2011 Legislature TPS Report 56193v1

Agency: Commerce, Community and Economic Development

Grants to Named Recipients (AS 37.05.316)

Grant Recipient: Southeast Regional Resource Center, Inc. **Federal Tax ID:** 92-0058572

Project Title: **Project Type:** Maintenance and Repairs

Southeast Regional Resource Center, Inc. - Heating System Replacement

State Funding Requested: $70,000 **House District:** Juneau Areawide (3-4)
One-Time Need

Brief Project Description:

SERRC - Alaska's Educational Resource Center - is housed in a 1950's era building. The antiquated oil-fired boilers, air handlers, and mechanical controls have become inefficient and increasingly unreliable. This building houses 30 employees who serve school districts statewide, and serves approximately 750 adult students on site through the Learning Connection on an annual basis. This request funds replacement of two boilers and plumbs them appropriately for a building of this type.

Funding Plan:

Total Project Cost:	$181,750
Funding Already Secured:	($0)
FY2012 State Funding Request:	($70,000)
Project Deficit:	$111,750

Detailed Project Description and Justification:

SERRC was created by the Alaska State Legislature in 1976 along with six other regional resource centers to improve student achievement throughout the state. With only seed money and no future funding, the other resource centers eventually closed but SERRC survived and flourished. Today, SERRC provides educational services to every school district in the state and adult education throughout Southeast.

SERRC's main office was constructed in 1957 and encompasses approximately 15,000 square feet. It is home to over 30 employees, and also houses the Learning Connection's computer labs and classrooms that are used by approximately 750 students each year. The mechanical systems in the SERRC building are more than 40 years old, and the antiquated oil fired boilers, air handlers, and mechanical controls have become inefficient and increasingly unreliable. Heating in the building is uneven and often inadequate, leaving a working environment that is frequently uncomfortable. Each winter a number of electric space heaters must be used to supplement the building's heat. And because each boiler is plumbed to serve a separate floor, there is no redundancy in the system, meaning a failure of either could easily lead to freezing in portions of the building.

In 2010, SERRC contracted with a local mechanical engineering firm to perform a limited condition survey of the building's mechanical systems, and recommend improvements. The engineers recommended replacement of both oil boilers and both air handlers in the building, along with refurbishment of the mechanical controls. In order to keep the project of a manageable size, their suggestion was that the work be split into two phases. The first phase would primarily refurbish the

Contact Name: Jesse Kiehl
Contact Number: 465-6827

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$70,000 Approved
10:26 AM 5/27/2011

buildings heating system, and the second would fully refurbish the ventilation system.

In 2011, SERRC obtained a proposed project scope of work and cost estimate based on the deficiencies found in the engineer's report. The contractor has worked in the building extensively in the past, and drew on their knowledge of the existing equipment and systems in the building to develop a prioritized scope of work. Copies of the engineering report and the contractor's recommendations are included with this proposal.

$70,000 funds the most critical elements of Phase 1 of this project, replacing both oil boilers, and plumbing them appropriately for efficiency and reliability. These funds will do much to refurbish and modernize the heating portion of the building's mechanical system. This is detailed in recommendation items 1 and 2 shown in the attached report. Replacing the old boilers with modern technology should reduce fuel oil consumption by at least 15%. This is estimated to be in the range of 700-1000 gallons per year, as shown in the attached utility log. More importantly, replacement of this equipment will prevent the inevitable failure of our heating system, and the costly emergency repairs that would likely result. These operational cost savings will help SERRC to continue to provide services to our clients around the state at a reasonable cost into the future.

These savings are passed on to school districts around the state. SERRC - Alaska's Educational Resource Center and the agency's adult education division, The Learning Connection, are funded entirely by grants and contracts. Understanding that money for educational services is generally in short supply, every attempt has been made to keep the agency's services affordable to its many clients (school districts). SERRC's auditor has commented that "SERRC's indirect cost is one of the lowest of our non-profit clients, and is indicative of its efficient administrative function." While these indirect funds do help to pay for routine maintenance of SERRC's infrastructure, funding major capital improvements is impossible without additional assistance like the funding requested here.

Project Timeline:

Expenditures are planned within the first few months of receipt of funds and should be complete within FY 12.

Entity Responsible for the Ongoing Operation and Maintenance of this Project:

Southeast Regional Resource Center, Inc.

Grant Recipient Contact Information:

Name:	Joan Pardes
Title:	Communications Director
Address:	210 Ferry Way
	Juneau, Alaska 99801
Phone Number:	(907)586-6806
Email:	joanp@serrc.org

Has this project been through a public review process at the local level and is it a community priority? ☐ Yes ☒ No

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10:26 AM 5/27/2011

Contact Name: Jesse Kiehl
Contact Number: 465-6827

SERRC – Alaska's Educational Resource Center

Proposed Capital Budget Request
(please see supporting documents)

1) Replace Boilers

Demolish and dispose of existing boilers		$ 3,000
Furnish and install 2 boilers		$ 15,000
Electrical		$ 2,000
Insulation		$ 1,500
Design		$ 3,000
Asbestos abatement		$ 8,500
	Total:	**$ 33,000**

2) Replace Boiler Room Piping, Valves, Pumps & Controls

Heat piping		$ 9,000
DHW piping and equipment		$ 3,500
Pumps		$ 4,500
Insulation		$ 7,500
Design		$ 5,000
Electrical		$ 5,000
Controls		$ 5,000
	Total:	**$ 39,500**

3) Maintenance, Thermostats & Insulation

Clean heating coils and finned radiation		$ 2,500
Test control valves, replacement, if required		$ 3,500
Replacement thermostats, relocate as required		$ 2,750
Electrical		$ 2,500
Replace missing insulation		$ 3,500
	Total:	**$ 14,750**

4) Air Handler Maintenance & Control Upgrade

Inspect and repair air handlers		$ 2,500
Design		$ 1,500
Electrical		$ 2,000
Replace controls		$ 7,500
	Total:	**$ 13,500**

5) Balance HVAC, Perform Ducting Modifications

Ductwork Modifications		$ 7,500
Louver and damper replacement		$ 2,500
Design		$ 3,000
Balancing		$ 6,500
	Total	**$ 19,500**

Phase I Cost: $120,250

Harri Plumbing & Heating, Inc.
809 West 12th Street
Juneau, Alaska 99801
t: 907.586.3190
f: 907.586.4129

February 8, 2011

Don Hiley, Facilities Program Manager
SERRC – Alaska Educational Resource Center
210 Ferry Way
Juneau, AK 99801

Re: Mechanical systems assessment of the Juneau SERRC Building located at 210 Ferry Way

Don,

Pursuant to your request, we have completed our assessment of the condition of the mechanical systems servicing your building. We have also spent considerable time reviewing the 2010 report prepared by Murray & Associates and have essentially come to the same conclusions regarding the present condition of the mechanical systems and their need of replacement. Rather than repeat all that is contained in the Murray & Associates report, I will simply ask that you include their report with ours for a comprehensive understanding of the systems and their general condition. Finally, we prepared a prioritized construction plan with a detailed budget and phasing schedule.

Prioritized Recommendations

1. Replace boilers, near boiler piping and appurtenances. ***The boilers are of an age that makes their reliability highly questionable. This is a simple remove and replace of the existing heating plants that will provide a base from which further upgrades can be made. Oil fired boilers are recommended as there is insufficient power available for electric boilers.***

2. Replace boiler room piping, isolation valves and pumps. Piping to be configured in a primary / secondary configuration with boiler staging allowing for true boiler redundancy. Replace boiler room controls. ***The modifications to the piping system and controls will optimize the efficiency of the core heating system. Standby losses will be minimized with outside temperature sensing, boiler staging and the consolidation of the domestic hot water. Provisions should be made for the future installation of an electric boiler.***

3. Perform maintenance on the terminal units and distribution system. Clean all heating coils and finned radiation. Test all control valves for function & replace if necessary. Replace all thermostats with programmable type, relocate as necessary. Replace pipe insulation where missing. ***This work element will ensure that we are delivering the heat where it is intended, maximizing the capabilities of the installed system. Relocating thermostats to accurately sense the temperature of the control area will eliminate many of the workplace temperature irregularities.***

4. Inspect air handlers, adjust and perform repairs as needed. Particular emphasis should be placed on the outside air dampers and their function. Replace air handler controls. ***This will result in maximizing the output capabilities of the air handlers. Replacing the controls will enhance the reliability of the operations over the current electro-mechanical time clock currently in use.***

5. Balance the ventilation system, replacing dampers & louvers as required to achieve the desired results. Extend ductwork as needed to properly distribute air to spaces not presently covered. ***Balancing the distribution of the available airflow to each area will address many of the workplace temperature irregularities.***

6. Replace air handlers. ***Replacing the air handlers will provide the required amount of air volume reliably and efficiently.***

While you can certainly approach this project in multiple stages, we believe work items one through five will make the largest impact on system reliability, energy consumption and overall comfort within the work areas. The air handlers, though outdated and undersized, should provide additional years of service without prohibitively expensive maintenance costs. Should you be unable to secure adequate funding to fully execute our recommendations, I strongly recommend that you find room in your budget to implement work items one and two prior to the onset of another winter.

Thank you for the opportunity to work with you on this project, please contact me at your convenience if we can be of further assistance.

Sincerely,

Harri Plumbing & Heating
Jeff Duvernay, President

1) Replace Boilers			
Demolish and dispose of existing boilers		$	3,000
Furnish and install 2 boilers		$	15,000
Electrical		$	2,000
Insulation		$	1,500
Design		$	3,000
Asbestos abatement		$	8,500
	Total:	**$**	**33,000**
2) Replace Boiler Room Piping, Valves, Pumps & Controls			
Heat piping		$	9,000
DHW piping and equipment		$	3,500
Pumps		$	4,500
Insulation		$	7,500
Design		$	5,000
Electrical		$	5,000
Controls		$	5,000
	Total:	**$**	**39,500**
3) Maintenance, Thermostats & Insulation			
Clean heating coils and finned radiation		$	2,500
Test control valves, replacement if required		$	3,500
Replace thermostats, relocate as required		$	2,750
Electrical		$	2,500
Replace missing insulation		$	3,500
	Total:	**$**	**14,750**
4) Air Handler Maintenance & Control Upgrade			
Inspect and repair air handlers		$	2,500
Design		$	1,500
Electrical		$	2,000
Replace controls		$	7,500
	Total:	**$**	**13,500**
5) Balance HVAC, Perform Ducting Modifications			
Ductwork modifications		$	7,500
Louver and damper replacement		$	2,500
Design		$	3,000
Balancing		$	6,500
	Total:	**$**	**19,500**
6) Replace Air Handlers			
Demolish and dispose of AH1		$	4,000
Furnish and install new air handler		$	18,000
Demolish and dispose of AH2		$	5,000
Furnish and install new air handler		$	22,000
Design		$	7,500
Controls		$	5,000
	Total:	**$**	**61,500**

Energy Consumption and Degree Day Records

SERRC BUILDING 210 Ferry Way, Juneau AK

1st fiscal year: **FY 08** 2nd fiscal year: **FY 09** 3rd fiscal year: **FY 10** 4th fiscal year: **FY 11**

Utility or Measurement 1: **Electricity** — Unit of Measurement 1: **KWH**
Utility or Measurement 2: **Fuel Oil Deliveries** — Unit of Measurement 2: **Gallons**
Utility or Measurement 3: **Water** — Unit of Measurement 3: **Gallons**
Utility or Measurement 4: **Heating Degree Days** — Unit of Measurement 4: **Degree Days**

Electricity FY 08

	KWH	KW	Cost
July	12,880	40	$847.20
August	12,000	40	$809.95
September	13,880	50	$958.23
October	14,160	50	$1,502.10
November	12,800	50	$1,409.76
December	14,000	50	$1,491.24
January	12,880	50	$1,430.74
February	9,440	50	$1,181.62
March	10,440	50	$1,249.51
April	14,960	50	$1,556.42
May	10,480	30	$5,228.32
June	10,400	30	$1,141.90
FY Total	148,320		$18,806.99

Electricity FY 09

	KWH	KW	Cost
July	14,440	40	$1,424.76
August	14,000	40	$1,374.92
September	15,000	50	$1,520.26
October	14,960	50	$1,528.01
November	10,760	40	$1,148.12
December	15,560	50	$1,567.61
January	14,840	50	$1,520.08
February	14,680	50	$3,447.06
March	14,720	50	$1,544.82
April	15,200	40	$1,441.14
May	15,200	40	$975.56
June	15,000	40	$978.79
FY Total	174,360		$18,471.13

Electricity FY 10

	KWH	KW	Cost
July	15,040	40	$969.53
August	15,600	50	$1,074.06
September	13,760	50	$981.41
October	16,280	50	$1,372.46
November	15,120	50	$1,302.79
December	13,160	50	$1,217.91
January	13,760	50	$1,234.25
February	14,040	50	$1,248.36
March	15,560	50	$1,324.98
April	15,840	40	$1,185.98
May	13,760	40	$922.66
June	15,040	40	$968.12
FY Total	176,960		$13,802.51

Electricity FY 11

	KWH	KW	Cost
July	15,720	30	$1,119.99
August	15,240	40	$1,188.86
September	15,000	30	$1,081.25
October	13,560	30	$1,269.73
November	15,680	50	$1,652.61
December			
January			
February			
March			
April			
May			
June			
FY Total	75,200		$6,312.44

Fuel Oil Deliveries FY 08

	Quantity	Price/Gal	Cost
July	389	$2.68	$1,043.06
August	231	$2.80	$647.64
September	282	$2.75	$775.23
October	432	$2.75	$1,188.28
November	605	$3.05	$2,150.87
December			
January	525	$3.10	$1,627.50
February	537	$3.11	$1,671.18
March	624	$3.45	$2,149.82
April	391	$3.62	$1,416.87
May	320	$3.92	$1,252.44
June	665	$4.22	$2,809.67
FY Total	5,001		$16,732.56

Fuel Oil Deliveries FY 09

	Quantity	Price/Gal	Cost
July	296	$4.35	$1,287.17
August	224	$4.35	$972.66
September	256	$4.30	$1,099.08
October	287	$3.95	$1,135.23
November	235	$3.53	$828.14
December	1,009	$3.12	$3,143.76
January	689	$2.77	$1,909.65
February	508	$2.58	$1,311.21
March	308	$2.17	$667.28
April	397	$2.17	$861.49
May	320	$2.17	$694.18
June	367	$2.32	$852.37
FY Total	4,895		$14,762.22

Fuel Oil Deliveries FY 10

	Quantity	Price/Gal	Cost
July			
August	287	$2.32	$664.91
September	285	$2.55	$727.52
October	256	$2.55	$653.82
November	246	$2.55	$626.03
December	694	$2.62	$1,817.16
January	389	$2.66	$1,034.01
February	329	$2.66	$874.41
March	744	$2.63	$1,956.96
April	253	$2.66	$673.78
May	321	$2.81	$901.73
June			
FY Total	3,805		$9,930.33

Fuel Oil Deliveries FY 11

	Quantity	Price/Gal	Cost
July	247	$2.73	$673.49
August			
September	374	$2.81	$1,049.54
October	417	$2.93	$1,220.93
November	522	$2.99	$1,560.48
December			
January			
February			
March			
April			
May			
June			
FY Total	1,559		$4,504.44

Heating Degree Days FY 08

July	262
August	276
September	449
October	703
November	884
December	1,155
January	1,192
February	1,072
March	921
April	790
May	526
June	416
FY Total	8,646

Heating Degree Days FY 09

July	364
August	342
September	455
October	722
November	883
December	1,317
January	1,211
February	1,057
March	1,122
April	771
May	524
June	318
FY Total	9,086

Heating Degree Days FY 10

July	209
August	288
September	452
October	685
November	893
December	1,143
January	1,095
February	795
March	871
April	688
May	454
June	335
FY Total	7,908

Heating Degree Days FY 11

July	315
August	267
September	425
October	685
November	894
December	1,297
January	
February	
March	
April	
May	
June	
FY Total	3,883

Murray & Associates, P. C. *Consulting Engineers*

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February 9, 2010

Don Hiley, Facilities Program Manager
SERRC – Alaska Educational Resource Center
210 Ferry Way,
Juneau, Alaska 99801

Subject: SERRC Building @ 210 Ferry Way - Mechanical Systems Survey and Recommendations

Don:

Roger Smith P.E. and Douglas Murray P.E. performed a site visit on February 5, 2010 and inspected the mechanical heating and ventilation systems. A previous survey report dated 1998 was used for reference. Many of the problems outlined in the 1998 report still exist and so this report is included for reference.

SUMMARY: The heating plant system is past its service life with boilers over 40 years old, pumps have been disconnected, piping is old and corroding, pipe insulation is lacking with some asbestos present, and controls are not operative. Recommend replacing the entire heating plant with new boiler(s), insulated piping, pumps, and heating plant controls. Two oil-fired boilers connected in parallel are recommended for diversity and greater efficiency, with a single electric boiler alternate also listed. Recommended for this phase of Work includes minor ductwork modifications, cleaning of booster coils, and related electrical work. The controls for the rest of the building (AHU-1, AHU-2, and room temperature zoning) should be investigated for correct operation and consideration for total replacement of controls at a later phase of construction. The Work outlined here is the highest priority and is the first phase of at least two or three phases of Work to upgrade the mechanical systems as necessary for extended equipment life, increased efficiency, and improved occupant comfort.

DESCRIPTION OF MECHANICAL SYSTEMS: The following is an update to the 1998 Mechanical condition survey. See the 1998 report for additional information.

Heating System: The heating plant consists of two oil fired boilers which supply heating water to the building. Boiler B-1 serves the first floor and is now approximately 50 years old. Boiler B-2 serves the upper floor and is approximately 40 years old. These boilers are past their normal service life and should be replaced along with the boiler room piping, pumps, and controls. The first floor is heated through the use of four duct mounted booster coils. Radiation baseboard units supply heating to much of the exterior offices of the second floor. It was reported that the occupants of the 2nd floor are cold in the winter and warm in the summer. Many of the offices have electric space heaters for use in the winter. Small, portable fans are also located in several of the offices, presumably for use in the summer to cool the space. Inadequate zoning and poor heat output of the radiation system is contributing to Occupant discomfort.

Ventilation System: AHU-1 provides heating and ventilation air for the first floor, including four booster coils for heating. AHU-2 serves the second floor and has one booster coil for heating. AHU-1 and AHU-2 are past their normal service life. The air handling units are not providing the required amount of outdoor air necessary to meet indoor air quality standards and building codes. It is recommended that the control system be repaired for proper operation in order to increase building comfort and as necessary to provide the proper amount of outdoor air as required by code.

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The first floor is heated via the air distribution system through the use of (4) room thermostats and (4) booster coils. The first floor ductwork and wall layout has been modified several times in the buildings lifetime, most recently in 1999. Due to these modifications to the space, the current duct distribution system is now improperly zoned resulting in warm/cold spaces and poor comfort levels. The duct distribution system should be revised to provide proper zoning.

The second floor air handler provides ventilation for the second floor offices. AHU-2 also provides heating for one group of offices utilizing a booster coil. The heating controls for the air handler and booster coil do not appear to be working properly and should be repaired. The inadequacy of proper outdoor air delivered to the spaces reduces the opportunity for natural cooling in addition to poor indoor air quality for the occupants.

Replacement of automatic controls for the air handler units is also recommended in order to increase building energy efficiency; however, only minor refurbishment should be done at this time with a full replacement done at the same time as the air handling unit replacement. Minor refurbishment of the air handling units would consist of investigating workability of existing controls and the replacement of failed controllers, actuators, time clocks, and thermostats.

As the air handling units are past their normal service life, replacement of the two air handling units should be planned for the near future. The replacement could be done in two future phases. Since the first floor air handling unit is older, the replacement of the AHU-1 could be accomplished in Phase 2 while the second floor air handling unit (AHU-2) replacement could be accomplished in Phase 3.

Roger Smith, P.E.
Murray & Associates, P.C.

CONDITION SURVEY
EASTAUGH BRADLEY BUILDING
JUNEAU, ALASKA
APRIL 6, 1998

GENERAL:

The lower floor of the building was constructed as the Juneau Clinic about 1955 and then remodeled in 1962. In the late 1960's or about 1970 the second floor was added. Boiler No. 1 and the pumps and piping were installed in the original first floor installation. Boiler No. 2 with pumps and piping were installed when the second floor was added. There are two separate hot water heating systems, each including a boiler, pumps, piping, radiation units, ventilating units, and controls.

The arrangement of the interior spaces and air and radiation systems were modified in 1979 and again in 1995. The ventilating units, pumps, and boiler room equipment are the original installed.

DESCRIPTION OF SYSTEMS:

A. Lower Floor: Ventilation is provided by ventilating unit VU-1 located near the boiler room. Outside air is drawn in through a roof intake. The gooseneck intake is only about two feet above the flat roof. A return fan either delivers the air to the ventilating unit VU-1 or discharges the air to the outside. Automatic dampers, controlled by a mixed air thermostat, direct the airflow. Normally a mixed air temperature of 60F is desired.

Most of the exterior radiation heating was removed in the 1995 modification. Unit heaters in both stairs, and heating units in the south rental area, northeast corner, and in the corridor portion of the building that is located on the Franklin Street entrance still remain. Four booster coils in the air heating system remain. Pump P-4 circulates heating water to these heating units.

Full boiler water temperature is delivered to the baseboard radiation units and the ventilating unit VU-1 heating coil. Pump P-1 serves VU-1. Pump P-4 delivers heating water to the booster coils and the radiation units in the northeast corner and the corridor to south Franklin Street. Pump P-3 was to serve the southwest part of the building, however, in the modifications of 1995, the piping and radiation system was eliminated.

Air conditioning was installed by the Columbia Emeralds International renters in 1995. It consists of two 5-ton systems with fan-coil units located above the ceiling and two air cooled condensers and compressor units located on the roof. It is still owned by the tenants.

B. Second Floor: Ventilation is provided by ventilating unit VU-2 located in the fan room on the second floor. Outside air is drawn in through a gooseneck intake duct

on the roof. The fan room serves as a return air plenum, with a return air grille in the wall open to the corridor. A mixed air thermostat controls the air mixing dampers. Face and bypass dampers control the amount of air that goes through the heating coil, controlled by a thermostat in the supply air. A thermostat on the leaving side of the heating coil controls a two-way valve in the heating supply to the coil.

A booster coil is installed in the branch duct serving the Northwest side, with a room thermostat controlling a three-way valve. Pump P-2 provides the heating water for the booster coil and for the VU-2 coil. A two-way valve is on the heating water to the VU-2 coil.

Radiation heating elements for the second floor are served by pump P-5. Three zone valves are controlled by room thermostats.

C. Other Equipment: The boilers installed are the original units. They are cast-iron hot water heating type. Boiler No. 1 is about 40 years old and boiler No. 2 is over 25 years old. They appear to be in acceptable operating condition. The heating circulating pumps also appear to be functioning properly. Ventilating unit No. 1 is a Western Blower Co. unit which has not been manufactured for over 35 years. It still appears to be operating adequately. Ventilating unit No. 2 and the return fan for ventilating unit No. 1 appear to be in satisfactory condition. All the equipment has passed their normal service life but appears to be operating satisfactorily.

ANALYSIS:

A. Code Requirements:
   1. The Uniform Building Code requires the introduction of outside air for dilution of the ventilation air and for makeup of exhaust air. The controls are not set correctly, and little or no outside air is delivered to the building. The units operate on mostly recirculated air.

   2. On the first floor, the ceiling space is being used for a return air plenum. This is prohibited by the Uniform Mechanical Code 1994, Section 601 and the Electrical Code because the exposed wiring above the ceiling is not plenum rated.

   3. The ventilation system has been modified by the tenants on the lower floor with diffusers, grilles and ductwork removed. The air volumes currently do not meet the code requirements.

B. Operating Deficiencies:
   1. The automatic controls for ventilating unit VU-2 have been changed, resulting in the system not operating as intended. The mixed air temperature control is set too high. Consequently the temperature in the rooms is too high due to the lack of outside air to provide natural cooling. Mixing damper settings have been changed.

   2. Only a small portion of the heating water piping is insulated. The heating piping

above the ceiling emits heat, all the time, even in moderate weather, thus contributing to the overheating of the building. Room temperatures cannot be controlled.

3. The air systems are not adjusted because many modifications have been made to the duct systems. Some supply air diffusers have too much air and others none. Some supply air diffusers and return air grilles have been eliminated. Lack of proper adjustment results in inadequate or excessive air flows into each room.

4. Modifications have been made to the radiation water system. Heating elements have been eliminated and piping has been re-routed. The systems are not adjusted for proper heating water flow. No adjusting fittings are installed for the adjustment of water flows.

5. Thermostats have been moved or eliminated during above modifications resulting in a lack of proper control to certain rooms.

6. Normally outside air is taken in and mixed with the recirculated air to deliver a supply air temperature of about 60F. The introduction of outside air provides some natural cooling to the building when the outside temperature is 60F or below. The mixed air temperature thermostats are not set correctly.

7. The outside air intakes for the two ventilating units are too close to the roof. In moderate and during warm weather, heat radiating from the flat built-up roof warms the air taken in by the ventilating units. The present arrangement results in a warmer supply air delivered to the interior than the actual outside temperature. There is much natural cooling potential lost.

8. The baseboard heating piping for the second floor heating elements along the southeast side of the building has been modified. Originally, the return piping was located above the baseboard heating element and the baseboard ran continuously along the entire length of the wall. The length of baseboard in each room has been reduced to about half the original lengths installed, and the heating supply and heating return piping was installed at the ceiling of the first floor, with each piece of baseboard fed from below. The up and down modified heating piping results in high and low points in the piping system, with no means to drain the piping or eliminate the air at the high points.

9. On the second floor air is supplied to the individual rooms. With the room door closed, there is no provision made for the air to get to the corridor which is used as the return plenum.
10. An exhaust air damper has not been installed in the discharge of the return fan serving the lower floor. This allows outside air to blow into the building when the return fan is not operating.

RECOMMENDATIONS:

A. The air supply systems should be redesigned and modified to meet code ventilation requirements. Because changes in room configurations have been done, modifications in air volumes and delivery are required. The second floor system will require installation of some balancing dampers for air adjustment. Relief ducts and grilles should be installed in each room on the second floor to allow relief to the corridor.

B. The heating water distribution systems need to be modified. There is no individual room control on the second floor. Automatic radiator valves should be installed for each room, with room thermostats. Manual air vents are required at each high point for elimination of air. The heating capacity originally installed has been reduced to about one-half capacity. Re-engineering of the heating system is required.

C. All controls need to be checked for serviceability and set correctly. Some re-engineering is required for zoning and correct operations.

D. The outside air intakes for both ventilating units should be raised to five feet above the roof so that cooler air can be obtained during mild and warm weather.

E. All heating water piping in the building should be insulated to conserve energy and to preclude overheating of the spaces during warm weather. Only a small amount of piping is insulated at present. No heating piping in the boiler room or mechanical rooms is insulated.

F. The baseboard installed is the residential type. It is not a quality type as normally used in office areas. It has a low capacity per lineal foot, and is subject to damage. There is no room in the baseboard enclosure for the installation of automatic radiator valves or specialties. Due to previous reduction of heating capacity in the second floor offices, the remaining capacity should be checked for adequacy.

CONCLUSION:

The mechanical systems generally are in fair operating condition. The main problem is that the existing systems were changed, modified and parts eliminated without consideration for operating efficiencies, code requirements, comfort conditions, and good engineering judgment. This has resulted in an uncoordinated mess, with which satisfactory comfort conditions cannot be obtained.

Murray & Associates, P. C.
Consulting Engineers

SERRC HEATING PLANT AND MECHANICAL SYSTEMS PHASE 1 RENOVATION
Juneau, Alaska February 10, 2010

OPTION #1 - Two Oil-fired Boilers Cost Element	Quantity	Rate	Subtotal	Total
01 Demolition				
011 Boiler (2), Piping, Trim	1 ls	$3,600.00	$3,600	
012 Electrical, Controls	1 ls	$1,500.00	$1,500	
013 Minor Abatement; Pipe Elbows (14)	1 ls	$10,000.00	$10,000	
Total				$15,100
08 Mechanical - Heating Plant				
081 Boilers (2) 212 MBH ea	2 ls	$6,500.00	$13,000	
082 Boiler Room Piping, Pumps (4), Valves	1 ls	$9,000.00	$9,000	
083 Breeching to Existing (Neg Pressure)	1 ls	$2,000.00	$2,000	
084 Pipe Insulation	1 ls	$5,000.00	$5,000	
085 Misc	1 ls	$1,000.00	$1,000	
Total				$30,000
08 Mechanical - Ventilation				
086 Repair/Modify Ductwork for Proper Zoning	1 ls	$6,500.00	$6,500	
087 Cleaning Booster Coils, Minor Ductwork	1 ls	$2,500.00	$2,500	
088 Testing and Balancing Air System	1 ls	$3,000.00	$3,000	
089 Misc	1 ls	$1,000.00	$1,000	
Total				$13,000
09 Electrical				
091 Boiler (2), Pumps (4) Power	1 ls	$5,000.00	$5,000	
092 Electrical Service	1 ls	$0.00	$0	
Total				$5,000
10 Controls				
101 Heating Plant Controls; Boilers, Pumps	1 ls	$5,500.00	$5,500	
Total				$5,500
12 General Requirements				
121 Mobilization	1 ls	$1,500.00	$1,500	
122 Profit		8%	$5,608	
Total				$7,108
13 Contingencies				
131 Estimating Contingency		15%	$9,091	
Total				$9,091
14 Engineering - Bid Docs, Construction Admin				
141 Mechanical & Electrical @ 20%	1 ls	$16,959.84	$16,960	
Total				$16,960
OPTION #1 TOTAL ESTIMATED COST (Rounded):				**$101,759**

SERRC HEATING PLANT AND MECHANICAL SYSTEMS PHASE 1 RENOVATION
Juneau, Alaska

February 10, 2010

OPTION #2 - One Electric Boiler Cost Element	Quantity	Rate	Subtotal	Total
01 Demolition				
011 Boiler (2), Piping, Trim	1 ls	$3,600.00	$3,600	
012 Electrical, Controls	1 ls	$1,500.00	$1,500	
013 Minor Abatement; Pipe Elbows (14)	1 ls	$10,000.00	$10,000	
Total				$15,100
08 Mechanical - Heating Plant				
081 Boilers (1) 420 MBH, 120 KW	1 ls	$25,000.00	$25,000	
082 Boiler Room Piping, Pumps (4), Valves	1 ls	$8,000.00	$8,000	
084 Pipe Insulation	1 ls	$4,500.00	$4,500	
085 Misc	1 ls	$2,000.00	$2,000	
Total				$39,500
08 Mechanical - Ventilation				
081 Repair/Modify Ductwork for Proper Zoning	1 ls	$6,500.00	$6,500	
086 Cleaning Booster Coils, Minor Ductwork	1 ls	$2,500.00	$2,500	
086 Testing and Balancing Air System	1 ls	$3,000.00	$3,000	
088 Misc	1 ls	$1,000.00	$1,000	
Total				$13,000
09 Electrical				
091 Boiler (1), Pumps (4) Power	1 ls	$6,000.00	$6,000	
092 Electrical Service	1 ls	$25,000.00	$25,000	
Total				$31,000
10 Controls				
101 Heating Plant Controls; Boilers, Pumps	1 ls	$5,500.00	$5,500	
Total				$5,500
12 General Requirements				
121 Mobilization	1 ls	$1,500.00	$1,500	
122 Profit		8%	$8,448	
Total				$9,948
13 Contingencies				
131 Estimating Contingency		15%	$14,842	
Total				$14,842
14 Engineering - Bid Docs, Construction Admin				
141 Mechanical & Electrical @ 20%	1 ls	$22,758.04	$22,758	
Total				$22,758
OPTION #2 TOTAL ESTIMATED COST (Rounded):				**$129,000**