KETCHIKAN GATEWAY BOROUGH SCHOOL DISTRICT
AGENDA STATEMENT

No. 10 b

MEETING OF May 13, 2020 Reviewed By

Item Title:
NEW BUSINESS
Motion to approve a sole source contract with PDC Engineers for engineering & design services

[X] Superintendent
[X] Finance
[X] Maintenance

SUBMITTED BY Al Jacobson, Facilities & Maintenance Director

Contact Person/Telephone APPROVED FOR SUBMITTAL

Katie Jo Parrott 247-2116
Name Phone

SUMMARY STATEMENT:
Administration is seeking approval of a sole source contract with PDC Engineers for mechanical and electrical engineering and design services related to the Ketchikan High School Boiler repair and replacement project.

ISSUE: Board Policy governs the district's purchasing and contracting procedures. Board Policy requires Board approval for expenditures over $25,000. Though this request is technically under $25,000, because it is part of a larger capital improvement project, and because of the occasional cost overrun in capital projects that calls for a contingency amount that would put this contract over the $25,000 threshold, the Board is being asked to provide approval. Additionally, owing to the urgent nature of the need for this project, the district is pursuing engineering and design services with PDC Engineers under a sole source contract and desires to be transparent with the Board and the public.

BACKGROUND: Ketchikan High School has three Weil-McLain 94 series oil-fired cast-iron sectional boilers that provide heat for the facility. These boilers are 25 years old, with a typical service life of 30-40 years. However, they have experienced deficiencies with cracks and leaking over the last several years, and have been repaired and parts replaced many times. Both Boiler #1 & #2 have now experienced failures, and need to be replaced. Boiler #2 replacement planning was already in process, but engineering and design services to include a Boiler #1 is being recommended. PDC Engineers are already familiar with the Kayhi boiler system and have provided support to the district in the past. Because of the urgent need to move forward with a replacement of at least Boiler #2, this work needs to be completed as soon as possible, with consideration for the longer term plan to also replace Boiler #1.

RECOMMENDATION:
Approval of the sole source contract with PDC Engineers.

FISCAL NOTE

EXPENDITURE REQUIRED	$24,757	AMOUNT AVAILABLE	$25,000

EXHIBITS ATTACHED
- Maintenance Director's Request & Justification
- PDC Engineers Fee Proposal and Technical Memorandum

RECOMMENDED ACTION:
"I move that the Board of Education approve the sole source contract agreement renewal with PDC Engineers for engineering and design services for the Kayhi Boiler repair and replacement project, in the amount of $24,757 and allowing for a 5% contingency."

Sole Source Justification

Name: Alan Jacobson
Date: 4/30/20
Supervisor: Beth Lougee
Dept./School: Maintenance/Kayhi
Vendor: PDC Engineering
Amount: $24,787.00

Item(s) description:

Mechanical and electrical engineering design documents. For the bid to replace boiler 2 at Ketchikan High School.

Reason for Sole Source request:

☐ Item(s) is only manufactured by the listed vendor.

☐ Item(s) is only shipped to AK by the listed vendor.

☐ Item(s) must match existing material(s), which is:

☐ Item(s) is a repair/replacement for existing material(s), which is:

☐ Other reasons, specify below:

There is an urgency to get this project started before summer. We are at an emergency status with only one heat generating boiler in operation. The fear is to have a failure in the fall or winter with our one remaining boiler, this would be catastrophic. A 3 quote process (BP3310) would take a month to implement putting design out another month. Going with a different engineering firm could delay the design another 3 to 4 weeks or longer because of the Covid -19 travel restrictions. PDC has done the professional cost estimate and pre-design already. They are aware of the needs of the project.

Continue on next page if needed.

PDC ENGINEERS

PLAN • DESIGN • CONSTRUCT

April 28, 2020

Al Jacobson
PKGBSD Maintenance Director
333 Schoenbar Rd.
Ketchikan, Alaska 99901

SUBJECT: PDC Fee Proposal for Ketchikan High School Boilers Replacement Design

Dear Mr. Jacobson:

As requested, we are providing a fee proposal for the mechanical and electrical engineering design required for bid ready documents of the replacement of 2 boilers at the Ketchikan High School.

Scope of Services includes review existing conditions, site trip, and preparation of mechanical and electrical bid-ready documents. One site trip by the mechanical engineer will be necessary to as-built boiler room conditions. Design will include the replacement of Boiler #1 and #2 with four smaller boilers. The dual oil supply pumps will also be relocated to accommodate the new boilers.

We can provide the design services for a fixed fee of $24,787. See summary below and attached fee schedules for a breakdown. We understand that you need this bid ready package as soon as possible for possible summer construction work and can accomplish that for you.

PDC Summary Sheet

#	PHASE	MECH	ELECT	PDC Reimb. Markup	Total
35	Construction Documents	$ 19,000	$ 5,290		$ 24,290
	Reimbursable	$ 497	$ -	$ -	$ 497
	Phase Total	**$ 19,497**	**$ 5,290**	**$ -**	**$ 24,787**
	Subtotal	**$ 19,497**	**$ 5,290**	**$ -**	**$ 24,787**

The fee and services are based on our understanding of the project and the following assumptions and exceptions: **Bidding and Construction Services are not included.**

Thank you for this opportunity; we look forward to beginning this work. Please call if you have any questions or comments.

Sincerely,

Doug Murray, PE
Principal, PDC Engineers
Attached: Fee Schedules

Anchorage | Fairbanks | Juneau | Palmer | Soldotna
9109 Mendenhall Mall Road, Suite 4, Juneau, Alaska 99801
907.780.6060
www.PDCENG.com

MECHANICAL ENGINEERING

#	TASK		Principal Mechanical Engineer	Senior Mechanical Engineer	Staff Mechanical Engineer	Lead Engineering Technician	Hourly Subtotal	Subtotal Cost
		Billing Rate ($/hr)	$250.00	$180.00	$130.00	$110.00		
35	**Construction Documents**							
	Set Up Project; File, Drawings, CAD Existing		1	1	1	8	11	$ 1,440
	Review/Update Calculations, Equipment			1	3		4	$ 570
	Mechanical Design - Boilers			6	36	32	74	$ 9,280
	Mechanical Design - Oil Supply Pumps			2	6		8	$ 1,140
	Site Trip				10		10	$ 1,300
	Specifications; 8 Sections			8	2		10	$ 1,700
	Project Coordination			2	4		6	$ 880
	QC		3	1	1	1	6	$ 1,170
	95% and 100% Submittals			2	2	3	7	$ 950
	Respond to Comments			1	3		4	$ 570
	Hourly Subtotal		**4**	**24**	**68**	**44**	**140**	
	Cost		**$ 1,000**	**$ 4,320**	**$ 8,840**	**$ 4,840**		**$ 19,000**

	Discipline Totals		**4**	**24**	**68**	**44**	**140**	
	Design Services		**$ 1,000**	**$ 4,320**	**$ 8,840**	**$ 4,840**		**$ 19,000**

ELECTRICAL ENGINEERING

#	TASK	Senior Electrical Engineer	Project Electrical Engineer	Electrical EIT	Staff Engineering Technician	Hourly Subtotal	Subtotal Cost
	Billing Rate ($/hr)	$200.00	$160.00	$105.00	$110.00		
35	**Construction Documents**						
	Set Up Project; File, Drawings, CAD Existing		2		2	4	$ 540
	Review Project Material		2			2	$ 320
	Electrical Design - Burners, Oil Pumps		10		6	16	$ 2,260
	Site Trip (None)		0			0	$ -
	Specifications; 5 Sections		3			3	$ 480
	Project Coordination		2			2	$ 320
	QC	2	1		1	4	$ 670
	95% and 100% Submittals		2		2	4	$ 540
	Respond to Comments		1			1	$ 160
	Hourly Subtotal	**2**	**23**	**0**	**11**	**36**	
	Cost	**$ 400**	**$ 3,680**	**$ -**	**$ 1,210**		**$ 5,290**

	Discipline Totals	**2**	**23**	**0**	**11**	**36**	
	Design Services	**$ 400**	**$ 3,680**	**$ -**	**$ 1,210**		**$ 5,290**

4/28/2020

REIMBURSABLE EXPENSES

#					Mechanical		Electrical	Total
35	**Construction Documents**							
	Item	**unit**	**unit cost**	**#**	**subtotal**	**#**	**subtotal**	
	Copies/Prints/Scans (Letter)	ea	$ 0.10		$ -		$ -	$ -
	Copies/Prints/Scans (11x17)	ea	$ 0.20		$ -		$ -	$ -
	Copies/Prints/Scans (Full Size Drawing)	ea	$ 1.00		$ -		$ -	$ -
	Teleconference Costing	hr/line	$ 3.00		$ -		$ -	$ -
	Airfare	ea	$ 320.00	1	$ 320		$ -	$ 320
	Rentals	day	$ 100.00	1	$ 100		$ -	$ 100
	Survey GPS Rental	day	$ 309.00		$ -		$ -	$ -
	Shipping	ea	$ 25.00		$ -		$ -	$ -
	Parking	day	$ 14.00	1	$ 14		$ -	$ 14
	Hotel	day	$ -		$ -		$ -	$ -
	Per Diem	man day	$ 125.00	$ 1	$ 63		$ -	$ 63
	Subtotal				**$ 497**		**$ -**	**$ 497**

PDC ENGINEERS
PLAN • DESIGN • CONSTRUCT

TECHNICAL MEMORANDUM

Client	Ketchikan Gateway Borough School District	**Date**	March 11, 2020
PDC #	20027N	**Prepared by**	Doug Murray, PE
Project Name	High School Heating Plant Analysis	**Reviewed by**	
Subject	Analysis and Recommendations		

Index

Summary

After reviewing the condition of the existing boilers and due to the boilers age and increasing maintenance costs we recommend to replace at least one WM 94 boiler with two smaller boilers. Smaller boilers will allow better full load firing, more efficient operation, boiler shock protection, and easier maintenance. Future boiler replacements would be similar; replace one boiler with two smaller boilers.

Background

PDC was requested to provide an analysis of the existing heating plant with recommendations for providing better diversity and staging of the oil-fired boilers. The desire by maintenance staff is to have a boiler plant that is operating longer for increased efficiency, better serviceability, and readily available burner parts. The goals of this analysis are to do the following:

- Evaluate the condition of the boiler plant
- Provide recommendations for improvement to the Plant including
  - Evaluate the past fuel usage in terms of optimal replacement boiler selections.
  - Interview maintenance staff for history, current practices, and desired outcomes of improvements at the heating plant.
  - Consider smaller boilers for better diversity and loading.
  - Preliminary layouts of replacement boilers and related ROM cost estimate.
- Check with the boiler Manufacturer's Representative.
  - Existing deficiencies in cast-iron sections.
  - Combustion requirements with joining smaller boilers with the larger ones; is a barometric damper needed.

Existing Conditions

There are three existing oil-fired cast-iron sectional boilers that provide heating water for the High School. The boilers are Weil-McLain 94 series, Boiler #1 is a 1494 and Boilers #2 & #3 are 1594 series. Each boiler combustion outlet is connected to a common breeching and chimney stack. The chimney stack is approximately 25 feet tall. The three boilers have the original Gordon Piatt burners. Each boiler return has an automatic valve with bypass that can be closed when the boiler is not operating. The bypass is a 3/4-inch pipe routed around the auto valve to provide a continuous small flow through the boiler to keep it warm when not operating.

Additional Concerns

Several items were brought up during the site visit that should be incorporated or at least considered for the new boiler installations.

- Utilize ball valves instead of gate valves where possible. Gate valves have been problematic and ball valves are viewed to be better suited for the application.
- Consider stack dampers in the boiler combustion to isolate each boiler for greater efficiency.
- Maintenance likes the automatic valve, with bypass, in the heating return to each boiler.
- Provide adequate service area around the new boilers.
- Provide service valve plus the 'firomatic' type safety valve for oil piping isolation.
- Provide oil-deaerator such as Tiger Loop for smaller burners.
- Would like to monitor oil flow to each burner.

Analysis

Existing Plant

The boilers and burners are 25 years old. Typically, the Weil McLain cast-iron sectional boilers have a service life of 30-40 years. Two of the boilers have experienced deficiencies with cracks in the sections over the last several years and several replacement sections have been purchased and installed. Boiler #2 is currently out of service with a cracked section. The Gordon-Piatt burners are well known and of higher quality, but the manufacturer stopped making these burners in 2009. Although burner parts are still available, they will become decreasingly difficult to procure and more expensive.

The boilers should have 5-10 years remaining but will experience increasing failures and maintenance requirements during that time. Because these boilers are sized to each take the entire building heating load they rarely will operate at full capacity. Operating a boiler at or near full load capacity is typically most efficient for its operation. Depending on how cold the temperature is outside, these boilers may not operate at full load in a winter season. It appears that these boilers are usually operating at somewhere between 20-50% load and are cycling more frequently which increases the wear on them and decreased service life. The burner firing rates have been reduced to about half loads by maintenance staff for better efficiency to operate longer between cycles.

Existing Boiler Section Cracks

The cracks in the rear sections are typically a result of the heating return water temperature returning to the boiler being too low. The HR temp can be low from a variety of reasons; start up after the boiler has been off for a long period, going from unoccupied to occupied schedule too quickly, and/or a large number of heating zones opening up for heating at the same time. Colder return water temperatures conflicting with the fire chamber internal temperature can result in a wide temperature variation causing stress in the cast-iron sections eventually leading to cracks over time.

Recently cracks have occurred in the middle sections at the bottom of the firing chamber. The factory has been apprised of these cracks with pictures and have not responded yet.

In order to reduce boiler shock due to low heating return water temperature we recommend new boiler installations to have a boiler shock control design such as described in the report utilizing a separate circulation pump and three-way mixing valve.

Proposed Boiler Selection

We requested and received annual fuel usage information for the last five years from KGBSD. The average annual fuel usage was tabulated to be 120,000 gallons. In 2011 the Energy Audit performed by Alaska Energy Engineering tabulated the average fuel usage for the High School to be 139,000 gallons. The decrease in fuel usage is probably due to replacement of windows and increased roof insulation from envelope improvement projects over the last decade.

From the fuel usage and the known heating degree days we analyzed several options of WM 88 boilers; see Table 1 – Attachment A. The table lists several 88 models and then number of boilers needed to provide the required heating load for that month. Utilizing two 888 boilers appears to be optimum. Two 888 boilers will supply the design heating load and the other two existing 94 boilers would be backup. The 888 series boiler dimension templates were then laid out on a pdf of the boiler room plan, see Attachment B, to check for practicability and service areas. Two 888 series fit into the space occupied by Boiler#2 except the concrete pad will need to be extended slightly.

A mixing valve to provide boiler shock protection would be controlled by a return water thermostat by diverting heating supply water into the heating return water to the boiler until the water temperature is above a set point (typically 140F). Once the temperature is above 140F the mixing valve would then modulate open and inject supply water to the heating system. See typical Boiler piping diagram, Attachment C.

Oil piping would be extended to the new burners. When the second set of 888 boilers are installed, taking the place of Boiler #1, the oil circulation pumps will need to be relocated

Boiler heating supply and return piping would be connected to the heating mains, a primary loop would be installed at each boiler with their individual circulating pump and three-way mixing valve. The primary loop would maintain water temperature and provide boiler shock control.

A submittal for the WM 888 Boiler and Beckett Burner is included in Attachment D.

For additional efficiencies recommend considering or doing further investigation on

- Installation of an automatic valve on the heating return with bypass to isolate the boiler during off operation. With the proposed boiler piping arrangement the bypass should not be needed with the three-way valve and spring check closing the system off.
- Installation of automatic stack control damper in each boiler combustion to isolate the boiler and prevent stack gases from other boilers infiltrating the off boiler. Control sequence will need to open stack damper fully with verification prior to igniting the burner. Manufacturer representative is recommending this addition for better efficiency.
- Installation of a barometric draft damper is being investigated; stack calculations have been requested from the manufacturer. Smaller boilers operating with the larger ones may require a draft damper in order for the smaller boilers to operate properly. Stack calculations are needed for determination.

Boiler Replacement Cost Opinion

A rough order of magnitude of cost for the removal of one WM 94 boiler and the installation of two WM 888 boilers is included in Attachment E.

End of Report

PDC INC. ENGINEERS

Project:	KGBSD Boiler Replacment
Project #:	20027JN
Title:	Heating Model
Engineer	SJB
Phase:	SD

Heating Model

Peak Loads	Input (GAL)	Factor (HF#2)	Net Total (kBTU)
Annual Energy Usage (5YR AVG)	120,000	139.6	13,401,600

KETCHIKAN WEATHER DATA	
SUMMER TEMPERATURE	72
WINTER TEMPERATURE	19
MAAT	45.5
HEATING DEGREE TEMP	65
COLDEST DAY	15

ENVIRONMENT				HEATING*				
MONTH	DAYS	AVG DESIGN TEMP	HEATING DEGREES	AVG NET LOADS (MBH)	BOILERS (988)	BOILERS (888)	BOILERS (788)	TOTAL (kBTU)
JANUARY	31	19.9	45.1	3,367.26	1.80	2.00	2.30	2,505,241
FEBRUARY	28	20.0	45.0	3,358.29	1.70	2.00	2.30	2,256,773
MARCH	31	26.2	38.8	2,892.62	1.50	1.70	2.00	2,152,112
APRIL	30	38.2	26.8	2,002.43	1.10	1.20	1.40	1,441,751
MAY	31	51.7	13.3	993.23	0.60	0.60	0.70	738,962
JUNE	30	63.9	1.1	79.75	0.10	0.10	0.10	57,417
JULY	31	70.9	0.0	-	-	-	-	-
AUGUST	31	71.2	0.0	-	-	-	-	-
SEPTEMBER	30	64.3	0.7	51.06	0.10	0.10	0.10	36,764
OCTOBER	31	52.7	12.3	921.28	0.50	0.60	0.70	685,433
NOVEMBER	30	38.7	26.3	1,963.57	1.00	1.20	1.40	1,413,772
DECEMBER	31	26.9	38.1	2,840.56	1.50	1.70	2.00	2,113,376
Totals:	365							13,401,600

* Number of boilers indicated shows how many are required to meet that months heating load. The WM 94 boilers would be utilized as backup.

ATTACHMENT B

IV D

IV E

IV 15

IV 13

IV 14

(E) ELECTRICAL EQUIPMENT (REF) (5 TYP)

PROPOSED NEW BOILERS

POTENTIAL FUTURE BOILERS

NEW CHIMNEY BRANCH

PMP 12A

PMP 12B

E/A

(E) EF-11 PH. III

TANK ROOM ADDITION SEE 2 M900 3 M900

(E) 5" SP DN TO ALARM VALVE

(E) 3" CW DN TO UTILIDOR

(E) 6" GS & GR PRIMARY MAINS DOWN TO UTILIDOR

(E) 3" HW (115°), 1-1/4" HWC DOWN TO UTILIDOR

(E) ELECTRICAL EQUIPMENT (REF)

16 (E) DUPLEX FUEL OIL PUMP SET

(E) ELECTRICAL EQUIPMENT (REF)

(E) DDC CONTROL PANELS

5 (E) 36" CHIMNEY STACK UP THRU ROOF

(E) FD

(E) FCO

19

14

M

(E) GS

(E) PIPE TRENCH

(E) FD

(E) GS HEADER

Weil Mclain 888

Weil Mclain 888

Weil Mclain 888

Weil Mclain 888

UP TO FD-2 C.O.

(E) BLR-1

(E) BLR-2

(E) BLR-3 UP TO FD-2

(E) PMP-5

(E) PMP-4

4

2

1

3

17

9

3" CW (UPPER LEVEL)

(E) 3" GS RECIRC

1-1/4" HWC

PMP 7A

PMP 7B

3" CW (LOWER LEVEL)

3" HW (140°)

RELOCATED TV-2

3'-3"

3'-7"

(E) 28ø

(E) GR HEADER

6

SEE SHEET M401 FOR CONTINUATION

(E) AC-2

C.O.

8

A

(E) SUMP

(E) FD

AC 5

2"V UP

CONNECT 3"W. TO (E) 3"

4" GS/GR UP

1/2" TP UP 2" V. UP

AC 3

20

AC 4

7

2" V UP CONNECT (E) 2"V FROM BELOW

3/4" CW UP

1/2" TP UP

2" V UP CONNECT (E) 2"V FROM BELOW

CORE DRILL OR SLEEVE THRU EXISTING CMU WALL FIRE SEAL (TYP)

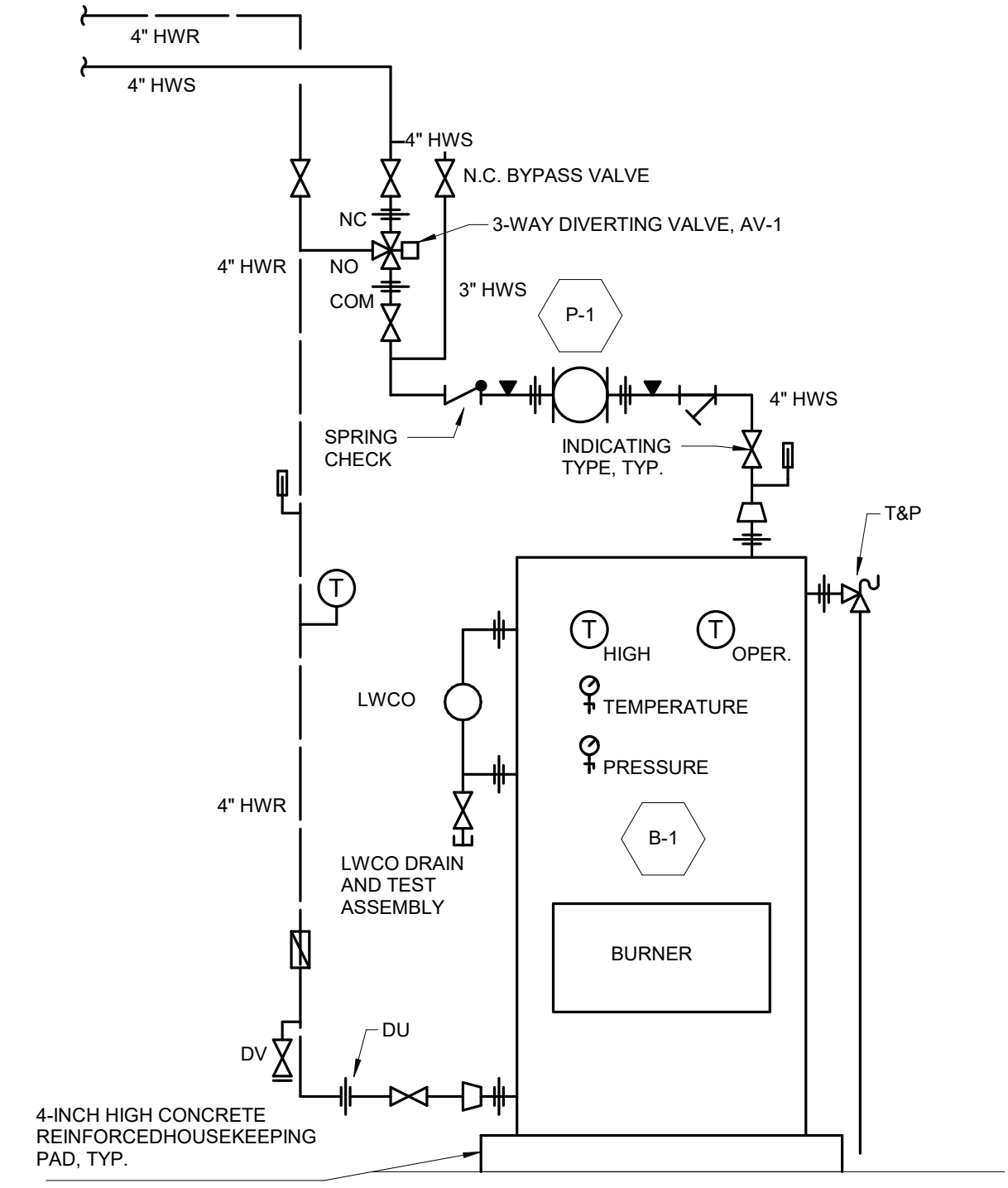
THIS AREA

KEY PLAN

1 M800 FLOOR PLAN – EXISTING BOILER ROOM

SCALE: 1/4"=1'-0"

1/8" 1/4" 3/8" 1/2" 3/4" 1-1/2" GRAPHIC SCALE



1 / M1.1 HEATING PLANT BOILER PIPING DIAGRAM

SCALE: NO SCALE

PDC ENGINEERS
PLAN • DESIGN • CONSTRUCT
9109 Mendenhall Mall Rd, Ste 4, Juneau, AK 99801
907.780.6060 | AECC605

Project Name
KETCHIKAN HIGH SCHOOL HEATING PLANT PROPOSED BOILER ARRANGEMENT

DESIGN:	DM
DRAWN:	CSB
CHECKED:	DM
03/06/2020	

PROJ No. 20027JN

FIGURE M1.1

Ketchikan Gateway Borough School District **ATTACHMENT E**
High School Boiler Replacement
Ketchikan, Alaska **Preliminary Cost Estimate**
March 10, 2020

Cost Element		Quantity	Rate	Subtotal	Total
01 Architectural Work					
011	Modify Concrete pad for New Boilers	1 ls	$1,500 ls	$1,500	
	Total				$1,500
02 Mechanical Equipment					
021	Demo Ex Boiler #2, Piping, Trim, Breeching	1 ls	$5,000 ls	$5,000	
022	Boiler - Material Cost Only WM BL-888-W with Becket Burner CF-2500	2 ls	$32,000 ls	$64,000	
023	Install Boiler - Labor Only	2 ls	$8,000 ls	$16,000	
024	Install HS/HR Piping, Valves, 4-inch sizes	2 ls	$11,000 ls	$22,000	
025	Install Oil Piping	2 ls	$1,500 ls	$3,000	
026	Install Breeching; Common plus indiv chimney connections	2 ls	$4,500 ls	$9,000	
026B	Install Breeching Damper	2 ls	$1,500 ls	$3,000	
027	Misc Trim, Gages, Equip, Auto Valve 4"	2 ls	$4,000 ls	$8,000	
028	Insulate HS/HR Piping	2 ls	$6,000 ls	$12,000	
029	Testing, Start-Up, Boilers	1 ls	$7,000 ls	$7,000	
030	DDC Controls; 6 pts per boiler plus engineering	2 ls	$8,000 ls	$16,000	
	Total				$165,000
05 Electrical					
051	Demo Burner, Auto valve	1 ea	$1,250 ea	$1,250	
052	Burner power plus safties (3)	2 ea	$2,500 ea	$5,000	
053	Controls Rough-in	2 ea	$1,500 ea	$3,000	
	Total				$9,250
12 General Requirements					
121	Mobilization/Demobilization	1 ls	$3,000 ls	$3,000	
122	Freight Costs	1 ls	$3,000 ls	$3,000	
123	Operation Costs, Submittals, O&M, Training	1 ls	$2,500 ls	$2,500	
124	Profit & Overhead		30%	$55,275	
	Total				$63,775
13 Contingencies					
131	Estimating Contingency		15%	$35,929	
132	Escalation to 2020		0%	$0	
	Total				$35,929
TOTAL ESTIMATED CONSTRUCTION COST:					**$275,454**
Note: Cost does not include design services or construction administration					
14 Design and Administration					
141	Design (Mechanical and Electrical)		ls	$18,000	
142	Bidding & Construction Administration (Mechanical and Electrical)		ls	$0	NI, By Owner
Total Project Cost					**$293,454**