUIV. GALLONS OF OIL [2]	TOTAL SAVING GALLONS [3]	TOTAL SAVINGS [4]
JAN	1,816	3,632,000	1,800,000	1,339,200,000	12,779	8,945	$31,934
FEB	2,294	4,588,000	1,600,000	1,075,200,000	10,260	7,182	$25,639
MAR	775	1,550,000	900,000	669,600,000	6,389	4,473	$15,967
APR	1,764	3,528,000	750,000	540,000,000	5,153	3,607	$12,877
MAY	828	1,656,000	250,000	186,000,000	1,775	1,242	$4,435
JUN	110	220,000	100	72,000	1	0	$2
JUL	5	10,000	100	74,400	1	0	$2
AUG	161	322,000	100	74,400	1	0	$2
SEP	135	270,000	270,000	194,400,000	1,855	1,298	$4,636
OCT	505	1,010,000	800,000	595,200,000	5,679	3,976	$14,193
NOV	6,220	12,440,000	1,200,000	864,000,000	8,244	5,771	$20,602
DEC	2,174	4,348,000	1,800,000	1,339,200,000	12,779	8,945	$31,934
TOTAL ANNUAL	16,787	33,574,000	9,370,300	6,803,020,800	64,914	45,440	$162,221

Notes:
[1] This is the quantity of heat that the school requires in BTU's
[2] Quantity of oil required to heat the school buildings (equivalent to the BTU's listed above)
[3] The savings in fuel consumption that can be realized due to the 30% shutdown of the CVEA powerplant for maintenance or no need for peaking of generation due to use of hydroelectric generation or cogeneration.
[4] The $ savings related to the fuel savings

PAYBACK ANALYSIS			
CONSTRUCTION COST – SEE DETAILED COST ESTIMATE IN APPENDIX	$1,890,900		
DESIGN FEE AT 10% OF CONSTRUCTION COST	$189,090		
TOTAL FIRST COST		$2,079,990	
VALUE OF FUEL SAVED	$162,221		
ANNUAL PUMPING COSTS	($35,380)		
ANNUAL MAINTENANCE COST	($14,040)		
NET ANNUAL OIL SAVINGS		$112,801	
SIMPLE PAYBACK IN YEARS			**18.4**

CONCLUSION

The simple payback is excessively long to recommend proceeding with this project from a purely economic standpoint. Typically a contract will be negotiated with the utility company for the purchase of the recovered power. Until such an agreement is in place with CVEA it is not possible to project who pays for the installation of the recovered heat system and benefits from the savings.

Other consideration for sources of capital for construction of the project such as grants or other alternate funding may be available that could change the attractiveness of the project. More detailed and sophisticated methods of economic analysis may also provide a more comprehensive approach with differing results and conclusions.

The final economic considerations will natural be impacted by the method of partnering between the CVEA and the CRSD will impact the decision making process concerning the feasibility of a recovered heat project. In some cases the utility may install the heating piping loop to a point just outside the school and the user will extend the piping from that point to the point of use inside the building. The recovered heat might then be sold to the school at one half the equivalent cost of the amount of the fuel oil that would be consumed to produce the same amount of heat. Until a preliminary agreement is reached between the CRSD and the CVEA it is not possible to include related factors in an economic analysis.

APPENDIX A

COST ESTIMATE

COPPER RIVER SCHOOL DISTRICT

GLENNALLEN SCHOOL
RECOVERED HEAT STUDY

CONCEPTUAL CONSTRUCTION
COST ESTIMATE
MAY 2007

Preparation Date: 05/10/07

GLENNALLEN SCHOOL
RECOVERED HEAT STUDY
COPPER RIVER SCHOOL DISTRICT

CONCEPTUAL CONSTRUCTION COST ESTIMATE - MAY 10, 2007

STUDY PREPARED FOR: COPPER RIVER SCHOOL DISTRICT

STUDY BY: COFFMAN ENGINEERS, INC, ANCHORAGE
BILL McNEAL, P.E., PRINCIPAL-IN-CHARGE - 907-276-6664

ESTIMATE: ALASKA CONSTRUCTION MANAGEMENT, INC., ANCHORAGE
RONN RASMUSSEN, CONSTRUCTION COST CONSULTANT - 907-258-4326

ESTIMATE DESCRIPTION

THIS REPORT IS THE CONCEPTUAL CONSTRUCTION COST ESTIMATE (05-10-07) PART OF AN ENGINEERING STUDY TO EVALUATE THE FEASIBILITY OF INSTALLING A HEAT RECOVERY SYSTEM AT THE COPPER VALLEY ELECTRIC ASSOCIATION POWER PLANT IN GLENNALLEN, ALASKA FOR THE PURPOSE OF PROVIDING HEAT TO THE GLENNALLEN SCHOOL.

THE ESTIMATE IS BASED ON SCHEMATIC DRAWINGS, NARRATIVES AND DISCUSSIONS WITH THE PROJECT DESIGN ENGINEER DURING THE PERIOD ENDING MAY 9, 2007.

RR/ACMI 05-10-07

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Eff. Date 05/10/07 PROJECT 07233: GLENNALLEN SCHOOL - RECOVERED HEAT STUDY
CONCEPTUAL CONSTRUCTION ESTIMATE 05-10-07
** PROJECT DIRECT SUMMARY - TOTAL (Rounded to 100's) **

	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST
10 NEW PUMPHOUSE ADJACENT TO CVEA	1,500	114,700	192,700	37,600	345,000
20 HEAT SUPPLY & RETURN PIPELINES	2,500	147,400	324,300	66,500	538,200
30 BOILER ROOM MODIFICATIONS	700	64,400	110,500	53,000	227,900
TOTAL GLENNALLEN SCHOOL DISTRICT	4,700	326,500	627,400	157,000	1,111,000
GENERAL CONDITIONS					172,400
SUBTOTAL					1,283,500
HOME OFFICE EXPENSE (8%)					102,700
SUBTOTAL					1,386,100
PROFIT (12%)					166,300
SUBTOTAL					1,552,500
BOND (1.5%)					23,300
TOTAL INCL INDIRECTS					1,575,800
CONTINGENCY (20%)					315,200
TOTAL INCL OWNER COSTS					**$1,890,900**

	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST
10 NEW PUMPHOUSE ADJACENT TO CVEA					
10.01 BUILDING CONSTRUCTION					
10.01.01 BUILDING FOUNDATION & SLAB	400	21,900	14,800	0	36,800
10.01.02 EXTERIOR CLOSURE	100	6,400	13,300	0	19,600
10.01.03 ROOF STRUCTURE & ROOFING	100	7,500	5,600	0	13,100
10.01.04 INTERIOR CONSTRUCTION/FINISHES	100	3,000	2,000	0	5,000
10.01.05 PLUMBING & HVAC	100	7,100	0	13,300	20,300
10.01.06 BUILDING POWER & LIGHTING	200	19,000	0	24,300	43,300
TOTAL BUILDING CONSTRUCTION	900	64,800	35,700	37,600	138,100
10.02 PROCESS MECHANICAL					
10.02.01 PROCESS PIPING	100	8,800	14,700	0	23,600
10.02.02 PRIMARY HEAT EXCHANGER	100	7,100	22,100	0	29,200
10.02.03 CIRCULATING PUMPS	100	10,600	29,500	0	40,100
10.02.04 BTU METER	0	2,100	7,400	0	9,500
10.02.05 BASIC MATERIALS & METHODS	200	15,900	15,500	0	31,400
TOTAL PROCESS MECHANICAL	500	44,600	89,200	0	133,800
10.03 CONTROL SYSTEMS					
10.03.01 MOTOR CONTROL PANEL & VFDs	0	3,500	18,400	0	22,000
10.03.02 CONTROL VALVE & PROCESS CONTROLS	0	1,700	49,400	0	51,100
TOTAL CONTROL SYSTEMS	100	5,200	67,900	0	73,100
TOTAL NEW PUMPHOUSE ADJACENT TO CVEA	1,500	114,700	192,700	37,600	345,000
20 HEAT SUPPLY & RETURN PIPELINES					
20.01 CLEAR & STRIP RIGHT OF WAY					
20.01.01 SITE SURVEY & AS-BUILDS	0	0	0	24,600	24,600
20.01.02 STRIP AREA WITHIN LIMITS	0	0	0	9,400	9,400
20.01.03 PAVEMENT SAWCUT & PATCH	100	4,800	4,000	22,500	31,300
TOTAL CLEAR & STRIP RIGHT OF WAY	100	4,800	4,000	56,500	65,300
20.02 BELOW GRADE PIPING					
20.02.01 TRENCH EXCAVATION	300	18,900	12,300	0	31,200
20.02.02 ARCTIC PIPE - BELOW GRADE	800	45,000	191,300	0	236,300

	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST
20.02.03 BOARD INSULATION	100	3,800	20,100	0	23,900
20.02.04 TRENCH BACKFILL & COMPACTION	400	24,000	4,000	0	28,000
20.02.05 LANDSCAPING	0	0	0	10,000	10,000
TOTAL BELOW GRADE PIPING	1,500	91,700	227,600	10,000	329,300
20.03 ABOVE GROUND PIPING					
20.03.01 ARCTIC PIPE - UNDER FLOORS	600	36,000	67,600	0	103,600
20.03.02 BRANCH PIPING TO BOILER ROOMS	300	15,000	25,000	0	40,000
TOTAL ABOVE GROUND PIPING	900	51,000	92,600	0	143,600
TOTAL HEAT SUPPLY & RETURN PIPELINES	2,500	147,400	324,300	66,500	538,200
30 BOILER ROOM MODIFICATIONS					
30.01 ELEMENTARY SCHOOL BOILER ROOM					
30.01.01 SECONDARY HEAT EXCHANGER	0	2,100	7,400	0	9,500
30.01.02 PROCESS PIPING	100	4,400	7,400	0	11,800
30.01.03 CIRCULATING PUMP	0	3,500	5,900	0	9,400
30.01.04 ELECTRICAL	0	2,800	1,500	0	4,300
30.01.05 CONTROLS	0	0	0	10,600	10,600
TOTAL ELEMENTARY SCHOOL BOILER ROOM	100	12,900	22,100	10,600	45,600
30.02 NEW SCHOOL ADDITION BOILER ROOM					
30.02.01 SECONDARY HEAT EXCHANGER	0	2,100	7,400	0	9,500
30.02.02 PROCESS PIPING	100	4,400	7,400	0	11,800
30.02.03 CIRCULATING PUMP	0	3,500	5,900	0	9,400
30.02.04 ELECTRICAL	0	2,700	1,400	0	4,100
30.02.05 CONTROLS	0	0	0	10,600	10,600
TOTAL NEW SCHOOL ADDITION BOILER ROOM	100	12,800	22,000	10,600	45,400
30.03 HIGH SCHOOL BOILER ROOM #1					
30.03.01 SECONDARY HEAT EXCHANGER	0	2,100	7,400	0	9,500
30.03.02 PROCESS PIPING	100	4,400	7,400	0	11,800
30.03.03 CIRCULATING PUMP	0	3,500	5,900	0	9,400
30.03.04 ELECTRICAL	0	2,800	1,500	0	4,300
30.03.05 CONTROLS	0	0	0	10,600	10,600
TOTAL HIGH SCHOOL BOILER ROOM #1	100	12,900	22,100	10,600	45,600

	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST
30.04 HIGH SCHOOL BOILER ROOM #2					
30.04.01 SECONDARY HEAT EXCHANGER	0	2,100	7,400	0	9,500
30.04.02 PROCESS PIPING	100	4,400	7,400	0	11,800
30.04.03 CIRCULATING PUMP	0	3,500	5,900	0	9,400
30.04.04 ELECTRICAL	0	2,800	1,500	0	4,300
30.04.05 CONTROLS	0	0	0	10,600	10,600
TOTAL HIGH SCHOOL BOILER ROOM #2	100	12,900	22,100	10,600	45,600
30.05 SHOP BUILDING BOILER ROOM					
30.05.01 SECONDARY HEAT EXCHANGER	0	2,100	7,400	0	9,500
30.05.02 PROCESS PIPING	100	4,400	7,400	0	11,800
30.05.03 CIRCULATING PUMP	0	3,500	5,900	0	9,400
30.05.04 ELECTRICAL	0	2,800	1,500	0	4,300
30.05.05 CONTROLS	0	0	0	10,600	10,600
TOTAL SHOP BUILDING BOILER ROOM	100	12,900	22,100	10,600	45,600
TOTAL BOILER ROOM MODIFICATIONS	700	64,400	110,500	53,000	227,900
TOTAL GLENNALLEN SCHOOL DISTRICT	4,700	326,500	627,400	157,000	1,111,000
GENERAL CONDITIONS					172,400
SUBTOTAL					1,283,500
HOME OFFICE EXPENSE (8%)					102,700
SUBTOTAL					1,386,100
PROFIT (12%)					166,300
SUBTOTAL					1,552,500
BOND (1.5%)					23,300
TOTAL INCL INDIRECTS					1,575,800
CONTINGENCY (20%)					315,200
TOTAL INCL OWNER COSTS					**$1,890,900**

** CONTRACTOR MARKUPS **

	PERCENT
GC GENERAL CONTRACTOR	
GENERAL CONDITIONS - SEE PROJECT DISTRIBUTED COSTS	
HOME OFFICE EXPENSE (8%)	8.00
PROFIT (12%)	12.00
BOND (1.5%)	1.50
SV SURVEYOR	
GENERAL CONDITIONS	5.00
HOME OFFICE EXPENSE	5.00
PROFIT	10.00
BOND	1.50
ME BUILDING MECHANICAL SUB	
GENERAL CONDITIONS	20.00
HOME OFFICE EXPENSE	10.00
PROFIT	10.00
BOND	1.50
EL BUILDING ELECTRICAL SUB	
GENERAL CONDITIONS	20.00
HOME OFFICE EXPENSE	10.00
PROFIT	10.00
BOND	1.50
CN CONTROLS SUBCONTRACTOR	
GENERAL CONDITIONS	15.00
HOME OFFICE EXPENSE	10.00
PROFIT	10.00
BOND	1.50

GENERAL CONTRACTOR	QUANTY	UOM	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST	UNIT COST
GENERAL CONTRACTOR								
PROJECT PERSONNEL								
Field Superintendent	16.00	WK	0.00 0	2000.00 32,000	0.00 0	0.00 0	2000.00 32,000	2000.00
Project Manager. General contractor's executive oversight	4.00	MO	0.00 0	2500.00 10,000	0.00 0	0.00 0	2500.00 10,000	2500.00
Project Engineer/ Quality Control/ Inspections. Budget allowance for job personnel assigned to project engineering, scheduling, submittals, expediting, and quality control.	1.00	JOB	0.00 0	15000.00 15,000	0.00 0	0.00 0	15000.00 15,000	15000.00
TOTAL PROJECT PERSONNEL			0	57,000	0	0	57,000	
FIELD OFFICE & EQUIPMENT								
General Contractor's Field Office	3.00	MO	0.00 0	0.00 0	1500.00 4,500	0.00 0	1500.00 4,500	1500.00
Office supplies	3.00	MO	0.00 0	0.00 0	500.00 1,500	0.00 0	500.00 1,500	500.00
Office equipment	3.00	MO	0.00 0	0.00 0	500.00 1,500	0.00 0	500.00 1,500	500.00
Expense for telephone, fax, cell phones, Internet	3.00	MO	0.00 0	0.00 0	750.00 2,250	0.00 0	750.00 2,250	750.00
TOTAL FIELD OFFICE & EQUIPMENT			0	0	9,750	0	9,750	
TEMPORARY UTILITIES								
Project electricity. Hookups and expense. Budget allowance.	3.00	MO	0.00 0	0.00 0	1000.00 3,000	0.00 0	1000.00 3,000	1000.00
Latrines	3.00	MO	0.00 0	0.00 0	400.00 1,200	0.00 0	400.00 1,200	400.00
TOTAL TEMPORARY UTILITIES			0	0	4,200	0	4,200	

GENERAL CONTRACTOR	QUANTY	UOM	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST	UNIT COST
SUBMITTALS & REPORTS								
Shop drawings, records and as-builds expense	1.00	JOB	0.00 0	0.00 0	1000.00 1,000	0.00 0	1000.00 1,000	1000.00
General testing: Concrete, soils, etc. Allowance.	1.00	JOB	0.00 0	0.00 0	0.00 0	2500.00 2,500	2500.00 2,500	2500.00
Photographs, reproduction expense, etc.	1.00	JOB	0.00 0	0.00 0	1000.00 1,000	0.00 0	1000.00 1,000	1000.00
TOTAL SUBMITTALS & REPORTS			0	0	2,000	2,500	4,500	
SMALL TOOLS & CONSUMABLES								
Small tools - Purchase/Rental	3.00	MO	0.00 0	0.00 0	1500.00 4,500	0.00 0	1500.00 4,500	1500.00
Safety Supplies	1.00	JOB	0.00 0	0.00 0	500.00 500	0.00 0	500.00 500	500.00
TOTAL SMALL TOOLS & CONSUMABLES			0	0	5,000	0	5,000	
PROJECT EQUIPMENT								
Budget allowance for General Contractor's project equipment including pickup trucks, job trucks, forklifts, welding equipment and supplies, backhoes and excavators, rigging, compactors, etc. Includes fuel, oil, and grease.	3.00	MO	0.00 0	0.00 0	15000.00 45,000	0.00 0	15000.00 45,000	15000.00
TOTAL PROJECT EQUIPMENT			0	0	45,000	0	45,000	
PROJECT FREIGHT								
Budget allowance for project freight, i.e. transport of materials and equipment to and from jobsite. Includes general mobilization and demobilization expenses.	1.00	JOB	0.00 0	0.00 0	20000.00 20,000	0.00 0	20000.00 20,000	20000.00
TOTAL PROJECT FREIGHT			0	0	20,000	0	20,000	

GENERAL CONTRACTOR	QUANTY UOM	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST	UNIT COST
MATERIALS HANDLING & STORAGE							
Budget allowance offloading and temporarily storing construction materials at the jobsite prior to installation.	100.00 MH	0.00 0	50.00 5,000	0.00 0	0.00 0	50.00 5,000	50.00
TOTAL MATERIALS HANDLING & STORAGE		0	5,000	0	0	5,000	
PROJECT MAINTENANCE							
Final cleanup and punch list expense.	80.00 MH	0.00 0	50.00 4,000	0.00 0	0.00 0	50.00 4,000	50.00
TOTAL PROJECT MAINTENANCE		0	4,000	0	0	4,000	
SUBSISTENCE & CAMP							
Local room and board for general contractor's field personnel during construction. Assume room and board for subcontractor personnel is included in their markups.	180.00 MD	0.00 0	0.00 0	100.00 18,000	0.00 0	100.00 18,000	100.00
TOTAL SUBSISTENCE & CAMP		0	0	18,000	0	18,000	
TOTAL Overhead Items - GC		0	66,000	103,950	2,500	172,450	

BUILDING CONSTRUCTION	QUANTY UOM	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST	UNIT COST
NEW PUMPHOUSE ADJACENT TO CVEA							
BUILDING CONSTRUCTION							
BUILDING FOUNDATION & SLAB							
Saw cut, remove and dispose of existing asphalt paving at the site of the new pump house adjacent to the existing CVEC power plant. Allowance.	500.00 SF	0.05 25	3.00 1,500	1.00 500	0.00 0	4.00 2,000	4.00
Pumphouse building structural excavation.	75.00 CY	0.50 38	30.00 2,250	15.00 1,125	0.00 0	45.00 3,375	45.00
Pumphouse building foundation NFS backfill and compaction	60.00 CY	0.70 42	42.00 2,520	50.00 3,000	0.00 0	92.00 5,520	92.00
Continuous concrete footings	60.00 LF	0.75 45	45.00 2,700	25.00 1,500	0.00 0	70.00 4,200	70.00
Foundation concrete walls and perimeter board insulation.	60.00 LF	3.00 180	180.02 10,801	125.00 7,500	0.00 0	305.02 18,301	305.02
Slab on grade, including housekeeping and equipment pads.	200.00 SF	0.18 36	10.80 2,160	6.00 1,200	0.00 0	16.80 3,360	16.80
TOTAL BUILDING FOUNDATION & SLAB		366	21,931	14,825	0	36,756	
EXTERIOR CLOSURE							
Pumphouse exterior walls, including structural framing, insulation and vapor barrier, exterior siding, and interior wall sheathing.	750.00 SF	0.12 90	7.20 5,400	15.00 11,250	0.00 0	22.20 16,650	22.20
Exterior personnel door and frame including finish hardware.	1.00 EA	16.00 16	960.00 960	2000.00 2,000	0.00 0	2960.00 2,960	2960.00
TOTAL EXTERIOR CLOSURE		106	6,360	13,250	0	19,610	
ROOF STRUCTURE & ROOFING							
Roof structural framing including insulation and vapor barrier.	250.00 SF	0.25 63	15.00 3,750	7.50 1,875	0.00 0	22.50 5,625	22.50

BUILDING CONSTRUCTION	QUANTY UOM	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST	UNIT COST
Roof coverings, e.g. standing seam metal roofing, trim and flashings.	250.00 SF	0.25 63	15.00 3,750	15.00 3,750	0.00 0	30.00 7,500	30.00
TOTAL ROOF STRUCTURE & ROOFING		125	7,500	5,625	0	13,125	
INTERIOR CONSTRUCTION/FINISHES							
Budget allowance for miscellaneous interior construction, trim, painting, etc.	200.00 SF	0.25 50	15.00 3,000	10.00 2,000	0.00 0	25.00 5,000	25.00
TOTAL INTERIOR CONSTRUCTION/FINISHES		50	3,000	2,000	0	5,000	
PLUMBING & HVAC							
Budget allowance for floor drains, domestic water piping, if required, etc.	200.00 SF	0.20 40	12.00 3,537	0.00 0	20.00 5,895	32.00 9,432	47.16
Budget allowance for interior building heating and ventilating systems, e.g. unit heater, exhaust fans, etc.	200.00 SF	0.20 40	12.00 3,537	0.00 0	25.00 7,369	37.00 10,906	54.53
TOTAL PLUMBING & HVAC		80	7,074	0	13,264	20,338	
BUILDING POWER & LIGHTING							
Budget allowance for service entrance including tie-in to existing power (assumed nearby at CVEC power plant). Includes feeder conductors, conduit, weather head or equivalent, safety/disconnect switch, meter base, etc.	1.00 LS	120.48 120	7228.92 10,654	0.00 0	10000 14,738	17228.92 25,392	25391.63
Electrical secondary service and distribution panel board including circuit breakers.	1.00 EA	23.98 24	1438.85 2,121	0.00 0	3000.00 4,421	4438.85 6,542	6541.89
Budget allowance for interior branch electrical conduit, wire, receptacles, wiring devices, equipment connections, etc.	200.00 SF	0.20 40	12.00 3,537	0.00 0	10.00 2,948	22.00 6,485	32.42

BUILDING CONSTRUCTION	QUANTY	UOM	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST	UNIT COST
Budget allowance for interior and exterior lighting including conduit, wire, light fixtures, switches.	200.00	SF	0.15 30	9.00 2,653	0.00 0	7.50 2,211	16.50 4,863	24.32
TOTAL BUILDING POWER & LIGHTING			214	18,964	0	24,317	43,282	
TOTAL BUILDING CONSTRUCTION			941	64,829	35,700	37,581	138,111	

PROCESS MECHANICAL	QUANTY UOM	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST	UNIT COST
PROCESS MECHANICAL							
PROCESS PIPING							
Piping tie-ins between the cooling water lines at the CVEA power plant and the new primary heat exchanger in the new pump house. Assume 4" schedule 40 steel pipe, insulated and jacketed,, including fittings, pipe supports and hangers, building penetration seals, etc. Budget allowance. Assume nominal 50 LF of 2 runs of supply and return piping.	100.00 LF	1.00 100	60.00 8,843	100.00 14,738	0.00 0	160.00 23,580	235.80
TOTAL PROCESS PIPING		100	8,843	14,738	0	23,580	
PRIMARY HEAT EXCHANGER							
Primary plate and frame heat exchanger HX-6. Budget allowance. Includes equipment, insulation and ancillary materials.	1.00 EA	80.00 80	4800.00 7,074	15000.00 22,107	0.00 0	19800.00 29,181	29180.84
TOTAL PRIMARY HEAT EXCHANGER		80	7,074	22,107	0	29,181	
CIRCULATING PUMPS							
Primary circulating pumps P-1 and P-2. Assume 20 HP. Includes pumps, mountings, connecting piping and valves.	2.00 EA	40.00 80	2400.00 7,074	8000.00 23,580	0.00 0	10400.00 30,655	15327.31
Secondary circulating pumps P-8 and P-9. Assume 2 HP. Includes pumps, mountings, connecting piping and valves.	2.00 EA	20.00 40	1200.00 3,537	2000.00 5,895	0.00 0	3200.00 9,432	4716.10
TOTAL CIRCULATING PUMPS		120	10,611	29,476	0	40,087	

PROCESS MECHANICAL	QUANTY UOM	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST	UNIT COST
BTU METER							
BTU meter. Budget allowance.	1.00 EA	23.98 24	1438.85 2,121	5000.00 7,369	0.00 0	6438.85 9,489	9489.45
TOTAL BTU METER		24	2,121	7,369	0	9,489	
BASIC MATERIALS & METHODS							
Add for additional ancillary mechanical construction materials, e.g. painting, identification, glycol, mixing tanks, etc.	1.00 LS	59.88 60	3592.81 5,295	10000.00 14,738	0.00 0	13592.81 20,033	20032.82
Testing and startup	1.00 LS	120.48 120	7228.92 10,654	500.00 737	0.00 0	7728.92 11,391	11390.72
TOTAL BASIC MATERIALS & METHODS		180	15,949	15,475	0	31,424	
TOTAL PROCESS MECHANICAL		504	44,597	89,164	0	133,761	

CONTROL SYSTEMS	QUANTY	UOM	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST	UNIT COST
CONTROL SYSTEMS								
MOTOR CONTROL PANEL & VFDs								
Budget allowance for variable frequency drives and control cabinet for primary pumps.	1.00	LS	40.00 40	2400.00 3,537	12500.00 18,422	0.00 0	14900.00 21,959	21959.32
TOTAL MOTOR CONTROL PANEL & VFDs			40	3,537	18,422	0	21,959	
CONTROL VALVE & PROCESS CONTROLS								
Three way control valve	1.00	EA	20.00 20	1200.00 1,695	5000.00 7,062	0.00 0	6200.00 8,757	8756.71
Process controls design and installation. Includes control sensors, indicators, valve actuators, conduit and wire, programming and software (if required), etc. Approximately 15 control points. Budget allowance. Subcontract.	1.00	LS	0.00 0	0.00 0	30000.00 42,371	0.00 0	30000.00 42,371	42371.18
TOTAL CONTROL VALVE & PROCESS CONTROLS			20	1,695	49,433	0	51,128	
TOTAL CONTROL SYSTEMS			60	5,232	67,855	0	73,087	
TOTAL NEW PUMPHOUSE ADJACENT TO CVEA			1,505	114,659	192,719	37,581	344,959	

CLEAR & STRIP RIGHT OF WAY	QUANTY UOM	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST	UNIT COST
HEAT SUPPLY & RETURN PIPELINES							
CLEAR & STRIP RIGHT OF WAY							
SITE SURVEY & AS-BUILDS							
Budget allowance for site survey, investigation, layout, staking, as-builds and record drawings of pipeline route from CVEA power plant to school building facilities including existing elementary school, high school and new elementary school addition, and shop building. Subcontract.	1.00 LS	0.00 0	0.00 0	0.00 0	20000 24,619	20000.00 24,619	24618.83
TOTAL SITE SURVEY & AS-BUILDS		0	0	0	24,619	24,619	
STRIP AREA WITHIN LIMITS							
Strip construction site of obstructions and organic matter, i.e. topsoil, plants, bushes and trees. Assume nominal dimension of pipeline route area to be cleared is 1,000 LF long X 20 LF wide = 30,000 SF (excluding existing pavement areas) See aerial view Sheet M1. Assume minor-to-light clearing required.	0.75 ACR	0.00 0	0.00 0	0.00 0	12500 9,375	12500.00 9,375	12500.00
TOTAL STRIP AREA WITHIN LIMITS		0	0	0	9,375	9,375	
PAVEMENT SAWCUT & PATCH							
Saw cut asphalt pavement at road crossing and parking lots. Selectively remove and dispose of asphalt paving	2000.00 SF	0.04 80	2.40 4,800	2.00 4,000	0.00 0	4.40 8,800	4.40
Patch asphalt paving at parking lots and roads. Subcontract. Budget allowance.	225.00 SY	0.00 0	0.00 0	0.00 0	100.00 22,500	100.00 22,500	100.00
TOTAL PAVEMENT SAWCUT & PATCH		80	4,800	4,000	22,500	31,300	

CLEAR & STRIP RIGHT OF WAY	QUANTY	UOM	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST	UNIT COST
TOTAL CLEAR & STRIP RIGHT OF WAY			80	4,800	4,000	56,494	65,294	

BELOW GRADE PIPING	QUANTY UOM	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST	UNIT COST
BELOW GRADE PIPING							
TRENCH EXCAVATION							
A.) The length of trench excavation between the new pump house and the High School building facility is 1800 LF. The length of trench excavation between the connection to the main pipeline and existing Elementary School facility is 500 LF. See Sheet M1. C.) Add approximately 200 LF of trench excavation for expansion loops. D.) Assume average width of the trench bottom is 4 LF. E.) The average depth of excavation is 3 LF. F.) Assume the excavated material will be stockpiled along the side of the trench. Assume that 100% of the excavated material will be re-used as backfill material for the new buried piping and manholes. See also TRENCH BACKFILL & COMPACTION below.	2000.00 CY	0.12 240	7.20 14,400	3.00 6,000	0.00 0	10.20 20,400	10.20
Fine grade by hand trench bottom. Place and spread pipe bedding material for buried pipe. Assume that bedding material can be obtained from a local borrow source.	2500.00 LF	0.03 75	1.80 4,500	2.50 6,250	0.00 0	4.30 10,750	4.30
TOTAL TRENCH EXCAVATION		315	18,900	12,250	0	31,150	
ARCTIC PIPE - BELOW GRADE							
Arctic pipe, 4". Budget quotation: Arctic Insulation and Manufacturing, Wasilla, Steve Westfall, Sales Rep [05-10-07], Material only	4000.00 LF	0.00 0	0.00 0	40.00 160,000	0.00 0	40.00 160,000	40.00
Arctic pipe, 2". Budget quotation: [05-10-07], Material only	1000.00 LF	0.00 0	0.00 0	25.00 25,000	0.00 0	25.00 25,000	25.00

BELOW GRADE PIPING	QUANTY UOM	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST	UNIT COST
Arctic pipe fittings and insulation kits. Budget quotation [05-10-07], Material only	1.00 EA	0.00 0	0.00 0	0.00 0	0.00 0	0.00 0	0.00
A.) Transport pipe from local storage yard. Spot and place along pipeline route. B.) Inspect and prep pipe. C.) Lower pipe into trench. D.) Place, adjust and align pipe prior to welding joints. Both supply and return piping placed in the same trench.	5000.00 LF	0.10 500	6.00 30,000	0.00 0	0.00 0	6.00 30,000	6.00
Butt weld joints at straight lengths and fittings. Insulate joints after welding. Includes inspection.	250.00 EA	1.00 250	60.00 15,000	25.00 6,250	0.00 0	85.00 21,250	85.00
TOTAL ARCTIC PIPE - BELOW GRADE		750	45,000	191,250	0	236,250	
BOARD INSULATION							
Board insulation placed above buried supply and return heat pipelines. Assume polyurethane insulation boards 4" thick 4' wide placed along the entire length of the trench.	10000 SF	0.01 50	0.30 3,000	2.00 20,000	0.00 0	2.30 23,000	2.30
Buried identification marking tape.	2500.00 LF	0.01 13	0.30 750	0.05 125	0.00 0	0.35 875	0.35
TOTAL BOARD INSULATION		63	3,750	20,125	0	23,875	
TRENCH BACKFILL & COMPACTION							
Place soils back in the trench around the insulated supply and return piping runs in 6" lifts. Compact by tamping. Assume that previously excavated and stockpiled soils are suitable for backfill.	2000.00 CY	0.20 400	12.00 24,000	2.00 4,000	0.00 0	14.00 28,000	14.00
TOTAL TRENCH BACKFILL & COMPACTION		400	24,000	4,000	0	28,000	

BELOW GRADE PIPING	QUANTY	UOM	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST	UNIT COST
LANDSCAPING								
Budget allowance for minor landscaping along pipeline route including seeding, topsoil and plantings. Subcontract.	20000	SF	0.00 0	0.00 0	0.00 0	0.50 10,000	0.50 10,000	0.50
TOTAL LANDSCAPING			0	0	0	10,000	10,000	
TOTAL BELOW GRADE PIPING			1,528	91,650	227,625	10,000	329,275	

ABOVE GROUND PIPING	QUANTY UOM	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST	UNIT COST
ABOVE GROUND PIPING							
ARCTIC PIPE - UNDER FLOORS							
Arctic pipe, 4". Budget quotation: Arctic Insulation and Manufacturing, Wasilla, Steve Westfall, Sales Rep [05-10-07], Material only	150.00 LF	0.00 0	0.00 0	40.00 6,000	0.00 0	40.00 6,000	40.00
Arctic pipe, 3". Budget quotation. [05-10-07], Material only	800.00 LF	0.00 0	0.00 0	35.00 28,000	0.00 0	35.00 28,000	35.00
Arctic pipe, 2". Budget quotation [05-10-07], Material only	550.00 LF	0.00 0	0.00 0	25.00 13,750	0.00 0	25.00 13,750	25.00
Arctic pipe fittings and insulation kits. Budget quotation [05-10-07], Material only	10.00 EA	0.00 0	0.00 0	300.00 3,000	0.00 0	300.00 3,000	300.00
A.) Transport pipe from local storage yard. Spot and place at under floor locations. See Sheet M1, Notes 2, 3, and 5. B.) Adjust and align pipe prior to installation. C.) Provide pipe supports, hangers, etc. as required. Includes both supply and return piping.	1500.00 LF	0.30 450	18.00 26,996	10.00 15,000	0.00 0	28.00 41,996	28.00
Butt weld joints at straight lengths and fittings. Insulate joints after welding. Includes inspection.	75.00 EA	2.00 150	120.00 9,000	25.00 1,875	0.00 0	145.00 10,875	145.00
TOTAL ARCTIC PIPE - UNDER FLOORS		600	35,996	67,625	0	103,621	
BRANCH PIPING TO BOILER ROOMS							
Piping tie-ins between the under floor heating water supply and return mains and the new secondary heat exchangers in the boiler rooms. Assume 2" schedule 40 steel pipe, insulated and jacketed typical, including fittings, pipe	500.00 LF	0.50 250	30.00 15,000	50.00 25,000	0.00 0	80.00 40,000	80.00

ABOVE GROUND PIPING	QUANTY	UOM	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST	UNIT COST
supports and hangers, building penetrations and seals, etc. Budget allowance. Assume nominal 50 LF of 2 runs of supply and return piping for each boler room. 5 boiler rooms total. See Sheet M3.								
TOTAL BRANCH PIPING TO BOILER ROOMS			250	15,000	25,000	0	40,000	
TOTAL ABOVE GROUND PIPING			850	50,996	92,625	0	143,621	
TOTAL HEAT SUPPLY & RETURN PIPELINES			2,458	147,446	324,250	66,494	538,190	

ELEMENTARY SCHOOL BOILER ROOM	QUANTY UOM	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST	UNIT COST
BOILER ROOM MODIFICATIONS							
ELEMENTARY SCHOOL BOILER ROOM							
SECONDARY HEAT EXCHANGER							
Secondary plate and frame heat exchanger installed in the boiler room. HX-1. Budget allowance.	1.00 EA	23.98 24	1438.85 2,121	5000.00 7,369	0.00 0	6438.85 9,489	9489.45
TOTAL SECONDARY HEAT EXCHANGER		24	2,121	7,369	0	9,489	
PROCESS PIPING							
Piping tie-in between the secondary heat exchanger and the existing hydronic return and supply lines in the boiler room. Assume 2" schedule 40 steel pipe typical, insulated and jacketed, including fittings, valves, pipe supports and hangers, building penetrations and seals, etc. Assume nominal 50 LF of 2 runs of supply and return piping for each boiler room. Includes miscellaneous valves and piping specialties. Includes architectural cutting and patching as required. Budget allowance.	100.00 LF	0.50 50	30.00 4,421	50.00 7,369	0.00 0	80.00 11,790	117.90
TOTAL PROCESS PIPING		50	4,421	7,369	0	11,790	
CIRCULATING PUMP							
Secondary circulating pumps P-3. Includes pumps, mountings, connecting piping and valves.	2.00 EA	20.00 40	1200.00 3,537	2000.00 5,895	0.00 0	3200.00 9,432	4716.10
TOTAL CIRCULATING PUMP		40	3,537	5,895	0	9,432	

ELEMENTARY SCHOOL BOILER ROOM	QUANTY UOM	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST	UNIT COST
ELECTRICAL							
Budget allowance for electrical power connections to the circulating pump, etc.	2.00 EA	16.00 32	960.00 2,830	500.00 1,474	0.00 0	1460.00 4,303	2151.72
TOTAL ELECTRICAL		32	2,830	1,474	0	4,303	
CONTROLS							
Budget allowance process control systems, including sensors, operated valves, panels, conduit and signal wire, etc. Subcontract.	1.00 JOB	0.00 0	0.00 0	0.00 0	7500.00 10,593	7500.00 10,593	10592.79
TOTAL CONTROLS		0	0	0	10,593	10,593	
TOTAL ELEMENTARY SCHOOL BOILER ROOM		146	12,909	22,107	10,593	45,608	

NEW SCHOOL ADDITION BOILER ROOM	QUANTY UOM	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST	UNIT COST
NEW SCHOOL ADDITION BOILER ROOM							
SECONDARY HEAT EXCHANGER							
Secondary plate and frame heat exchanger installed in the boiler room. HX-2. Budget allowance.	1.00 EA	23.98 24	1438.85 2,121	5000.00 7,369	0.00 0	6438.85 9,489	9489.45
TOTAL SECONDARY HEAT EXCHANGER		24	2,121	7,369	0	9,489	
PROCESS PIPING							
Piping tie-in between the secondary heat exchanger and the existing hydronic return and supply lines in the boiler room. Assume 2" schedule 40 steel pipe typical, insulated and jacketed, including fittings, valves, pipe supports and hangers, building penetrations and seals, etc. Assume nominal 50 LF of 2 runs of supply and return piping for each boiler room. Includes miscellaneous valves and piping specialties. Includes architectural cutting and patching as required. Budget allowance.	100.00 LF	0.50 50	30.00 4,421	50.00 7,369	0.00 0	80.00 11,790	117.90
TOTAL PROCESS PIPING		50	4,421	7,369	0	11,790	
CIRCULATING PUMP							
Secondary circulating pumps P-4. Includes pumps, mountings, connecting piping and valves.	2.00 EA	20.00 40	1200.00 3,537	2000.00 5,895	0.00 0	3200.00 9,432	4716.10
TOTAL CIRCULATING PUMP		40	3,537	5,895	0	9,432	
ELECTRICAL							
Budget allowance for electrical power connections to the circulating pump, etc.	2.00 EA	16.00 32	960.00 2,712	500.00 1,412	0.00 0	1460.00 4,124	2062.06

NEW SCHOOL ADDITION BOILER ROOM	QUANTY	UOM	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST	UNIT COST
TOTAL ELECTRICAL			32	2,712	1,412	0	4,124	
CONTROLS								
Budget allowance process control systems, including sensors, operated valves, panels, conduit and signal wire, etc. Subcontract.	1.00	JOB	0.00 0	0.00 0	0.00 0	7500.00 10,593	7500.00 10,593	10592.79
TOTAL CONTROLS			0	0	0	10,593	10,593	
TOTAL NEW SCHOOL ADDITION BOILER ROOM			146	12,791	22,045	10,593	45,429	

HIGH SCHOOL BOILER ROOM #1	QUANTY UOM	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST	UNIT COST
HIGH SCHOOL BOILER ROOM #1							
SECONDARY HEAT EXCHANGER							
Secondary plate and frame heat exchanger installed in the boiler room. HX-3. Budget allowance.	1.00 EA	23.98 24	1438.85 2,121	5000.00 7,369	0.00 0	6438.85 9,489	9489.45
TOTAL SECONDARY HEAT EXCHANGER		24	2,121	7,369	0	9,489	
PROCESS PIPING							
Piping tie-in between the secondary heat exchanger and the existing hydronic return and supply lines in the boiler room. Assume 2" schedule 40 steel pipe typical, insulated and jacketed, including fittings, valves, pipe supports and hangers, building penetrations and seals, etc. Assume nominal 50 LF of 2 runs of supply and return piping for each boiler room. Includes miscellaneous valves and piping specialties. Includes architectural cutting and patching as required. Budget allowance.	100.00 LF	0.50 50	30.00 4,421	50.00 7,369	0.00 0	80.00 11,790	117.90
TOTAL PROCESS PIPING		50	4,421	7,369	0	11,790	
CIRCULATING PUMP							
Secondary circulating pumps P-5. Includes pumps, mountings, connecting piping and valves.	2.00 EA	20.00 40	1200.00 3,537	2000.00 5,895	0.00 0	3200.00 9,432	4716.10
TOTAL CIRCULATING PUMP		40	3,537	5,895	0	9,432	
ELECTRICAL							
Budget allowance for electrical power connections to the circulating pump, etc.	2.00 EA	16.00 32	960.00 2,830	500.00 1,474	0.00 0	1460.00 4,303	2151.72

HIGH SCHOOL BOILER ROOM #1	QUANTY	UOM	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST	UNIT COST
TOTAL ELECTRICAL			32	2,830	1,474	0	4,303	
CONTROLS								
Budget allowance process control systems, including sensors, operated valves, panels, conduit and signal wire, etc. Subcontract.	1.00	JOB	0.00 0	0.00 0	0.00 0	7500.00 10,593	7500.00 10,593	10592.79
TOTAL CONTROLS			0	0	0	10,593	10,593	
TOTAL HIGH SCHOOL BOILER ROOM #1			146	12,909	22,107	10,593	45,608	

HIGH SCHOOL BOILER ROOM #2	QUANTY UOM	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST	UNIT COST
HIGH SCHOOL BOILER ROOM #2							
SECONDARY HEAT EXCHANGER							
Secondary plate and frame heat exchanger installed in the boiler room. HX-4. Budget allowance.	1.00 EA	23.98 24	1438.85 2,121	5000.00 7,369	0.00 0	6438.85 9,489	9489.45
TOTAL SECONDARY HEAT EXCHANGER		24	2,121	7,369	0	9,489	
PROCESS PIPING							
Piping tie-in between the secondary heat exchanger and the existing hydronic return and supply lines in the boiler room. Assume 2" schedule 40 steel pipe typical, insulated and jacketed, including fittings, valves, pipe supports and hangers, building penetrations and seals, etc. Assume nominal 50 LF of 2 runs of supply and return piping for each boiler room. Includes miscellaneous valves and piping specialties. Includes architectural cutting and patching as required. Budget allowance.	100.00 LF	0.50 50	30.00 4,421	50.00 7,369	0.00 0	80.00 11,790	117.90
TOTAL PROCESS PIPING		50	4,421	7,369	0	11,790	
CIRCULATING PUMP							
Secondary circulating pumps P-6. Includes pumps, mountings, connecting piping and valves.	2.00 EA	20.00 40	1200.00 3,537	2000.00 5,895	0.00 0	3200.00 9,432	4716.10
TOTAL CIRCULATING PUMP		40	3,537	5,895	0	9,432	
ELECTRICAL							
Budget allowance for electrical power connections to the circulating pump, etc.	2.00 EA	16.00 32	960.00 2,830	500.00 1,474	0.00 0	1460.00 4,303	2151.72

HIGH SCHOOL BOILER ROOM #2	QUANTY	UOM	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST	UNIT COST
TOTAL ELECTRICAL			32	2,830	1,474	0	4,303	
CONTROLS								
Budget allowance process control systems, including sensors, operated valves, panels, conduit and signal wire, etc. Subcontract.	1.00	JOB	0.00 0	0.00 0	0.00 0	7500.00 10,593	7500.00 10,593	10592.79
TOTAL CONTROLS			0	0	0	10,593	10,593	
TOTAL HIGH SCHOOL BOILER ROOM #2			146	12,909	22,107	10,593	45,608	

SHOP BUILDING BOILER ROOM	QUANTY UOM	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST	UNIT COST
SHOP BUILDING BOILER ROOM							
SECONDARY HEAT EXCHANGER							
Secondary plate and frame heat exchanger installed in the boiler room. HX-5. Budget allowance.	1.00 EA	23.98 24	1438.85 2,121	5000.00 7,369	0.00 0	6438.85 9,489	9489.45
TOTAL SECONDARY HEAT EXCHANGER		24	2,121	7,369	0	9,489	
PROCESS PIPING							
Piping tie-in between the secondary heat exchanger and the existing hydronic return and supply lines in the boiler room. Assume 2" schedule 40 steel pipe typical, insulated and jacketed, including fittings, valves, pipe supports and hangers, building penetrations and seals, etc. Assume nominal 50 LF of 2 runs of supply and return piping for each boiler room. Includes miscellaneous valves and piping specialties. Includes architectural cutting and patching as required. Budget allowance.	100.00 LF	0.50 50	30.00 4,421	50.00 7,369	0.00 0	80.00 11,790	117.90
TOTAL PROCESS PIPING		50	4,421	7,369	0	11,790	
CIRCULATING PUMP							
Secondary circulating pumps P-5. Includes pumps, mountings, connecting piping and valves.	2.00 EA	20.00 40	1200.00 3,537	2000.00 5,895	0.00 0	3200.00 9,432	4716.10
TOTAL CIRCULATING PUMP		40	3,537	5,895	0	9,432	
ELECTRICAL							
Budget allowance for electrical power connections to the circulating pump, etc.	2.00 EA	16.00 32	960.00 2,830	500.00 1,474	0.00 0	1460.00 4,303	2151.72

SHOP BUILDING BOILER ROOM	QUANTY UOM	MANHRS	LABOR	MATERIAL	SUBCTR	TOTAL COST	UNIT COST
TOTAL ELECTRICAL		32	2,830	1,474	0	4,303	
CONTROLS							
Budget allowance process control systems, including sensors, operated valves, panels, conduit and signal wire, etc. Subcontract.	1.00 JOB	0.00 0	0.00 0	0.00 0	7500.00 10,593	7500.00 10,593	10592.79
TOTAL CONTROLS		0	0	0	10,593	10,593	
TOTAL SHOP BUILDING BOILER ROOM		146	12,909	22,107	10,593	45,608	
TOTAL BOILER ROOM MODIFICATIONS		730	64,425	110,472	52,964	227,861	

*** * * END OF REPORT * * ***

APPENDIX B

DRAWINGS

1 M1 PIPE ROUTING SITE PLAN
SCALE: 1:80

0 20 40 80 160 240
1"=80'-0"

1	4"	1760 FT	HDS/HDR	ARCTIC PIPE	BURIED
2	4"	80 FT	HDS/HDR	ARCTIC PIPE	SUPPORTED UNDER BUILDING
3	2"	240 FT	HDS/HDR	ARCTIC PIPE	SUPPORTED UNDER BUILDING
4	2"	50 FT	HDS/HDR	ARCTIC PIPE	BURIED
5	3"	280 FT	HDS/HDR	ARCTIC PIPE	SUPPORTED UNDER BUILDING
6	2"	440 FT	HDS/HDR	ARCTIC PIPE	BURIED

PRELIMINARY NOT FOR CONSTRUCTION

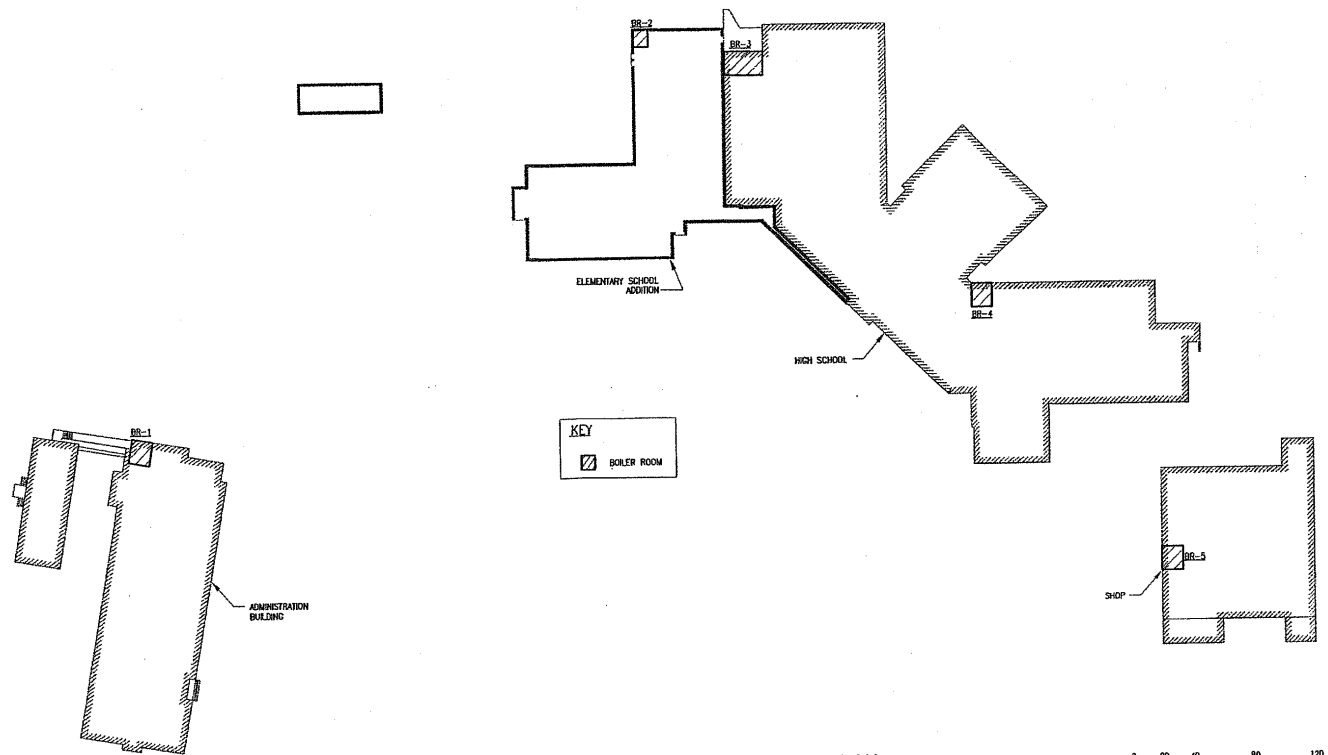
Revisions

COFFMAN ENGINEERS
800 F Street • Anchorage, Alaska 99501 • (907) 276 8664

GLENALLEN SCHOOL
RECOVERED HEAT

SITE PLAN

Date 5/14/07
Design WKM
Drawn ALM
Job No. 07233
Sheet No. M1
Of 1 Sheets



1 M2 SCHOOL COMPLEX SITE PLAN
SCALE: 1:40

PRELIMINARY NOT FOR CONSTRUCTION

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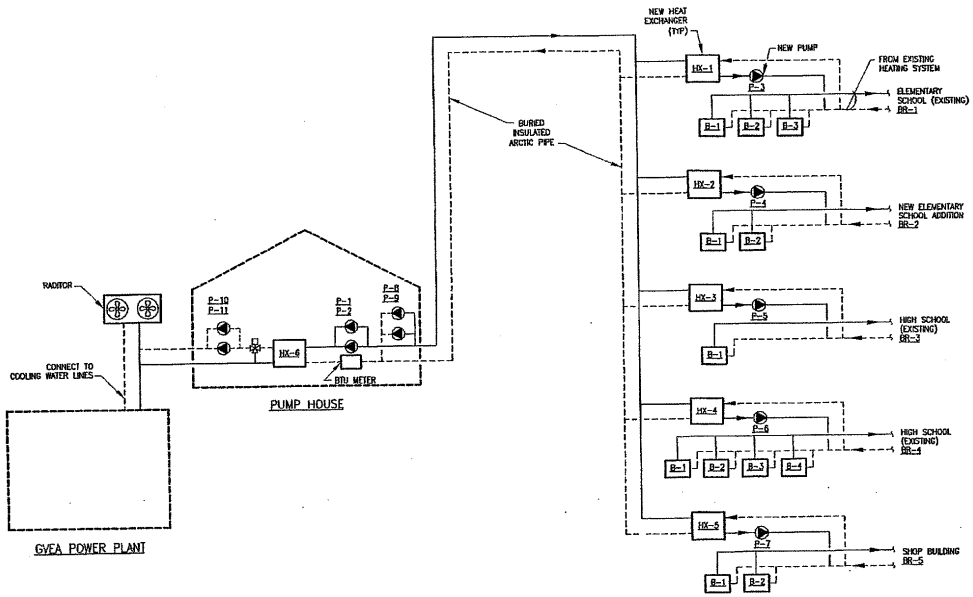
Revisions

GLENALLEN SCHOOL
RECOVERED HEAT

SITE PLAN

Date 5/14/07
Design WKM
Drawn ALM
Job No. 07233
Sheet No. M2
of 1 Sheets



1 PIPING DIAGRAM

M3 SCALE: NTS

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Revisions

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GLENALLEN SCHOOL
RECOVERED HEAT

PIPING DIAGRAM

Date 5/14/07
Design WKM
Drawn AMF
Job No. 07233
Sheet No. M3
Of 1 Sheets