

PBEEEP

State Government

Public Buildings Enhanced Energy Efficiency Program

Investigation Results For Bemidji State University



BEMIDJI
STATE UNIVERSITY



Minnesota
STATE COLLEGES
& UNIVERSITIES

5/14/2012

PBEEEP
State Government

Table of Contents

Investigation Report..... Section 1

Bemidji State University Overview.....	5
Summary Tables.....	6
Facility Overview.....	8

Summary of Findings..... Section 2

Findings Details..... Section 3

Findings Details, includes Summary, Details and Investigative Checklist

Clark Library	(Pages 1-5)
American Indian Center	(Pages 6-8)
Bridgeman Hall	(Pages 9-12)
Deputy Hall	(Pages 13-20)
Educations/Art	(Pages 21-26)
Gillette Rec/Fitness	(Pages 27-31)
Hagg-Sauer	(Pages 32-35)
Hobson Hall	(Pages 36-40)
Memorial Hall	(Pages 41-42)
Physical Education	(Pages 43-45)
Sattgast Hall	(Pages 46-48)
Walnut Hall	(Pages 49-54)

Lighting Counts By Building	
Suggested Air Handler Schedules	(Pages 1-16)

Bemidji State University Screening Report.....Section 4

PBEEEP Deleted Findings	
PBEEEP Screening Report	

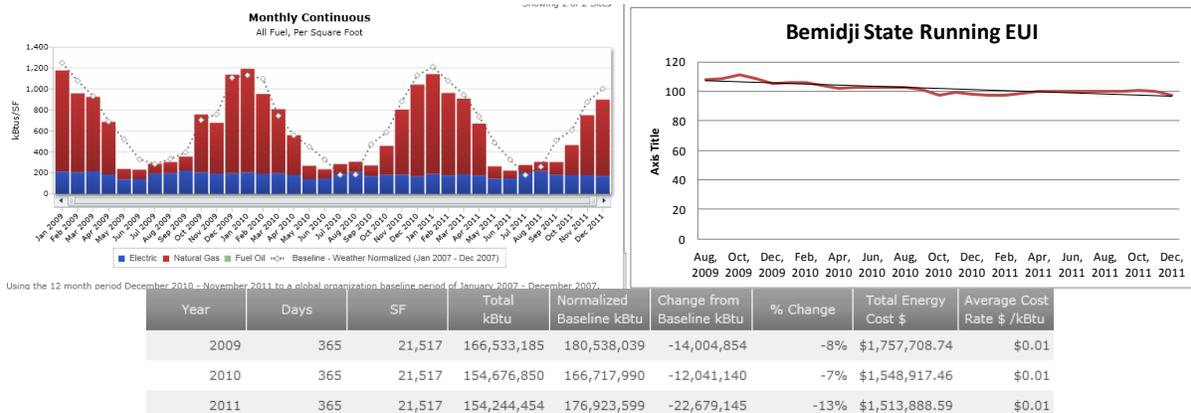


This Documentation is owned and copyrighted by Center for Energy and Environment
Copyright © 2012 All Rights Reserved.

Investigation Overview

The goal of a PBEEEP Energy Investigation is to identify energy savings opportunities with a payback of fifteen years or less. Particular emphasis is on finding those opportunities that will generate savings with a relatively fast (1 to 5 years) and certain payback. During the investigation phase the provider conducts a rigorous analysis of the building operations. Through observation, targeted functional testing, and analysis of extensive trend and portable logger data, the energy engineering provider identifies deficiencies in the operation of the mechanical equipment, lighting, envelope, and related controls. The investigation of the Bemidji State University was performed by Karges Faulconbridge, Inc. This report is the result of that information.

Payback Information and Energy Savings			
Total Project costs (Without Co-funding)		Project costs with Co-funding	
Total costs to date including study	\$181,471	Total Project Cost	\$304,416
Future costs including Implementation , Measurement & Verification	\$122,945	Study and Administrative Cost Paid with ARRA Funds	(181,471)
Total Project Cost	\$304,416	Utility Co-funding	(\$)
Estimated Annual Total Savings (\$)	\$44,886	Total costs after co-funding	\$119,945
Total Project Payback (years)	6.8	Estimated Annual Total Savings (\$)	\$44,886
		Total Project Payback (years) with co-funding	2.7
Electric Energy Savings		8.9 % and Natural Gas Savings	
		2.7 %	
(Savings percentages are based on buildings in this project)			



Bemidji State University Consumption Report; total energy usage has decreased 3% over the period of the investigation



STATE OF MINNESOTA B3 BENCHMARKING

Summary Tables

Facility Name	Bemidji State University
Location	1500 Birchmont Avenue NE, Bemidji, MN 56601
Facility Manager	Michael Kruse Energy Management and Electronics Coordinator
Number of Buildings Investigated	14
Interior Square Footage Investigated	878,529
PBEEEP Provider	Karges Faulconbridge, Inc.
Study Period	Summer 2011 – Winter 2012
Site Project Manager	Jeff Sande Physical Plant Manager
Annual Energy Cost	\$1,513,889 (2011 from B3)
Utility Company	Electric: Otter Tail Power Company Natural Gas: Minnesota Energy Resources
Site Energy Use Index (EUI)	102 kBtu/sqft (at beginning of study) 99 kBtu/sqft (at end of study)
Benchmark EUI (from B3)	128 kBtu/sqft

Buildings Investigated:

The fourteen buildings listed below totaling 878,529 interior square feet at Bemidji State University were investigated.

Building Name	State ID	Building Type	Area (Square Feet)	EUI	Year Built
A.C. Clark Library	E26070S1366	Library	71,462	80	1966
American Indian Resource Center	E26070S9302	Administration	10,388	129	2002
Bridgeman Hall	E26070S1264	Academic	33,772	93	1964
CAET	E26070S9403	Academic	25,349	93	2003
Deputy Hall	E26070S0118	Administration	78,656	95	1918
Education-Art Building	E26070S0650	Academic	53,342	81	1950
Gillett Recreation-Fitness Center	E26070S2189	Athletic	85,765	46	1989
Hagg-Sauer Hall	E26070S1570	Academic	82,478	62	1970
Heating Plant	E26070S0325	Mechanical	20,317	70	1925
Hobson Memorial Student Union	E26070S8067	Student Union	76,756	120	1967
Memorial Hall	E26070S0540	Mixed Use	53,893	66	1940
Phy Ed-Glas Field House	E26070S0959	Athletic	121,586	72	1959
Sattgast Hall of Science	E26070S1162	Academic	107,598	116	1962
Walnut Hall	E26070S5669	Dining Hall	57,167	268	1969

Based on sub-metered or metered data from B3.

Mechanical Equipment Summary Table	
3	Building Automation Systems (Honeywell, Johnson Controls, Trane)
14	Buildings
878,529	Interior Square Feet
79	Air Handlers
281	VAV Boxes
124	Exhaust Fans and Power Roof Ventilators
53	Unit Heaters
3	Chillers
1	Cooling Tower
4	Steam Boilers (dual fuel- natural gas or fuel oil)
2	Hot Water Boilers
71	Pumps (HW, CHW, etc)
20	Heat Exchangers
2,343	Minimum points for trending per PBEEEP Guidelines
4,289	Points available for trending
84	Data loggers required (52 temperature, 27 motor status, 5 current)

*NOTE: This table does not include equipment that is no longer in use, including the chiller in Hobson Memorial Student Union and the refrigeration system for the ice rink at Phy Ed-Glas Field House.

Implementation Information			
Estimated Annual Total Savings (\$)		\$44,886	
Total Estimated Implementation Cost (\$)		\$119,945	
GHG Avoided in U.S Tons (CO2e)		552	
Electric Energy Savings (kWh) (2011 Usage 6,232,300 kWh)*	8.9 % Savings	555,965	
Electric Demand Savings (Peak kW) (2011 Peak demand was 3,145 kW)	5.2 % Savings	163	
Natural Gas Savings (Therms) (2011 Usage 507,964 Therms)*	2.7 % Savings	13,692	
Statistics			
Number of Measures identified		42	
Number of Measures with payback < 3 years		48	
Screening Start Date	11/18/2010	Screening End Date	3/23/2011
Investigation Start Date	05/24/2011	Investigation End Date	4/25/2012
Final Report	5/14/2012	Report Presentation	

*Prorated based on submetering data as 47% of total campus

Bemidji State Cost Information			
Phase		To date	Estimated
Screening		\$11,676	
Investigation [Provider]		\$157,800	
Investigation [CEE]		\$11,995	\$1,000
Implementation			\$119,945
Implementation [CEE]			\$1,000
Measurement & Verification			\$1,000
	Total	\$181,471	\$122,945

Co-funding Summary	
Study and Administrative Cost	\$181,471
Otter Tail Power Co-funding (\$)	
Total Co-funding (\$)	\$181,471

Summary of Savings per Building

Building	Initial EUI (kbtu/ft²)	Savings Found (kbtu/ft²)	% Savings
American Indian Center	129	5.7	4.4%
Bridgeman Hall	80	4.0	4.3%
Clark Library	93	10.6	13.3%
Deputy Hall	95	1.2	1.3%
Education/Art	81	4.6	5.6%
Gillette Rec/Fitness	46	5.7	12.3%
Hagg-Sauer	62	1.4	2.2%
Hobson Memorial	120	3.6	3.0%
Memorial Hall	66	2.2	3.3%
Physical Education	72	3.1	4.3%
Sattgast Hall	116	2.4	2.0%
Walnut Hall	268	6.1	2.3%
Total of all Buildings	96	5.7	3.9%

Bemidji State University Overview

The energy investigation of fourteen buildings that make up 47% of the energy use (based on submetering data) at Bemidji State University identified 3.9% of energy savings in these buildings with measures that payback in less than 15 years and do not adversely affect occupant comfort. The energy savings opportunities identified at Bemidji State University include adjusting air handler operations to better match building operational schedules when spaces are not occupied, replacing 32 Watt lighting with more effective 28W lighting and other controls optimization. The total cost of implementing all the measures is \$131,945.

Implementing all these measures can save the facility approximately \$44,886 a year, paying back the cost of implementation by energy savings in 2.9 years. Because the study was paid for with ARRA funds the payback is based only on the implementation costs (the study cost is excluded).

During the period of the PBEEEP investigation energy use at Bemidji State University decreased by about 3% compared to the year prior to the study. It is now 29% below the benchmark value according to the Minnesota Benchmarking and Beyond database (B3).

Bemidji State University is comprised of 27 buildings ranging in size from 10,388 to 128,550 square feet. The total area of the buildings on campus is 1,579,243 square feet. The campus has eight classroom/laboratory buildings, three administration buildings, three athletics buildings, seven dormitories, a dining hall, a library, a student union, a skyway, a warehouse, and a heating plant. Some of the buildings are attached to other buildings via open hallways or are additions to buildings. All of the buildings are located on campus, which is on the shore of Lake Bemidji and stretches six blocks long.

Mechanical Equipment

The Heating Plant houses the central steam and chilled water plant for the campus. There are three high pressure steam boilers that operate during the fall, winter, and spring and a low pressure steam boiler that is used during the summer. The high pressure steam boilers operate between 80 and 100 psi and the “summer boiler” operates around 11 psi. During the winter, one or two boilers operate at a time, and even during extremely cold weather, the largest boiler alone can handle the heating load for the entire campus. All four boilers are shut down for two to three weeks during the spring for annual maintenance, during which electric water heaters provide domestic hot water to the buildings. There are two chillers in the Heating Plant that provide chilled water to the campus. Only one operates at a time due to the constraints of the cooling tower capacity. All of the recommended buildings use steam and chilled water from the Heating Plant except for the American Indian Resource Center (AIRC), which has its own boilers and chiller, and the Physical Education and Glas Field House, which use steam from the Heating Plant and has some Direct Expansion (DX) cooling, but is mostly not cooled. All of the recommended buildings that use steam from the Heating Plant have their own converters and pumps that circulate hot water to the air handlers, reheats, and radiation for heating.

Controls and Trending

There are three automation systems that control the equipment in the buildings on campus. There is a Honeywell Excel Building Supervisor System that controls the majority of the buildings on campus. The chillers in the heating plant are controlled by a Trane Tracer Summit System and the Sattgast Hall addition is controlled by a Johnson Controls Metasys System. Neither the boilers in the Heating Plant nor any of the equipment in Walnut Hall is on any of the automation systems. Daily logs are kept on the boiler operation in the Heating Plant, but otherwise data logging will be required for these buildings.

A number of BAS system upgrades were done prior to the start of the project, using ARRA funds. The provider, KFI, Inc. noted that while an improvement over the prior status, it is likely that increased energy savings would be possible if the system were fully upgraded to be comparable to the system found in other large Minnesota State Universities, such as MSU Moorhead.

Lighting

The majority of interior lighting on campus is 32 watt T8s. The A.C. Clark Library has a stand-alone light control system and there are some motion sensors throughout the campus, but otherwise the majority of interior lighting is controlled by manual switches.

Approximately 90% of the exterior lighting is high pressure sodium fixtures and 10% are metal halide. Most of the lighting is 100 or 250 watt. All exterior lights are controlled by a photocell.

Submetering

The electricity and steam used by the buildings is sub-metered and the usage data is collected and stored electronically. The building staff is aware that the steam meters are prone to getting out of calibration and so buildings can have much higher reported energy use than is actually occurring. In monthly sub-metering reports, it was found that the steam produced by the heating plant was lower than the total amount of steam used in each building, according to the sub-metering data. Therefore, although the data is useful in providing relative usage, it is not accurate for absolute values. The chilled water use of the buildings is not sub-metered, so that portion of energy used by each building is not being tracked. Because the steam metering is inaccurate and chilled water use is not being sub-metered, the EUI for each building cannot be calculated for this site.

Findings Summary

Site: Bemidji State



Eco #	Building	Investigation Finding	Total Cost	Savings	Payback	Co-Funding	Payback Co-Funding	GHG
1	Clark Library	Excessive Enabling (24/7)	\$400	\$5,772	0.07	\$0	0.07	79
4	Physical Education	Excessive Enabling (24/7): AHU-4 (PE - Locker Rm & Training Rm)	\$400	\$2,460	0.16	\$0	0.16	34
1	Gillett Rec/Fitness	Excessive Enabling (24/7): AHU--6	\$400	\$2,402	0.17	\$0	0.17	34
1	Sattgast Hall	Excessive Enabling (24/7): AHU-6	\$400	\$2,181	0.18	\$0	0.18	30
3	Physical Education	Excessive Enabling (24/7): AHU-2 (PE - East Gym)	\$400	\$1,985	0.20	\$0	0.20	27
2	Clark Library	Excessive Enabling (24/7)	\$400	\$1,935	0.21	\$0	0.21	26
3	Gillett Rec/Fitness	Excessive Enabling (24/7): AHU-9	\$400	\$1,664	0.24	\$0	0.24	22
4	Education/Art	Excessive Enabling of Equipment: AHU-1	\$400	\$1,628	0.25	\$0	0.25	21
1	Memorial Hall	Excessive Enabling of Equipment: AHU-1	\$400	\$1,454	0.28	\$0	0.28	20
1	Bridgeman Hall	Excessive Enabling of Equipment	\$400	\$1,042	0.38	\$0	0.38	16
2	Gillett Rec/Fitness	Excessive Enabling (24/7): AHU-8	\$400	\$904	0.44	\$0	0.44	13
7	Hobson Memorial	Excessive Enabling of Equipment: AHU-3	\$400	\$851	0.47	\$0	0.47	9
6	Hobson Memorial	Excessive Enabling of Equipment: AHU-2	\$400	\$665	0.60	\$0	0.60	8
5	Hobson Memorial	Excessive Enabling of Equipment: AHU-1	\$400	\$639	0.63	\$0	0.63	9
1	American Indian Center	Excessive Enabling of Equipment	\$400	\$554	0.72	\$0	0.72	6
5	Walnut Hall	Excessive Enabling (24/7): AIRCON-4	\$1,200	\$1,580	0.76	\$0	0.76	18
2	Bridgeman Hall	Excessive Enabling of Equipment	\$400	\$498	0.80	\$0	0.80	8
2	Hagg-Sauer Hall	Excessive Enabling of Equipment: AHU-2	\$400	\$315	1.27	\$0	1.27	4
3	Clark Library	Excessive Enabling (24/7)	\$400	\$259	1.55	\$0	1.55	4
1	Education/Art	Excessive Enabling of Equipment: EF-15	\$400	\$259	1.55	\$0	1.55	4

Findings Summary

Site: Bemidji State



Eco #	Building	Investigation Finding	Total Cost	Savings	Payback	Co-Funding	Payback Co-Funding	GHG
2	Education/Art	Excessive Enabling of Equipment: EF-19	\$400	\$259	1.55	\$0	1.55	4
3	Education/Art	Excessive Enabling of Equipment: EF-14	\$400	\$259	1.55	\$0	1.55	4
3	Walnut Hall	Excessive Enabling (24/7): AIRCON-2	\$1,200	\$595	2.02	\$0	2.02	7
1	Hagg-Sauer Hall	Excessive Enabling of Equipment: AHU-1	\$400	\$177	2.26	\$0	2.26	2
6	Deputy Hall	Excessive Enabling of Equipment: AHU-4	\$400	\$144	2.77	\$0	2.77	2
7	Deputy Hall	Excessive Enabling of Equipment: AHU-5	\$400	\$140	2.85	\$0	2.85	2
8	Deputy Hall	Excessive Enabling of Equipment: AHU-6	\$400	\$138	2.90	\$0	2.90	2
2	Walnut Hall	Excessive Enabling (24/7): AIRCON-1	\$1,200	\$406	2.96	\$0	2.96	6
5	Deputy Hall	Excessive Enabling of Equipment: AHU-3	\$400	\$117	3.43	\$0	3.43	2
3	Deputy Hall	Excessive Enabling of Equipment: AHU-1	\$400	\$116	3.45	\$0	3.45	2
4	Deputy Hall	Excessive Enabling of Equipment: AHU-2	\$400	\$115	3.48	\$0	3.48	2
5	Gillett Rec/Fitness	Retrofit-Efficient Lighting	\$8,115	\$2,089	3.88	\$0	3.88	16
4	Walnut Hall	Excessive Enabling (24/7): AIRCON-3	\$1,200	\$194	6.19	\$0	6.19	2
1	Walnut Hall	Retrofit-Efficient Lighting	\$6,040	\$938	6.44	\$0	6.44	9
8	Hobson Memorial	Retrofit-Efficient Lighting	\$7,400	\$1,021	7.25	\$0	7.25	9
3	Bridgeman Hall	Retrofit - Efficient Lighting	\$8,620	\$1,183	7.29	\$0	7.29	11
9	Deputy Hall	Retrofit-Efficient Lighting	\$11,295	\$1,487	7.60	\$0	7.60	13
5	Education/Art	Retrofit-Efficient Lighting	\$8,825	\$1,113	7.93	\$0	7.93	10
3	Hagg-Sauer Hall	Retrofit-Efficient Lighting	\$14,300	\$1,743	8.20	\$0	8.20	15

Findings Summary

Site: Bemidji State



Eco #	Building	Investigation Finding	Total Cost	Savings	Payback	Co-Funding	Payback Co-Funding	GHG
2	American Indian Center	Retrofit-Efficient Lighting	\$1,250	\$149	8.38	\$0	8.38	1
4	Clark Library	Retrofit-Efficient Lighting	\$13,260	\$1,383	9.59	\$0	9.59	21
2	Sattgast Hall	Retrofit-Efficient Lighting	\$24,840	\$2,074	11.98	\$0	11.98	18
Total for Findings with Payback 3 years or less:			\$13,600	\$31,164	0.44	\$0	0.44	420
Total for all Findings:			\$119,945	\$44,886	2.67	\$0	2.67	552

14900 Bemidji State

Finding Type Number	Finding Type	Relevant Findings	Looked for, Not found	Not relevant
a.1 (1)	Time of Day enabling is excessive	11		1
a.2 (2)	Equipment is enabled regardless of need, or such enabling is excessive		11	1
a.3 (3)	Lighting is on more hours than necessary.		11	1
a.4 (4)	OTHER Equipment Scheduling/Enabling		10	2
b.1 (5)	Economizer Operation – Inadequate Free Cooling (Damper failed in minimum or closed position.		11	1
b.2 (6)	Over-Ventilation – Outside air damper failed in an open position. Minimum outside air fraction not set to design		11	1
b.3 (7)	OTHER Economizer/OA Loads		10	2
c.1 (8)	Simultaneous Heating and Cooling is present and excessive		11	1
c.2 (9)	Sensor/Thermostat needs calibration, relocation/shielding, and/or replacement			12
c.3 (10)	Controls "hunt" and/or need Loop Tuning or separation of heating/cooling setpoints		11	1
c.4 (11)	OTHER Controls		10	2
d.1 (12)	Daylighting controls or occupancy sensors need optimization.			12
d.2 (13)	Zone setpoint setup/setback are not implemented or are sub-optimal.		11	1
d.3 (14)	Fan Speed Doesn't Vary Sufficiently		11	1
d.4 (15)	Pump Speed Doesn't Vary Sufficiently		11	1
d.5 (16)	VAV Box Minimum Flow Setpoint is higher than necessary		11	1
d.6 (17)	Other Controls (Setpoint Changes)		10	2
e.1 (18)	HW Supply Temperature Reset is not implemented or is sub-optimal		11	1
e.2 (19)	CHW Supply Temperature Reset is not implemented or is sub-optimal		11	1
e.3 (20)	Supply Air Temperature Reset is not implemented or is sub-optimal		10	2
e.4 ()	Supply Duct Static Pressure Reset is not implemented or is sub-optimal		10	2
e.5 (21)	Condenser Water Temperature Reset is not implemented or is sub-optimal			12
e.6 (22)	Other Controls (Reset Schedules)		2	10

f.1 (23)	Daylighting Control needs optimization—Spaces are Over-Lit	9	1	2
f.2 (24)	Pump Discharge Throttled		10	2
f.3 (25)	Over-Pumping		10	2
f.4 (26)	Equipment is oversized for load.		2	10
f.5 (27)	OTHER Equipment Efficiency/Load Reduction		10	2
g.1 (28)	VFD Retrofit - Fans		10	2
g.2 (29)	VFD Retrofit - Pumps		10	2
g.3 (30)	VFD Retrofit - Motors (process)		10	2
g.4 (31)	OTHER_VFD		10	2
h.1 (32)	Retrofit - Motors		10	2
h.2 (33)	Retrofit - Chillers		2	10
h.3 (34)	Retrofit - Air Conditioners (Air Handling Units, Packaged Unitary Equipment)		2	10
h.4 (35)	Retrofit - Boilers		2	10
h.5 (36)	Retrofit - Packaged Gas fired heating			12
h.6 (37)	Retrofit - Heat Pumps			12
h.7 (38)	Retrofit - Equipment (custom)			12
h.8 (39)	Retrofit - Pumping distribution method			12
h.9 (40)	Retrofit - Energy/Heat Recovery			12
h.10 (41)	Retrofit - System (custom)			12
h.11 (42)	Retrofit - Efficient Lighting	12		
h.12 (43)	Retrofit - Building Envelope			12
h.13 (44)	Retrofit - Alternative Energy			12
h.14 (45)	OTHER Retrofit			12
i.1 (46)	Differed Maintenance from Recommended/Standard		11	1
i.2 (47)	Impurity/Contamination			12
i.3 ()	Leaky/Stuck Damper		11	1
i.4 ()	Leaky/Stuck Valve		11	1
i.5 (48)	OTHER Maintenance		10	2
j.1 (49)	OTHER		10	2



Findings Glossary: Findings Examples

a.1 (1)	Time of Day enabling is excessive
	<ul style="list-style-type: none"> • HVAC running when building is unoccupied. Equipment schedule doesn't follow building occupancy • Optimum start-stop is not implemented • Controls in hand
a.2 (2)	Equipment is enabled regardless of need, or such enabling is excessive
	<ul style="list-style-type: none"> • Fan runs at 2" static pressure. Lowering pressure to 1.8" does not create comfort problem and the flow is per design. • Supply air temperature and pressure reset: cooling and heating
a.3 (3)	Lighting is on more hours than necessary
	<ul style="list-style-type: none"> • Lighting is on at night when the building is unoccupied • Photocells could be used to control exterior lighting • Lighting controls not calibrated/adjusted properly
a.4 (4)	OTHER Equipment Scheduling and Enabling
	<ul style="list-style-type: none"> • Please contact PBEEEP Project Engineer for approval
b.1 (5)	Economizer Operation – Inadequate Free Cooling
	<ul style="list-style-type: none"> • Economizer is locked out whenever mechanical cooling is enabled (non-integrated economizer) • Economizer linkage is broken • Economizer setpoints could be optimized • Plywood used as the outdoor air control • Damper failed in minimum or closed position
b.2 (6)	Over-Ventilation
	<ul style="list-style-type: none"> • Demand-based ventilation control has been disabled • Outside air damper failed in an open position • Minimum outside air fraction not set to design specifications or occupancy
b.3 (7)	OTHER Economizer/Outside Air Loads
	<ul style="list-style-type: none"> • Please contact PBEEEP Project Engineer for approval
c.1 (8)	Simultaneous Heating and Cooling is present and excessive
	<ul style="list-style-type: none"> • For a given zone, CHW and HW systems are unnecessarily on and running simultaneously • Different setpoints are used for two systems serving a common zone
c.2 (9)	Sensor / Thermostat needs calibration, relocation / shielding, and/or replacement
	<ul style="list-style-type: none"> • OAT temperature is reading 5 degrees high, resulting in loss of useful economizer operation • Zone sensors need to be relocated after tenant improvements • OAT sensor reads high in sunlight
c.3 (10)	Controls "hunt" / need Loop Tuning or separation of heating/cooling setpoints
	<ul style="list-style-type: none"> • CHW valve cycles open and closed • System needs loop tuning – it is cycling between heating and cooling
c.4 (11)	OTHER Controls
	<ul style="list-style-type: none"> • Please contact PBEEEP Project Engineer for approval
d.1 (12)	Daylighting controls or occupancy sensors need optimization
	<ul style="list-style-type: none"> • Existing controls are not functioning or overridden • Light sensors improperly placed or out of calibration
d.2 (13)	Zone setpoint setup / setback are not implemented or are sub-optimal
	<ul style="list-style-type: none"> • The cooling setpoint is 74 °F 24 hours per day
d.3 (14)	Fan Speed Doesn't Vary Sufficiently
	<ul style="list-style-type: none"> • Fan runs at 2" static pressure. Lowering pressure to 1.8" does not create comfort problem and the flow is per design. • Supply air temperature and pressure reset: cooling and heating

d.4 (15)	Pump Speed Doesn't Vary Sufficiently
	<ul style="list-style-type: none"> • Pump runs at 15 PSI on peak day. Lowering pressure to 12 does not create comfort problem and the flow is per design. Low ΔT across the chiller during low load conditions.
d.5 (16)	VAV Box Minimum Flow Setpoint is higher than necessary
	<ul style="list-style-type: none"> • Boxes universally set at 40%, regardless of occupancy. Most boxes can have setpoints lowered and still meet minimum airflow requirements.
d.6 (17)	Other Controls (Setpoint Changes)
	<ul style="list-style-type: none"> • Please contact PBEEEP Project Engineer for approval
e.1 (18)	HW Supply Temperature Reset is not implemented or is sub-optimal
	<ul style="list-style-type: none"> • HW supply temperature is a constant 180 °F. It should be reset based on demand, or decreased by a reset schedule as OAT increases. • DHW Setpoints are constant 24 hours per day
e.2 (19)	CHW Supply Temperature Reset is not implemented or is sub-optimal
	<ul style="list-style-type: none"> • CHW supply temperature is a constant 42 °F. It could be reset, based on demand or ambient temperature.
e.3 (20)	Supply Air Temperature Reset is not implemented or is sub-optimal
	<ul style="list-style-type: none"> • The SAT is constant at 55 °F. It could be reset to minimize reheat and maximize economizer cooling. The reset should ideally be based on demand (e.g., looking at zone box damper positions), but could also be reset based on OAT.
e.4 ()	Supply Duct Static Pressure Reset is not implemented or is suboptimal
	<ul style="list-style-type: none"> • The Duct Static Pressure (DSP) is constant at 1.5" wc. It could be reset to minimize fan energy. The reset should ideally be based on demand (e.g. looking at zone box damper positions), but could also be reset based on OAT.
e.5 (21)	Condenser Water Temperature Reset is not implemented or is sub-optimal
	<ul style="list-style-type: none"> • CW temperature is constant leaving the tower at 85 °F. The temperature should be reduced to minimize the total energy use of the chiller and tower. It may be worthwhile to reset based on load and ambient conditions.
e.6 (22)	Other Controls (Reset Schedules)
	<ul style="list-style-type: none"> • Please contact PBEEEP Project Engineer for approval
f.1 (23)	Lighting system needs optimization - Spaces are overlit
	<ul style="list-style-type: none"> • Lighting exceeds ASHRAE or IES standard levels for specific space types or tasks
f.2 (24)	Pump Discharge Throttled
	<ul style="list-style-type: none"> • The discharge valve for the CHW pump is 30% open. The valve should be opened and the impeller size reduced to provide the proper flow without throttling.
f.3 (25)	Over-Pumping
	<ul style="list-style-type: none"> • Only one CHW pump runs when one chiller is running. However, due to the reduced pressure drop in the common piping, the pump is providing much greater flow than needed.
f.4 (26)	Equipment is oversized for load
	<ul style="list-style-type: none"> • The equipment cycles unnecessarily • The peak load is much less than the installed equipment capacity

f.5 (27)	OTHER Equipment Efficiency/Load Reduction
	<ul style="list-style-type: none"> • Please contact PBEEEP Project Engineer for approval
g.1 (28)	VFD Retrofit Fans
	<ul style="list-style-type: none"> • Fan serves variable flow system, but does not have a VFD. • VFD is in override mode, and was found to be not modulating.
g.2 (29)	VFD Retrofit - Pumps
	<ul style="list-style-type: none"> • 3-way valves are used to maintain constant flow during low load periods. • Only one CHW pumps runs when one chiller is running. However, due to the reduced pressure drop in the common piping, the pump is providing much greater flow than needed.
g.3 (30)	VFD Retrofit - Motors (process)
	<ul style="list-style-type: none"> • Motor is constant speed and uses a variable pitch sheave to obtain speed control.
g.4 (31)	OTHER VFD
	<ul style="list-style-type: none"> • Please contact PBEEEP Project Engineer for approval
h.1 (32)	Retrofit - Motors
	<ul style="list-style-type: none"> • Efficiency of installed motor is much lower than efficiency of currently available motors
h.2 (33)	Retrofit - Chillers
	<ul style="list-style-type: none"> • Efficiency of installed chiller is much lower than efficiency of currently available chillers
h.3 (34)	Retrofit - Air Conditioners (Air Handling Units, Packaged Unitary Equipment)
	<ul style="list-style-type: none"> • Efficiency of installed air conditioner is much lower than efficiency of currently available air conditioners
h.4 (35)	Retrofit - Boilers
	<ul style="list-style-type: none"> • Efficiency of installed boiler is much lower than efficiency of currently available boilers
h.5 (36)	Retrofit - Packaged Gas-fired heating
	<ul style="list-style-type: none"> • Efficiency of installed heaters is much lower than efficiency of currently available heaters
h.6 (37)	Retrofit - Heat Pumps
	<ul style="list-style-type: none"> • Efficiency of installed heat pump is much lower than efficiency of currently available heat pumps
h.7 (38)	Retrofit - Equipment (custom)
	<ul style="list-style-type: none"> • Efficiency of installed equipment is much lower than efficiency of currently available equipment
h.8 (39)	Retrofit - Pumping distribution method
	<ul style="list-style-type: none"> • Current pumping distribution system is inefficient, and could be optimized. • Pump distribution loop can be converted from primary to primary-secondary)
h.9 (40)	Retrofit - Energy / Heat Recovery
	<ul style="list-style-type: none"> • Energy is not recouped from the exhaust air. • Identification of equipment with higher effectiveness than the current equipment.
h.10 (41)	Retrofit - System (custom)
	<ul style="list-style-type: none"> • Efficiency of installed system is much lower than efficiency of another type of system
h.11 (42)	Retrofit - Efficient lighting
	<ul style="list-style-type: none"> • Efficiency of installed lamps, ballasts or fixtures are much lower than efficiency of currently available lamps, ballasts or fixtures.

h.12 (43)	Retrofit - Building Envelope
	<ul style="list-style-type: none"> • Insulation is missing or insufficient • Window glazing is inadequate • Too much air leakage into / out of the building • Mechanical systems operate during unoccupied periods in extreme weather
h.13 (44)	Retrofit - Alternative Energy
	<ul style="list-style-type: none"> • Alternative energy strategies, such as passive/active solar, wind, ground sheltered construction or other alternative, can be incorporated into the building design
h.14 (45)	OTHER Retrofit
	<ul style="list-style-type: none"> • Please contact PBEEEP Project Engineer for approval
i.1 (46)	Differed Maintenance from Recommended/Standard
	<ul style="list-style-type: none"> • Differed maintenance that results in sub-optimal energy performance. • Examples: Scale buildup on heat exchanger, broken linkages to control actuator missing equipment components, etc.
i.2 (47)	Impurity/Contamination
	<ul style="list-style-type: none"> • Impurities or contamination of operating fluids that result in sub-optimal performance. Examples include lack of chemical treatment to hot/cold water systems that result in elevated levels of TDS which affect energy efficiency.
i.3 ()	Leaky/Stuck Damper
	<ul style="list-style-type: none"> • The outside or return air damper on an AHU is leaking or is not modulating causing the energy use go up because of additional load to the central heating and/or cooling plant.
i.4 ()	Leaky/Stuck Valve
	<ul style="list-style-type: none"> • The heating or cooling coil valve on an AHU is leaking or is not modulating causing the energy use go up because of additional load to the central heating and/or cooling plant.
i.5 (48)	OTHER Maintenance
	<ul style="list-style-type: none"> • Please contact PBEEEP Project Engineer for approval
j.1 (49)	OTHER
	<ul style="list-style-type: none"> • Please contact PBEEEP Project Engineer for approval

Findings Summary



Building: Clark Library
Site: Bemidji State

Eco #	Investigation Finding	Total Cost	Savings	Payback	Co-Funding	Payback Co-Funding	GHG
1	Excessive Enabling (24/7)	\$400	\$5,772	0.07	\$0	0.07	79
2	Excessive Enabling (24/7)	\$400	\$1,935	0.21	\$0	0.21	26
3	Excessive Enabling (24/7)	\$400	\$259	1.55	\$0	1.55	4
4	Retrofit-Efficient Lighting	\$13,260	\$1,383	9.59	\$0	9.59	21
Total for Findings with Payback 3 years or less:		\$1,200	\$7,965	0.15	\$0	0.15	109
Total for all Findings:		\$14,460	\$9,349	1.55	\$0	1.55	130

Findings Details



Building: Clark Library

FWB Number:	14901	Eco Number:	1
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling (24/7)	Date Identified:	11/15/2011
Description of Finding:	AHU-West: Found 24/7 operation via trend logs but building is not occupied 24/7. AHU includes: SF, RF, CC, HC.		
Equipment or System(s):	AHU with heating and cooling	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended SF & RF fan status & fan speed for existing schedule and compare to printed schedules. Trended VFD amp draw.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	AHU-West: Revise BAS schedule to match building operating schedule with unit starting 1hr before occupancy. Proposed Schedule: M-Thur 6:45am-10:45pm, F 7am-4:45pm; Sat 10am-4:45pm; Sun. 12pm-10:45pm. Refer to supporting documentation spreadsheet- Calculations-LIB.		
Evidence of Implementation Method:	AHU-West: Review fan statuses trends. Refer to supporting documentation spreadsheet- Calculations- LIB for proposed schedule. Proposed Schedule: M-Thur 6:45am-10:45pm, F 7am-4:45pm; Sat 10am-4:45pm; Sun. 12pm-10:45pm.Trend Points: LIBWAHRaFanSpeed; LIBWAHSaFanSpeed.		

Annual Electric Savings (kWh):	78,265	Annual Natural Gas Savings (therms):	2,196
Estimated Annual kWh Savings (\$):	\$4,397	Estimated Annual Natural Gas Savings (\$):	\$1,375
Contractor Cost (\$):	\$200		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$400		

Estimated Annual Total Savings (\$):	\$5,772	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.07	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.07	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO2e):	79	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	12.7%	Percent of Implementation Costs:	0.3%

Findings Details



Building: Clark Library

FWB Number:	14901	Eco Number:	2
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling (24/7)	Date Identified:	11/15/2011
Description of Finding:	AHU-East: Found 24/7 operation via trend logs but building is not occupied 24/7. AHU includes: SF, RF, CC, HC.		
Equipment or System(s):	AHU with heating and cooling	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended SF & RF fan status & fan speed for existing schedule and compare to printed schedules. Trended VFD amp draw.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	AHU-East: Revise BAS schedule to match building operating schedule with unit starting 1hr before occupancy. Proposed Schedule: M-Thur 6:45am-10:45pm, F 7am-4:45pm; Sat 10am-4:45pm; Sun. 12pm-10:45pm. Refer to supporting documentation spreadsheet- Calculations-LIB.		
Evidence of Implementation Method:	AHU-East: Review fan statuses trends. Refer to supporting documentation spreadsheet- Calculations- LIB for proposed schedule. Proposed Schedule: M-Thur 6:45am-10:45pm, F 7am-4:45pm; Sat 10am-4:45pm; Sun. 12pm-10:45pm.Trend Points: LIBEAHRaFanSpeed; LIBEHSaFanSpeed.		

Annual Electric Savings (kWh):	24,533	Annual Natural Gas Savings (therms):	888
Estimated Annual kWh Savings (\$):	\$1,379	Estimated Annual Natural Gas Savings (\$):	\$556
Contractor Cost (\$):	\$200		
PBEEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$400		

Estimated Annual Total Savings (\$):	\$1,935	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.21	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.21	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO2e):	26	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	4.3%	Percent of Implementation Costs:	0.3%

Findings Details



Building: Clark Library

FWB Number:	14901	Eco Number:	3
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling (24/7)	Date Identified:	11/15/2011
Description of Finding:	Exhaust Fan (Restrooms): Found 24/7 operation via trends logs but building is not occupied 24/7.		
Equipment or System(s):	Other	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended EF fan status & fan speed for existing schedule and compare to printed schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	Exhaust Fan (Restrooms): Revise BAS schedule to match building operating schedule with unit starting 1hr before occupancy. Proposed Schedule: M-Thur 6:45am-10:45pm, F 7am-4:45pm; Sat 10am-4:45pm; Sun. 12pm-10:45pm. Refer to supporting documentation spreadsheet- Calculations-LIB.		
Evidence of Implementation Method:	Exhaust Fan (Restrooms): Review fan status trends. Refer to supporting documentation spreadsheet- Calculations- LIB for proposed schedule. Proposed Schedule: M-Thur 6:45am-10:45pm, F 7am-4:45pm; Sat 10am-4:45pm; Sun. 12pm-10:45pm.Trend Points: LIBEAFanStatus.		

Annual Electric Savings (kWh):	4,609	Contractor Cost (\$):	\$200
Estimated Annual kWh Savings (\$):	\$259	PBEEP Provider Cost for Implementation Assistance (\$):	\$200
		Total Estimated Implementation Cost (\$):	\$400

Estimated Annual Total Savings (\$):	\$259	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	1.55	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	1.55	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (C02e):	4	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	0.6%	Percent of Implementation Costs:	0.3%

Findings Details



Building: Clark Library

FWB Number:	14901	Eco Number:	4
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Retrofit-Efficient Lighting	Date Identified:	12/20/2011
Description of Finding:	Efficiency of installed lamps, ballasts or fixtures are much lower than efficiency of currently available lamps, ballasts or fixtures.		
Equipment or System(s):	Interior Lighting	Finding Category:	Retrofits
Finding Type:	Retrofit - Efficient Lighting		

Implementer:	In-house Staff	Benefits:	Energy Savings
Baseline Documentation Method:	Verified installed lamps; counted total fixtures per room and lamps per fixture.		
Measure:	Replace existing 32 watt T8 lamps with lower wattage 28 watt T8 lamps.		
Recommendation for Implementation:	Whole Building: Replace existing 32 watt T8 lamps with lower wattage 28 watt T8 lamps. Refer to supporting documentation spreadsheet- Lighting Calcs.		
Evidence of Implementation Method:	Spot check 10% of affected areas and take photos.		

Annual Electric Savings (kWh):	24,597	Peak Demand Savings (kWh):	19
Estimated Annual kWh Savings (\$):	\$1,383	Estimated Annual Demand Savings (\$):	\$0
Contractor Cost (\$):	\$11,760		
PBEEP Provider Cost for Implementation Assistance (\$):	\$1,500		
Total Estimated Implementation Cost (\$):	\$13,260		

Estimated Annual Total Savings (\$):	\$1,383	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	9.59	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	9.59	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO2e):	21	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	3.1%	Percent of Implementation Costs:	8.7%



Findings Summary

Building: American Indian Center
Site: Bemidji State

Eco #	Investigation Finding	Total Cost	Savings	Payback	Co-Funding	Payback Co-Funding	GHG
1	Excessive Enabling of Equipment	\$400	\$554	0.72	\$0	0.72	6
2	Retrofit-Efficient Lighting	\$1,250	\$149	8.38	\$0	8.38	1
	Total for Findings with Payback 3 years or less:	\$400	\$554	0.72	\$0	0.72	6
	Total for all Findings:	\$1,650	\$703	2.35	\$0	2.35	7

Findings Details



Building: American Indian Center

FWB Number:	14902	Eco Number:	1
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling of Equipment	Date Identified:	11/7/2011
Description of Finding:	AHU-1: Found excessive enabling (few hours each day) via trend logs. AHU includes: SF, RF, CC, HC.		
Equipment or System(s):	AHU with heating and cooling	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended SF & RF fan status for existing schedule and compare to AHU schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	AHU-1: Revise BAS schedule to match building operating schedule. Refer to supporting document spreadsheet- Calculations-AIRC.		
Evidence of Implementation Method:	AHU-1: Review fan statuses trends. Refer to supporting documentation spreadsheet- Calculations- AIRC for proposed schedule. M-F: 6am-9pm Sa, Su: 8am-8pm Confirm w/ screenshot of implemented schedule showing equipment tag.		

Annual Electric Savings (kWh):	4,401	Annual Natural Gas Savings (therms):	394
Estimated Annual kWh Savings (\$):	\$247	Estimated Annual Natural Gas Savings (\$):	\$306
Contractor Cost (\$):	\$200		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$400		

Estimated Annual Total Savings (\$):	\$554	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.72	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.72	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (C02e):	6	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	1.2%	Percent of Implementation Costs:	0.3%

Findings Details



Building: American Indian Center

FWB Number:	14902	Eco Number:	2
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Retrofit-Efficient Lighting	Date Identified:	12/20/2011
Description of Finding:	Efficiency of installed lamps, ballasts or fixtures are much lower than efficiency of currently available lamps, ballasts or fixtures.		
Equipment or System(s):	Interior Lighting	Finding Category:	Retrofits
Finding Type:	Retrofit - Efficient Lighting		

Implementer:	In-house Staff	Benefits:	Energy Savings
Baseline Documentation Method:	Verified installed lamps; counted total fixtures per room and lamps per fixture.		
Measure:	Replace existing 32 watt T8 lamps with lower wattage 28 watt T8 lamps.		
Recommendation for Implementation:	Whole Building: Replace existing 32 watt T8 lamps with lower wattage 28 watt T8 lamps. Refer to supporting documentation spreadsheet- Lighting Calcs.		
Evidence of Implementation Method:	Spot check 10% of affected areas and take photos.		

Annual Electric Savings (kWh):	1,484	Peak Demand Savings (kWh):	2
Estimated Annual kWh Savings (\$):	\$83	Estimated Annual Demand Savings (\$):	\$66
Contractor Cost (\$):	\$1,150		
PBEEP Provider Cost for Implementation Assistance (\$):	\$100		
Total Estimated Implementation Cost (\$):	\$1,250		

Estimated Annual Total Savings (\$):	\$149	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	8.38	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	8.38	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (C02e):	1	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	0.3%	Percent of Implementation Costs:	0.8%

Findings Summary



Building: Bridgeman Hall
 Site: Bemidji State

Eco #	Investigation Finding	Total Cost	Savings	Payback	Co-Funding	Payback Co-Funding	GHG
1	Excessive Enabling of Equipment	\$400	\$1,042	0.38	\$0	0.38	16
2	Excessive Enabling of Equipment	\$400	\$498	0.80	\$0	0.80	8
3	Retrofit - Efficient Lighting	\$8,620	\$1,183	7.29	\$0	7.29	11
	Total for Findings with Payback 3 years or less:	\$800	\$1,541	0.52	\$0	0.52	24
	Total for all Findings:	\$9,420	\$2,724	3.46	\$0	3.46	34

Findings Details



Building: Bridgeman Hall

FWB Number:	14903	Eco Number:	1
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling of Equipment	Date Identified:	11/30/2011
Description of Finding:	AHU-7: Found excessive enabling (few hours each day) via trend logs. AHU includes: SF, EF, CC, HC, ERW.		
Equipment or System(s):	AHU with heating and cooling	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended SF & RF fan VFD for existing schedule and compare to AHU schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	AHU-7: Revise BAS schedule to match building operating schedule. Refer to supporting documentation spreadsheet- Calculations-CAET.		
Evidence of Implementation Method:	AHU-7: Review fan statuses trends. Refer to supporting documentation spreadsheet- Calculations- CAT for proposed schedule. Screenshot w/ the proposed schedule and equipment tag: M-F: 5am-8pm Sa, Su: Off		

Annual Electric Savings (kWh):	18,561	Contractor Cost (\$):	\$200
Estimated Annual kWh Savings (\$):	\$1,042	PBEEP Provider Cost for Implementation Assistance (\$):	\$200
		Total Estimated Implementation Cost (\$):	\$400

Estimated Annual Total Savings (\$):	\$1,042	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.38	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.38	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO ₂ e):	16	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	2.3%	Percent of Implementation Costs:	0.3%

Findings Details



Building: Bridgeman Hall

FWB Number:	14903	Eco Number:	2
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling of Equipment	Date Identified:	11/30/2011
Description of Finding:	AHU-11: Found excessive enabling (few hours each day) via trend logs. AHU includes: SF, EF, CC, HC, ERW.		
Equipment or System(s):	AHU with heating and cooling	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended RF fan VFD for existing schedule and compare to AHU schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	AHU-11: Revise BAS schedule to match building operating schedule. Refer to supporting documentation spreadsheet- Calculations-CAET.		
Evidence of Implementation Method:	AHU-11: Review fan statuses trends. Refer to supporting documentation spreadsheet- Calculations- CAT for proposed schedule. Screenshot w/ the proposed schedule and equipment tag: M-F: 5am-8pm Sa, Su: Off		

Annual Electric Savings (kWh):	8,877	Contractor Cost (\$):	\$200
Estimated Annual kWh Savings (\$):	\$498	PBEEP Provider Cost for Implementation Assistance (\$):	\$200
		Total Estimated Implementation Cost (\$):	\$400

Estimated Annual Total Savings (\$):	\$498	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.80	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.80	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO ₂ e):	8	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	1.1%	Percent of Implementation Costs:	0.3%

Findings Details



Building: Bridgeman Hall

FWB Number:	14903	Eco Number:	3
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Retrofit - Efficient Lighting	Date Identified:	12/20/2011
Description of Finding:	Efficiency of installed lamps, ballasts or fixtures are much lower than efficiency of currently available lamps, ballasts or fixtures.		
Equipment or System(s):	Interior Lighting	Finding Category:	Retrofits
Finding Type:	Retrofit - Efficient Lighting		

Implementer:	In-house Staff	Benefits:	Energy Savings
Baseline Documentation Method:	Verified installed lamps; counted total fixtures per room and lamps per fixture.		
Measure:	Replace existing 32 watt T8 lamps with lower wattage 28 watt T8 lamps.		
Recommendation for Implementation:	Whole Building: Replace existing 32 watt T8 lamps with lower wattage 28 watt T8 lamps. Refer to supporting documentation spreadsheet- Lighting Calcs.		
Evidence of Implementation Method:	Spot check 10% of affected areas and take photos.		

Annual Electric Savings (kWh):	12,552	Peak Demand Savings (kWh):	14
Estimated Annual kWh Savings (\$):	\$706	Estimated Annual Demand Savings (\$):	\$477
Contractor Cost (\$):	\$8,420		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$8,620		

Estimated Annual Total Savings (\$):	\$1,183	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	7.29	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	7.29	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (C02e):	11	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	2.6%	Percent of Implementation Costs:	5.7%

Findings Summary



Building: Deputy Hall
Site: Bemidji State

Eco #	Investigation Finding	Total Cost	Savings	Payback	Co-Funding	Payback Co-Funding	GHG
6	Excessive Enabling of Equipment: AHU-4	\$400	\$144	2.77	\$0	2.77	2
7	Excessive Enabling of Equipment: AHU-5	\$400	\$140	2.85	\$0	2.85	2
8	Excessive Enabling of Equipment: AHU-6	\$400	\$138	2.90	\$0	2.90	2
5	Excessive Enabling of Equipment: AHU-3	\$400	\$117	3.43	\$0	3.43	2
3	Excessive Enabling of Equipment: AHU-1	\$400	\$116	3.45	\$0	3.45	2
4	Excessive Enabling of Equipment: AHU-2	\$400	\$115	3.48	\$0	3.48	2
9	Retrofit-Efficient Lighting	\$11,295	\$1,487	7.60	\$0	7.60	13
	Total for Findings with Payback 3 years or less:	\$1,200	\$423	2.84	\$0	2.84	6
	Total for all Findings:	\$13,695	\$2,257	6.07	\$0	6.07	24

Findings Details



Building: Deputy Hall

FWB Number:	14904	Eco Number:	3
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling of Equipment: AHU-1	Date Identified:	11/29/2011
Description of Finding:	AHU-1(1st FL): Found excessive enabling via trend logs. AHU includes: SF, CC.		
Equipment or System(s):	AHU with cooling only	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended SF fan speed for existing schedule and compare to AHU schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	AHU-1: Revise BAS schedule to match building operating schedule. Refer to supporting documentation spreadsheet- Calculations-DEP.		
Evidence of Implementation Method:	AHU-1: Review fan statuses trends. Refer to supporting documentation spreadsheet- Calculations- DEP for proposed schedule. Include screenshot of implemented schedule w/ equipment tag. M-F: 6am-8pm Sa: 7am-6pm Su: 7am-5pm		

Annual Electric Savings (kWh):	2,061	Contractor Cost (\$):	\$200
Estimated Annual kWh Savings (\$):	\$116	PBEEP Provider Cost for Implementation Assistance (\$):	\$200
		Total Estimated Implementation Cost (\$):	\$400

Estimated Annual Total Savings (\$):	\$116	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	3.45	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	3.45	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO2e):	2	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	0.3%	Percent of Implementation Costs:	0.3%

Findings Details



Building: Deputy Hall

FWB Number:	14904	Eco Number:	4
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling of Equipment: AHU-2	Date Identified:	11/29/2011
Description of Finding:	AHU-2(2nd FL): Found excessive enabling via trend logs. AHU includes: SF, CC.		
Equipment or System(s):	AHU with cooling only	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended SF fan speed for existing schedule and compare to AHU schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	AHU-2: Revise BAS schedule to match building operating schedule. Refer to supporting documentation spreadsheet- Calculations-DEP.		
Evidence of Implementation Method:	AHU-2: Review fan statuses trends. Refer to supporting documentation spreadsheet- Calculations- DEP for proposed schedule. Include screenshot of implemented schedule w/ equipment tag. M-F: 6am-8pm Sa: 7am-6pm Su: 7am-5pm		

Annual Electric Savings (kWh):	2,042	Contractor Cost (\$):	\$200
Estimated Annual kWh Savings (\$):	\$115	PBEEP Provider Cost for Implementation Assistance (\$):	\$200
		Total Estimated Implementation Cost (\$):	\$400

Estimated Annual Total Savings (\$):	\$115	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	3.48	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	3.48	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO2e):	2	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	0.3%	Percent of Implementation Costs:	0.3%

Findings Details



Building: Deputy Hall

FWB Number:	14904	Eco Number:	5
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling of Equipment: AHU-3	Date Identified:	11/29/2011
Description of Finding:	AHU-3(3rd FL): Found excessive enabling via trend logs. AHU includes: SF, CC.		
Equipment or System(s):	AHU with cooling only	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended SF fan speed for existing schedule and compare to AHU schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	AHU-3: Revise BAS schedule to match building operating schedule. Refer to supporting documentation spreadsheet- Calculations-DEP.		
Evidence of Implementation Method:	AHU-3: Review fan statuses trends. Refer to supporting documentation spreadsheet- Calculations- DEP for proposed schedule. Include screenshot of implemented schedule w/ equipment tag. M-F: 6am-8pm Sa: 7am-6pm Su: 7am-5pm		

Annual Electric Savings (kWh):	2,071	Contractor Cost (\$):	\$200
Estimated Annual kWh Savings (\$):	\$117	PBEEP Provider Cost for Implementation Assistance (\$):	\$200
		Total Estimated Implementation Cost (\$):	\$400

Estimated Annual Total Savings (\$):	\$117	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	3.43	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	3.43	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO ₂ e):	2	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	0.3%	Percent of Implementation Costs:	0.3%

Findings Details



Building: Deputy Hall

FWB Number:	14904	Eco Number:	6
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling of Equipment: AHU-4	Date Identified:	11/29/2011
Description of Finding:	AHU-4(1st FL): Found excessive enabling via trend logs. AHU includes: SF, CC.		
Equipment or System(s):	AHU with cooling only	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended SF fan speed for existing schedule and compare to AHU schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	AHU-4: Revise BAS schedule to match building operating schedule. Refer to supporting documentation spreadsheet- Calculations-DEP.		
Evidence of Implementation Method:	AHU-4: Review fan statuses trends. Refer to supporting documentation spreadsheet- Calculations- DEP for proposed schedule. Include screenshot of implemented schedule w/ equipment tag. M-F: 6am-8pm Sa: 7am-6pm Su: 7am-5pm		

Annual Electric Savings (kWh):	2,566	Contractor Cost (\$):	\$200
Estimated Annual kWh Savings (\$):	\$144	PBEEP Provider Cost for Implementation Assistance (\$):	\$200
		Total Estimated Implementation Cost (\$):	\$400

Estimated Annual Total Savings (\$):	\$144	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	2.77	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	2.77	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO ₂ e):	2	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	0.3%	Percent of Implementation Costs:	0.3%

Findings Details



Building: Deputy Hall

FWB Number:	14904	Eco Number:	7
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling of Equipment: AHU-5	Date Identified:	11/29/2011
Description of Finding:	AHU-5(2nd FL): Found excessive enabling via trend logs. AHU includes: SF, CC.		
Equipment or System(s):	AHU with cooling only	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended SF fan speed for existing schedule and compare to AHU schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	AHU-5: Revise BAS schedule to match building operating schedule. Refer to supporting documentation spreadsheet- Calculations-DEP.		
Evidence of Implementation Method:	AHU-5: Review fan statuses trends. Refer to supporting documentation spreadsheet- Calculations- DEP for proposed schedule. Include screenshot of implemented schedule w/ equipment tag. M-F: 6am-8pm Sa: 7am-6pm Su: 7am-5pm		

Annual Electric Savings (kWh):	2,493	Contractor Cost (\$):	\$200
Estimated Annual kWh Savings (\$):	\$140	PBEEP Provider Cost for Implementation Assistance (\$):	\$200
		Total Estimated Implementation Cost (\$):	\$400

Estimated Annual Total Savings (\$):	\$140	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	2.85	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	2.85	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO ₂ e):	2	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	0.3%	Percent of Implementation Costs:	0.3%

Findings Details



Building: Deputy Hall

FWB Number:	14904	Eco Number:	8
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling of Equipment: AHU-6	Date Identified:	11/29/2011
Description of Finding:	AHU-6(3rd FL): Found excessive enabling via trend logs. AHU includes: SF, CC.		
Equipment or System(s):	AHU with cooling only	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended SF fan speed for existing schedule and compare to AHU schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	AHU-6: Revise BAS schedule to match building operating schedule. Refer to supporting documentation spreadsheet- Calculations-DEP.		
Evidence of Implementation Method:	AHU-6: Review fan statuses trends. Refer to supporting documentation spreadsheet- Calculations- DEP for proposed schedule. Include screenshot of implemented schedule w/ equipment tag. M-F: 6am-8pm Sa: 7am-6pm Su: 7am-5pm		

Annual Electric Savings (kWh):	2,452	Contractor Cost (\$):	\$200
Estimated Annual kWh Savings (\$):	\$138	PBEEP Provider Cost for Implementation Assistance (\$):	\$200
		Total Estimated Implementation Cost (\$):	\$400

Estimated Annual Total Savings (\$):	\$138	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	2.90	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	2.90	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO ₂ e):	2	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	0.3%	Percent of Implementation Costs:	0.3%

Findings Details



Building: Deputy Hall

FWB Number:	14904	Eco Number:	9
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Retrofit-Efficient Lighting	Date Identified:	12/20/2011
Description of Finding:	Efficiency of installed lamps, ballasts or fixtures are much lower than efficiency of currently available lamps, ballasts or fixtures.		
Equipment or System(s):	Interior Lighting	Finding Category:	Retrofits
Finding Type:	Retrofit - Efficient Lighting		

Implementer:	In-house Staff	Benefits:	Energy Savings
Baseline Documentation Method:	Verified installed lamps; counted total fixtures per room and lamps per fixture.		
Measure:	Replace existing 32 watt T8 lamps with lower wattage 28 watt T8 lamps.		
Recommendation for Implementation:	Whole Building: Replace existing 32 watt T8 lamps with lower wattage 28 watt T8 lamps. Refer to supporting documentation spreadsheet- Lighting Calcs.		
Evidence of Implementation Method:	Spot check 10% of affected areas and take photos.		

Annual Electric Savings (kWh):	14,661	Peak Demand Savings (kWh):	19
Estimated Annual kWh Savings (\$):	\$824	Estimated Annual Demand Savings (\$):	\$662
Contractor Cost (\$):	\$11,095		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$11,295		

Estimated Annual Total Savings (\$):	\$1,487	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	7.60	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	7.60	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (C02e):	13	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	3.3%	Percent of Implementation Costs:	7.4%

Findings Summary



Building: Education/Art
Site: Bemidji State

Eco #	Investigation Finding	Total Cost	Savings	Payback	Co-Funding	Payback Co-Funding	GHG
4	Excessive Enabling of Equipment: AHU-1	\$400	\$1,628	0.25	\$0	0.25	21
1	Excessive Enabling of Equipment: EF-15	\$400	\$259	1.55	\$0	1.55	4
2	Excessive Enabling of Equipment: EF-19	\$400	\$259	1.55	\$0	1.55	4
3	Excessive Enabling of Equipment: EF-14	\$400	\$259	1.55	\$0	1.55	4
5	Retrofit-Efficient Lighting	\$8,825	\$1,113	7.93	\$0	7.93	10
Total for Findings with Payback 3 years or less:		\$1,600	\$2,404	0.67	\$0	0.67	33
Total for all Findings:		\$10,425	\$3,517	2.96	\$0	2.96	43

Findings Details



Building: Education/Art

FWB Number:	14905	Eco Number:	1
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling of Equipment: EF-15	Date Identified:	11/23/2011
Description of Finding:	EF-15 (Hood- RM 208): Found 24/7 operation via trend logs but is not used 24/7.		
Equipment or System(s):	Other	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended EF fan status for existing schedule and compare to building schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	EF-15: Revise BAS schedule to match building operating schedule. Refer to supporting documentation spreadsheet- Calculations-EA.		
Evidence of Implementation Method:	EF-15: Review fan status trend. Refer to supporting documentation spreadsheet- Calculations- EA for proposed schedule. Include a screenshot showing the implemented schedule and equipment tag. M-F: 6am-11pm Sa, Su: 7am-11pm		

Annual Electric Savings (kWh):	4,609	Contractor Cost (\$):	\$200
Estimated Annual kWh Savings (\$):	\$259	PBEEP Provider Cost for Implementation Assistance (\$):	\$200
		Total Estimated Implementation Cost (\$):	\$400

Estimated Annual Total Savings (\$):	\$259	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	1.55	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	1.55	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO ₂ e):	4	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	0.6%	Percent of Implementation Costs:	0.3%

Findings Details



Building: Education/Art

FWB Number:	14905	Eco Number:	2
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling of Equipment: EF-19	Date Identified:	11/23/2011
Description of Finding:	EF-19 (RM 213): Found 24/7 operation via trend logs but is not used 24/7.		
Equipment or System(s):	Other	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended EF fan status for existing schedule and compare to building schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	EF-19: Revise BAS schedule to match building operating schedule. Refer to supporting documentation spreadsheet- Calculations-EA.		
Evidence of Implementation Method:	EF-19: Review fan status trend. Refer to supporting documentation spreadsheet- Calculations- EA for proposed schedule. Include a screenshot showing the implemented schedule and equipment tag. M-F: 6am-11pm Sa, Su: 7am-11pm		

Annual Electric Savings (kWh):	4,609	Contractor Cost (\$):	\$200
Estimated Annual kWh Savings (\$):	\$259	PBEEP Provider Cost for Implementation Assistance (\$):	\$200
		Total Estimated Implementation Cost (\$):	\$400

Estimated Annual Total Savings (\$):	\$259	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	1.55	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	1.55	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO ₂ e):	4	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	0.6%	Percent of Implementation Costs:	0.3%

Findings Details



Building: Education/Art

FWB Number:	14905	Eco Number:	3
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling of Equipment: EF-14	Date Identified:	11/23/2011
Description of Finding:	EF-14(Soldering Hood- RM 209): Found 24/7 operation via trend logs but is not used 24/7.		
Equipment or System(s):	Other	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended EF fan status for existing schedule and compare to building schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	EF-14: Revise BAS schedule to match building operating schedule. Refer to supporting documentation spreadsheet- Calculations-EA.		
Evidence of Implementation Method:	EF-14: Review fan status trend. Refer to supporting documentation spreadsheet- Calculations- EA for proposed schedule. Include a screenshot showing the implemented schedule and equipment tag. M-F: 6am-11pm Sa, Su: 7am-11pm		

Annual Electric Savings (kWh):	4,609	Contractor Cost (\$):	\$200
Estimated Annual kWh Savings (\$):	\$259	PBEEP Provider Cost for Implementation Assistance (\$):	\$200
		Total Estimated Implementation Cost (\$):	\$400

Estimated Annual Total Savings (\$):	\$259	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	1.55	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	1.55	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO ₂ e):	4	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	0.6%	Percent of Implementation Costs:	0.3%

Findings Details



Building: Education/Art

FWB Number:	14905	Eco Number:	4
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling of Equipment: AHU-1	Date Identified:	11/23/2011
Description of Finding:	AHU-1: Found 24/7 operation of exhaust fan via trend logs but is not used 24/7. AHU includes: SF, EF, CC, HC.		
Equipment or System(s):	AHU with heating and cooling	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended EF fan status for existing schedule and compare to building schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	AHU-1: Revise BAS schedule to match building operating schedule. Refer to supporting documentation spreadsheet- Calculations-EA.		
Evidence of Implementation Method:	AHU-1: Review fan status trend. Refer to supporting documentation spreadsheet- Calculations- EA for proposed schedule. Include a screenshot showing the implemented schedule and equipment tag. M-F: 6am-11pm Sa, Su: 7am-11pm		

Annual Electric Savings (kWh):	18,423	Annual Natural Gas Savings (therms):	943
Estimated Annual kWh Savings (\$):	\$1,038	Estimated Annual Natural Gas Savings (\$):	\$590
Contractor Cost (\$):	\$200		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$400		

Estimated Annual Total Savings (\$):	\$1,628	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.25	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.25	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (C02e):	21	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	3.6%	Percent of Implementation Costs:	0.3%

Findings Details



Building: Education/Art

FWB Number:	14905	Eco Number:	5
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Retrofit-Efficient Lighting	Date Identified:	12/20/2011
Description of Finding:	Efficiency of installed lamps, ballasts or fixtures are much lower than efficiency of currently available lamps, ballasts or fixtures.		
Equipment or System(s):	Interior Lighting	Finding Category:	Retrofits
Finding Type:	Retrofit - Efficient Lighting		

Implementer:	In-house Staff	Benefits:	Energy Savings
Baseline Documentation Method:	Verified installed lamps; counted total fixtures per room and lamps per fixture.		
Measure:	Replace existing 32 watt T8 lamps with lower wattage 28 watt T8 lamps.		
Recommendation for Implementation:	Whole Building: Replace existing 32 watt T8 lamps with lower wattage 28 watt T8 lamps. Refer to supporting documentation spreadsheet- Lighting Calcs.		
Evidence of Implementation Method:	Spot check 10% of affected areas and take photos.		

Annual Electric Savings (kWh):	11,403	Peak Demand Savings (kWh):	13
Estimated Annual kWh Savings (\$):	\$641	Estimated Annual Demand Savings (\$):	\$471
Contractor Cost (\$):	\$8,625		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$8,825		

Estimated Annual Total Savings (\$):	\$1,113	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	7.93	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	7.93	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO2e):	10	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	2.5%	Percent of Implementation Costs:	5.8%

Findings Summary



Building: Gillett Rec/Fitness
Site: Bemidji State

Eco #	Investigation Finding	Total Cost	Savings	Payback	Co-Funding	Payback Co-Funding	GHG
1	Excessive Enabling (24/7): AHU--6	\$400	\$2,402	0.17	\$0	0.17	34
3	Excessive Enabling (24/7): AHU-9	\$400	\$1,664	0.24	\$0	0.24	22
2	Excessive Enabling (24/7): AHU-8	\$400	\$904	0.44	\$0	0.44	13
5	Retrofit-Efficient Lighting	\$8,115	\$2,089	3.88	\$0	3.88	16
Total for Findings with Payback 3 years or less:		\$1,200	\$4,970	0.24	\$0	0.24	68
Total for all Findings:		\$9,315	\$7,059	1.32	\$0	1.32	84

Findings Details



Building: Gillett Rec/Fitness

FWB Number:	14906	Eco Number:	1
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling (24/7): AHU--6	Date Identified:	11/16/2011
Description of Finding:	AHU-6(Lobby): Found 24/7 operation via trend logs but building is not occupied 24/7. AHU includes: SF, RF, HC; constant volume.		
Equipment or System(s):	AHU with heating only	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended SF & RF fan status for existing schedule and compare to printed schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	AHU-6: Revise BAS schedule to match building operating schedule with unit starting 1hr before occupancy. Refer to supporting documentation spreadsheet- Calculations-FIT.		
Evidence of Implementation Method:	AHU-6: Review fan statuses trends. Refer to supporting documentation spreadsheet- Calculations- FIT for proposed schedule. Include screenshot if possible including implemented schedule and equipment tag. M-F: 4:30am-10pm Sa: 7am-10pm Su: 11am-10pm		

Annual Electric Savings (kWh):	34,035	Annual Natural Gas Savings (therms):	784
Estimated Annual kWh Savings (\$):	\$1,911	Estimated Annual Natural Gas Savings (\$):	\$491
Contractor Cost (\$):	\$200		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$400		

Estimated Annual Total Savings (\$):	\$2,402	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.17	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.17	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO2e):	34	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	5.3%	Percent of Implementation Costs:	0.3%

Findings Details



Building: Gillett Rec/Fitness

FWB Number:	14906	Eco Number:	2
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling (24/7): AHU-8	Date Identified:	11/16/2011
Description of Finding:	AHU-8(Offices near lobby): Found 24/7 operation via trend logs but building is not occupied 24/7. AHU includes: SF, RF, CC, HC; constant volume.		
Equipment or System(s):	AHU with heating and cooling	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended SF & RF fan status for existing schedule and compare to printed schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	AHU-8: Revise BAS schedule to match building operating schedule with unit starting 1hr before occupancy. Refer to supporting documentation spreadsheet- Calculations-FIT.		
Evidence of Implementation Method:	AHU-8: Review fan statuses trends. Refer to supporting documentation spreadsheet- Calculations- FIT for proposed schedule. Include screenshot if possible including implemented schedule and equipment tag. M-F: 4:30am-10pm Sa: 7am-10pm Su: 11am-10pm		

Annual Electric Savings (kWh):	13,270	Annual Natural Gas Savings (therms):	251
Estimated Annual kWh Savings (\$):	\$747	Estimated Annual Natural Gas Savings (\$):	\$157
Contractor Cost (\$):	\$200		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$400		

Estimated Annual Total Savings (\$):	\$904	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.44	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.44	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO2e):	13	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	2.0%	Percent of Implementation Costs:	0.3%

Findings Details



Building: Gillett Rec/Fitness

FWB Number:	14906	Eco Number:	3
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling (24/7): AHU-9	Date Identified:	11/16/2011
Description of Finding:	AHU-9(Locker RM): Found 24/7 operation via trend logs but building is not occupied 24/7. AHU includes: SF, RF, HC; constant volume.		
Equipment or System(s):	AHU with heating only	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended SF & RF fan status for existing schedule and compare to printed schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	AHU-9: Revise BAS schedule to match building operating schedule with unit starting 1hr before occupancy. Refer to supporting documentation spreadsheet- Calculations-FIT.		
Evidence of Implementation Method:	AHU-9: Review fan statuses trends. Refer to supporting documentation spreadsheet- Calculations- FIT for proposed schedule. Include screenshot if possible including implemented schedule and equipment tag. M-F: 4:30am-11pm Sa: 7am-11pm Su: 11am-11pm		

Annual Electric Savings (kWh):	19,647	Annual Natural Gas Savings (therms):	896
Estimated Annual kWh Savings (\$):	\$1,103	Estimated Annual Natural Gas Savings (\$):	\$561
Contractor Cost (\$):	\$200		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$400		

Estimated Annual Total Savings (\$):	\$1,664	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.24	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.24	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO2e):	22	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project

Percent Savings (Costs basis)	3.7%	Percent of Implementation Costs:	0.3%
-------------------------------	------	----------------------------------	------

Findings Details



Building: Gillett Rec/Fitness

FWB Number:	14906	Eco Number:	5
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Retrofit-Efficient Lighting	Date Identified:	12/20/2011
Description of Finding:	Efficiency of installed lamps, ballasts or fixtures are much lower than efficiency of currently available lamps, ballasts or fixtures.		
Equipment or System(s):	Interior Lighting	Finding Category:	Retrofits
Finding Type:	Retrofit - Efficient Lighting		

Implementer:	In-house Staff	Benefits:	Energy Savings
Baseline Documentation Method:	Verified installed lamps; counted total fixtures per room and lamps per fixture.		
Measure:	Replace existing 32 watt T8 lamps with lower wattage 28 watt T8 lamps. Replace T12 fixtures with T8.		
Recommendation for Implementation:	Whole Building: Replace existing 32 watt T8 lamps with lower wattage 28 watt T8 lamps. Refer to supporting documentation spreadsheet- Lighting Calcs.		
Evidence of Implementation Method:	Spot check 10% of affected areas and take photos.		

Annual Electric Savings (kWh):	19,003	Peak Demand Savings (kWh):	29
Estimated Annual kWh Savings (\$):	\$1,069	Estimated Annual Demand Savings (\$):	\$1,021
Contractor Cost (\$):	\$7,915		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$8,115		

Estimated Annual Total Savings (\$):	\$2,089	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	3.88	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	3.88	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (C02e):	16	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	4.6%	Percent of Implementation Costs:	5.3%

Findings Summary



Building: Hagg-Sauer Hall
 Site: Bemidji State

Eco #	Investigation Finding	Total Cost	Savings	Payback	Co-Funding	Payback Co-Funding	GHG
2	Excessive Enabling of Equipment: AHU-2	\$400	\$315	1.27	\$0	1.27	4
1	Excessive Enabling of Equipment: AHU-1	\$400	\$177	2.26	\$0	2.26	2
3	Retrofit-Efficient Lighting	\$14,300	\$1,743	8.20	\$0	8.20	15
	Total for Findings with Payback 3 years or less:	\$800	\$492	1.63	\$0	1.63	6
	Total for all Findings:	\$15,100	\$2,235	6.76	\$0	6.76	22

Findings Details



Building: Hagg-Sauer Hall

FWB Number:	14907	Eco Number:	1
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling of Equipment: AHU-1	Date Identified:	11/21/2011
Description of Finding:	AHU-1: Found excessive enabling (few hours each day) via trend logs. AHU includes: SF, CC, HC.		
Equipment or System(s):	AHU with heating and cooling	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended SF fan status & fan speed for existing schedule and compare to AHU schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	AHU-1: Revise BAS schedule to match building operating schedule with unit starting 1hr before occupancy. Refer to supporting documentation spreadsheet- Calculations-HGS.		
Evidence of Implementation Method:	AHU-1: Review fan statuses trends. Refer to supporting documentation spreadsheet- Calculations- HGS for proposed schedule. If system features allow, include a screenshot indicating the implemented schedule and equipment tag. M-F: 6am-9pm Sa, Su: 7am-7pm		

Annual Electric Savings (kWh):	1,918	Annual Natural Gas Savings (therms):	109
Estimated Annual kWh Savings (\$):	\$109	Estimated Annual Natural Gas Savings (\$):	\$68
Contractor Cost (\$):	\$200		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$400		

Estimated Annual Total Savings (\$):	\$177	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	2.26	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	2.26	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO2e):	2	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	0.4%	Percent of Implementation Costs:	0.3%

Findings Details



Building: Hagg-Sauer Hall

FWB Number:	14907	Eco Number:	2
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling of Equipment: AHU-2	Date Identified:	11/21/2011
Description of Finding:	AHU-2: Found excessive enabling (few hours each day) via trend logs. AHU includes: SF, CC, HC.		
Equipment or System(s):	AHU with heating and cooling	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended SF fan status & fan speed for existing schedule and compare to AHU schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	AHU-2: Revise BAS schedule to match building operating schedule with unit starting 1hr before occupancy. Refer to supporting documentation spreadsheet- Calculations-HGS.		
Evidence of Implementation Method:	AHU-2: Review fan statuses trends. Refer to supporting documentation spreadsheet- Calculations- HGS for proposed schedule. If system features allow, include a screenshot indicating the implemented schedule and equipment tag. M-F: 6am-9pm Sa, Su: 7am-7pm		

Annual Electric Savings (kWh):	2,832	Annual Natural Gas Savings (therms):	246
Estimated Annual kWh Savings (\$):	\$161	Estimated Annual Natural Gas Savings (\$):	\$154
Contractor Cost (\$):	\$200		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$400		

Estimated Annual Total Savings (\$):	\$315	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	1.27	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	1.27	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO ₂ e):	4	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	0.7%	Percent of Implementation Costs:	0.3%

Findings Details



Building: Hagg-Sauer Hall

FWB Number:	14907	Eco Number:	3
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Retrofit-Efficient Lighting	Date Identified:	12/20/2011
Description of Finding:	Efficiency of installed lamps, ballasts or fixtures are much lower than efficiency of currently available lamps, ballasts or fixtures.		
Equipment or System(s):	Interior Lighting	Finding Category:	Retrofits
Finding Type:	Retrofit - Efficient Lighting		

Implementer:	In-house Staff	Benefits:	Energy Savings
Baseline Documentation Method:	Verified installed lamps; counted total fixtures per room and lamps per fixture.		
Measure:	Replace existing 32 watt T8 lamps with lower wattage 28 watt T8 lamps.		
Recommendation for Implementation:	Whole Building: Replace existing 32 watt T8 lamps with lower wattage 28 watt T8 lamps. Refer to supporting documentation spreadsheet- Lighting Calcs.		
Evidence of Implementation Method:	Spot check 10% of affected areas and take photos.		

Annual Electric Savings (kWh):	18,052	Peak Demand Savings (kWh):	21
Estimated Annual kWh Savings (\$):	\$1,015	Estimated Annual Demand Savings (\$):	\$728
Contractor Cost (\$):	\$14,100		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$14,300		

Estimated Annual Total Savings (\$):	\$1,743	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	8.20	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	8.20	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (C02e):	15	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	3.8%	Percent of Implementation Costs:	9.4%

Findings Summary

Building: Hobson Memorial
Site: Bemidji State



Eco #	Investigation Finding	Total Cost	Savings	Payback	Co-Funding	Payback Co-Funding	GHG
7	Excessive Enabling of Equipment: AHU-3	\$400	\$851	0.47	\$0	0.47	9
6	Excessive Enabling of Equipment: AHU-2	\$400	\$665	0.60	\$0	0.60	8
5	Excessive Enabling of Equipment: AHU-1	\$400	\$639	0.63	\$0	0.63	9
8	Retrofit-Efficient Lighting	\$7,400	\$1,021	7.25	\$0	7.25	9
	Total for Findings with Payback 3 years or less:	\$1,200	\$2,155	0.56	\$0	0.56	26
	Total for all Findings:	\$8,600	\$3,176	2.71	\$0	2.71	35

Findings Details



Building: Hobson Memorial

FWB Number:	14909	Eco Number:	5
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling of Equipment: AHU-1	Date Identified:	11/22/2011
Description of Finding:	AHU-1(Lower- Court Side): Found excessive enabling via trend logs. AHU includes: SF, RF, CC, HC.		
Equipment or System(s):	AHU with heating and cooling	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended SF & RF fan status for existing schedule and compare to AHU schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	AHU-1: Revise BAS schedule to match building operating schedule. Refer to supporting documentation spreadsheet- Calculations-HOBS.		
Evidence of Implementation Method:	AHU-1: Review fan status trends. Refer to supporting documentation spreadsheet- Calculations- HOBS for proposed schedule. If systems allow, provide a screenshot indicating the implemented schedule and equipment tag. M-F: 6am-8pm Sa, Su: Off		

Annual Electric Savings (kWh):	8,988	Annual Natural Gas Savings (therms):	207
Estimated Annual kWh Savings (\$):	\$509	Estimated Annual Natural Gas Savings (\$):	\$129
Contractor Cost (\$):	\$200		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$400		

Estimated Annual Total Savings (\$):	\$639	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.63	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.63	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (C02e):	9	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	1.4%	Percent of Implementation Costs:	0.3%

Findings Details



Building: Hobson Memorial

FWB Number:	14909	Eco Number:	6
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling of Equipment: AHU-2	Date Identified:	11/22/2011
Description of Finding:	AHU-2 (Lower- 2nd FL Offices-Mtg. RM's): Found excessive enabling via trend logs. AHU includes: SF, RF, CC, HC.		
Equipment or System(s):	AHU with heating and cooling	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended SF & RF fan status for existing schedule and compare to AHU schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	AHU-2: Revise BAS schedule to match building operating schedule. Refer to supporting documentation spreadsheet- Calculations-HOBS.		
Evidence of Implementation Method:	AHU-2: Review fan status trends. Refer to supporting documentation spreadsheet- Calculations- HOBS for proposed schedule. If systems allow, provide a screenshot indicating the implemented schedule and equipment tag. M-F: 5am-10pm Sa, Su: 9am-10pm		

Annual Electric Savings (kWh):	6,988	Annual Natural Gas Savings (therms):	434
Estimated Annual kWh Savings (\$):	\$394	Estimated Annual Natural Gas Savings (\$):	\$271
Contractor Cost (\$):	\$200		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$400		

Estimated Annual Total Savings (\$):	\$665	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.60	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.60	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (C02e):	8	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	1.5%	Percent of Implementation Costs:	0.3%

Findings Details



Building: Hobson Memorial

FWB Number:	14909	Eco Number:	7
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling of Equipment: AHU-3	Date Identified:	11/22/2011
Description of Finding:	AHU-3 (Lower- Kitchen): Found excessive enabling via trend logs. AHU includes: SF, CC, HC.		
Equipment or System(s):	AHU with heating and cooling	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended SF fan status for existing schedule and compare to AHU schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	AHU-3: Revise BAS schedule to match building operating schedule. Refer to supporting documentation spreadsheet- Calculations-HOBS.		
Evidence of Implementation Method:	AHU-3: Review fan status trends. Refer to supporting documentation spreadsheet- Calculations- HOBS for proposed schedule. If systems allow, provide a screenshot indicating the implemented schedule and equipment tag. M-F: 7am-10pm Sa, Su: 9am-6pm		

Annual Electric Savings (kWh):	3,210	Annual Natural Gas Savings (therms):	1,071
Estimated Annual kWh Savings (\$):	\$180	Estimated Annual Natural Gas Savings (\$):	\$670
Contractor Cost (\$):	\$200		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$400		

Estimated Annual Total Savings (\$):	\$851	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.47	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.47	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO2e):	9	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	1.9%	Percent of Implementation Costs:	0.3%

Findings Details



Building: Hobson Memorial

FWB Number:	14909	Eco Number:	8
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Retrofit-Efficient Lighting	Date Identified:	12/20/2011
Description of Finding:	Efficiency of installed lamps, ballasts or fixtures are much lower than efficiency of currently available lamps, ballasts or fixtures.		
Equipment or System(s):	Interior Lighting	Finding Category:	Retrofits
Finding Type:	Retrofit - Efficient Lighting		

Implementer:	In-house Staff	Benefits:	Energy Savings
Baseline Documentation Method:	Verified installed lamps; counted total fixtures per room and lamps per fixture.		
Measure:	Replace existing 32 watt T8 lamps with lower wattage 28 watt T8 lamps.		
Recommendation for Implementation:	Whole Building: Replace existing 32 watt T8 lamps with lower wattage 28 watt T8 lamps. Refer to supporting documentation spreadsheet- Lighting Calcs.		
Evidence of Implementation Method:	Spot check 10% of affected areas and take photos.		

Annual Electric Savings (kWh):	10,725	Peak Demand Savings (kWh):	12
Estimated Annual kWh Savings (\$):	\$603	Estimated Annual Demand Savings (\$):	\$418
Contractor Cost (\$):	\$7,200		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$7,400		

Estimated Annual Total Savings (\$):	\$1,021	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	7.25	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	7.25	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (C02e):	9	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	2.3%	Percent of Implementation Costs:	4.9%

Findings Summary



Building: Memorial Hall
 Site: Bemidji State

Eco #	Investigation Finding	Total Cost	Savings	Payback	Co-Funding	Payback Co-Funding	GHG
1	Excessive Enabling of Equipment: AHU-1	\$400	\$1,454	0.28	\$0	0.28	20
	Total for Findings with Payback 3 years or less:	\$400	\$1,454	0.28	\$0	0.28	20
	Total for all Findings:	\$400	\$1,454	0.28	\$0	0.28	20

Findings Details



Building: Memorial Hall

FWB Number:	14910	Eco Number:	1
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling of Equipment: AHU-1	Date Identified:	11/22/2011
Description of Finding:	AHU-1: Found excessive enabling via trend logs. AHU includes: SF, RF, CC, HC.		
Equipment or System(s):	AHU with heating and cooling	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended SF & RF fan status for existing schedule and compare to AHU schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	AHU-1: Revise BAS schedule to match building operating schedule. Refer to supporting documentation spreadsheet- Calculations-MHC.		
Evidence of Implementation Method:	AHU-1: Review fan statuses trends. Refer to supporting documentation spreadsheet- Calculations- MHC for proposed schedule. If possible, include a screenshot of the implemented schedule and equipment tag: M-F: 6am-6pm Sa, Su: 8am-5pm		

Annual Electric Savings (kWh):	20,771	Annual Natural Gas Savings (therms):	460
Estimated Annual kWh Savings (\$):	\$1,167	Estimated Annual Natural Gas Savings (\$):	\$288
Contractor Cost (\$):	\$200		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$400		

Estimated Annual Total Savings (\$):	\$1,454	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.28	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.28	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO ₂ e):	20	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	3.2%	Percent of Implementation Costs:	0.3%

Findings Summary



Building: Physical Education
 Site: Bemidji State

Eco #	Investigation Finding	Total Cost	Savings	Payback	Co-Funding	Payback Co-Funding	GHG
4	Excessive Enabling (24/7): AHU-4 (PE - Locker Rm & Training Rm)	\$400	\$2,460	0.16	\$0	0.16	34
3	Excessive Enabling (24/7): AHU-2 (PE - East Gym)	\$400	\$1,985	0.20	\$0	0.20	27
	Total for Findings with Payback 3 years or less:	\$800	\$4,445	0.18	\$0	0.18	61
	Total for all Findings:	\$800	\$4,445	0.18	\$0	0.18	61

Findings Details



Building: Physical Education

FWB Number:	14911	Eco Number:	3
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling (24/7): AHU-2 (PE - East Gym)	Date Identified:	11/8/2011
Description of Finding:	AHU-2(PE- EAST GYM): Found 24/7 operation via trend logs but building is not occupied 24/7. AHU includes: SF, HC.		
Equipment or System(s):	AHU with heating only	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended SF fan status for existing schedule and compare to printed schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	AHU-2(PE): Revise BAS schedule to match building operating schedule with unit starting 1hr before occupancy. Refer to supporting documentation spreadsheet- Calculations-GLAS.		
Evidence of Implementation Method:	AHU-2: Review fan statuses trends. Refer to supporting documentation spreadsheet- Calculations- PE for proposed schedule. If possible, include a screenshot showing the implemented schedule and equipment tag. M-F: 4:30am-10pm Sa: 7am-10pm Su: 11am-10pm		

Annual Electric Savings (kWh):	25,526	Annual Natural Gas Savings (therms):	881
Estimated Annual kWh Savings (\$):	\$1,433	Estimated Annual Natural Gas Savings (\$):	\$552
Contractor Cost (\$):	\$200		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$400		

Estimated Annual Total Savings (\$):	\$1,985	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.20	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.20	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (C02e):	27	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	4.4%	Percent of Implementation Costs:	0.3%

Findings Details



Building: Physical Education

FWB Number:	14911	Eco Number:	4
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling (24/7): AHU-4 (PE - Locker Rm & Training Rm)	Date Identified:	11/8/2011
Description of Finding:	AHU-4(PE- LOCKER RM & TRAINING RM): Found 24/7 operation via trend logs but building is not occupied 24/7. AHU includes: SF, HC.		
Equipment or System(s):	AHU with heating only	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended SF fan status for existing schedule and compare to printed schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	AHU-4(PE): Revise BAS schedule to match building operating schedule with unit starting 1hr before occupancy. Refer to supporting documentation spreadsheet- Calculations-GLAS.		
Evidence of Implementation Method:	AHU-4: Review fan statuses trends. Refer to supporting documentation spreadsheet- Calculations- PE for proposed schedule. If possible, include a screenshot showing the implemented schedule and equipment tag. M-F: 4:30am-10pm Sa: 7am-10pm Su: 11am-10pm		

Annual Electric Savings (kWh):	34,036	Annual Natural Gas Savings (therms):	876
Estimated Annual kWh Savings (\$):	\$1,911	Estimated Annual Natural Gas Savings (\$):	\$549
Contractor Cost (\$):	\$200		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$400		

Estimated Annual Total Savings (\$):	\$2,460	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.16	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.16	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (C02e):	34	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	5.4%	Percent of Implementation Costs:	0.3%

Findings Summary



Building: Sattgast Hall
 Site: Bemidji State

Eco #	Investigation Finding	Total Cost	Savings	Payback	Co-Funding	Payback Co-Funding	GHG
1	Excessive Enabling (24/7): AHU-6	\$400	\$2,181	0.18	\$0	0.18	30
2	Retrofit-Efficient Lighting	\$24,840	\$2,074	11.98	\$0	11.98	18
	Total for Findings with Payback 3 years or less:	\$400	\$2,181	0.18	\$0	0.18	30
	Total for all Findings:	\$25,240	\$4,255	5.93	\$0	5.93	48

Findings Details



Building: Sattgast Hall

FWB Number:	14912	Eco Number:	1
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling (24/7): AHU-6	Date Identified:	11/17/2011
Description of Finding:	AHU-6 (SE): Found 24/7 operation via trend logs but building is not occupied 24/7. AHU includes: SF, RF, CC, HC.		
Equipment or System(s):	AHU with heating and cooling	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended SF & RF fan status & fan speed for existing schedule and compare to printed schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	AHU-6: Revise BAS schedule to match building operating schedule. Refer to supporting documentation spreadsheet- Calculations-SAT.		
Evidence of Implementation Method:	AHU-6: Review fan statuses trends. Refer to supporting documentation spreadsheet- Calculations- SAT for proposed schedule. If possible, include screenshot of implemented schedule and equipment tag. M-F: 6:15am-6:45pm Sa, Su: 6:15am-5:45pm		

Annual Electric Savings (kWh):	30,062	Annual Natural Gas Savings (therms):	792
Estimated Annual kWh Savings (\$):	\$1,686	Estimated Annual Natural Gas Savings (\$):	\$496
Contractor Cost (\$):	\$200		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$400		

Estimated Annual Total Savings (\$):	\$2,181	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.18	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.18	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (C02e):	30	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	4.8%	Percent of Implementation Costs:	0.3%

Findings Details



Building: Sattgast Hall

FWB Number:	14912	Eco Number:	2
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Retrofit-Efficient Lighting	Date Identified:	12/20/2011
Description of Finding:	Efficiency of installed lamps, ballasts or fixtures are much lower than efficiency of currently available lamps, ballasts or fixtures.		
Equipment or System(s):	Interior Lighting	Finding Category:	Retrofits
Finding Type:	Retrofit - Efficient Lighting		

Implementer:	In-house Staff	Benefits:	Energy Savings
Baseline Documentation Method:	Verified installed lamps; counted total fixtures per room and lamps per fixture.		
Measure:	Replace existing 32 watt T8 lamps with lower wattage 28 watt T8 lamps. Replace T12 fixtures with T8 fixtures.		
Recommendation for Implementation:	Whole Building: Replace existing 32 watt T8 lamps with lower wattage 28 watt T8 lamps. Replace T12 fixtures with T8 fixtures. Refer to supporting documentation spreadsheet- Lighting Calcs.		
Evidence of Implementation Method:	Spot check 10% of affected areas and take photos.		

Annual Electric Savings (kWh):	21,173	Peak Demand Savings (kWh):	25
Estimated Annual kWh Savings (\$):	\$1,191	Estimated Annual Demand Savings (\$):	\$883
Contractor Cost (\$):	\$24,640		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$24,840		

Estimated Annual Total Savings (\$):	\$2,074	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	11.98	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	11.98	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO2e):	18	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	4.6%	Percent of Implementation Costs:	16.4%

Findings Summary



Building: Walnut Hall
Site: Bemidji State

Eco #	Investigation Finding	Total Cost	Savings	Payback	Co-Funding	Payback Co-Funding	GHG
5	Excessive Enabling (24/7): AIRCON-4	\$1,200	\$1,580	0.76	\$0	0.76	18
3	Excessive Enabling (24/7): AIRCON-2	\$1,200	\$595	2.02	\$0	2.02	7
2	Excessive Enabling (24/7): AIRCON-1	\$1,200	\$406	2.96	\$0	2.96	6
4	Excessive Enabling (24/7): AIRCON-3	\$1,200	\$194	6.19	\$0	6.19	2
1	Retrofit-Efficient Lighting	\$6,040	\$938	6.44	\$0	6.44	9
Total for Findings with Payback 3 years or less:		\$3,600	\$2,580	1.40	\$0	1.40	31
Total for all Findings:		\$10,840	\$3,713	2.92	\$0	2.92	43

Findings Details



Building: Walnut Hall

FWB Number:	14913	Eco Number:	1
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Retrofit-Efficient Lighting	Date Identified:	12/20/2011
Description of Finding:	Efficiency of installed lamps, ballasts or fixtures are much lower than efficiency of currently available lamps, ballasts or fixtures.		
Equipment or System(s):	Interior Lighting	Finding Category:	Retrofits
Finding Type:	Retrofit - Efficient Lighting		

Implementer:	In-house Staff	Benefits:	Energy Savings
Baseline Documentation Method:	Verified installed lamps; counted total fixtures per room and lamps per fixture.		
Measure:	Replace existing 32 watt T8 lamps with lower wattage 28 watt T8 lamps.		
Recommendation for Implementation:	Whole Building: Replace existing 32 watt T8 lamps with lower wattage 28 watt T8 lamps. Refer to supporting documentation spreadsheet- Lighting Calcs.		
Evidence of Implementation Method:	Spot check 10% of affected areas and take photos.		

Annual Electric Savings (kWh):	11,064	Peak Demand Savings (kWh):	9
Estimated Annual kWh Savings (\$):	\$622	Estimated Annual Demand Savings (\$):	\$316
Contractor Cost (\$):	\$5,840		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$6,040		

Estimated Annual Total Savings (\$):	\$938	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	6.44	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	6.44	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (C02e):	9	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	2.1%	Percent of Implementation Costs:	4.0%

Findings Details



Building: Walnut Hall

FWB Number:	14913	Eco Number:	2
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling (24/7): AIRCON-1	Date Identified:	1/15/2012
Description of Finding:	AIRCON-1: Found 24/7 operation via trend logs but building is not occupied 24/7. AHU includes: SF, CC, HC.		
Equipment or System(s):	AHU with heating and cooling	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trend SF fan amps for existing schedule and compare to printed schedules.		
Measure:	Install Webstat (remote programmable enable/disable point- CAT 5) to schedule equipment.		
Recommendation for Implementation:	AIRCON-1: Revise BAS schedule to match building operating schedule. Refer to supporting documentation spreadsheet- Calculations-Walnut.		
Evidence of Implementation Method:	AIRCON-1: Review fan amps via data loggers. Refer to supporting documentation spreadsheet- Calculations- Walnut for proposed schedule.		

Annual Electric Savings (kWh):	6,268	Annual Natural Gas Savings (therms):	85
Estimated Annual kWh Savings (\$):	\$352	Estimated Annual Natural Gas Savings (\$):	\$53
Contractor Cost (\$):	\$1,000		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$1,200		

Estimated Annual Total Savings (\$):	\$406	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	2.96	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	2.96	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (C02e):	6	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	0.9%	Percent of Implementation Costs:	0.8%

Findings Details



Building: Walnut Hall

FWB Number:	14913	Eco Number:	3
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling (24/7): AIRCON-2	Date Identified:	1/15/2012
Description of Finding:	AIRCON-2: Found 24/7 operation via trend logs but building is not occupied 24/7. AHU includes: SF, CC, HC.		
Equipment or System(s):	AHU with heating and cooling	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trend SF fan amps for existing schedule and compare to printed schedules.		
Measure:	Install Webstat (remote programmable enable/disable point- CAT 5) to schedule equipment.		
Recommendation for Implementation:	AIRCON-2: Revise BAS schedule to match building operating schedule. Refer to supporting documentation spreadsheet- Calculations-Walnut.		
Evidence of Implementation Method:	AIRCON-2: Review fan amps via data loggers. Refer to supporting documentation spreadsheet- Calculations- Walnut for proposed schedule.		

Annual Electric Savings (kWh):	4,304	Annual Natural Gas Savings (therms):	564
Estimated Annual kWh Savings (\$):	\$242	Estimated Annual Natural Gas Savings (\$):	\$353
Contractor Cost (\$):	\$1,000		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$1,200		

Estimated Annual Total Savings (\$):	\$595	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	2.02	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	2.02	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (C02e):	7	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	1.3%	Percent of Implementation Costs:	0.8%

Findings Details



Building: Walnut Hall

FWB Number:	14913	Eco Number:	4
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling (24/7): AIRCON-3	Date Identified:	1/15/2012
Description of Finding:	AIRCON-3: Found 24/7 operation via trend logs but building is not occupied 24/7. AHU includes: SF, CC, HC.		
Equipment or System(s):	AHU with heating and cooling	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trend SF fan amps for existing schedule and compare to printed schedules.		
Measure:	Install Webstat (remote programmable enable/disable point- CAT 5) to schedule equipment.		
Recommendation for Implementation:	AIRCON-3: Revise BAS schedule to match building operating schedule. Refer to supporting documentation spreadsheet- Calculations-Walnut.		
Evidence of Implementation Method:	AIRCON-3: Review fan amps via data loggers. Refer to supporting documentation spreadsheet- Calculations- Walnut for proposed schedule.		

Annual Electric Savings (kWh):	2,684	Annual Natural Gas Savings (therms):	127
Estimated Annual kWh Savings (\$):	\$115	Estimated Annual Natural Gas Savings (\$):	\$79
Contractor Cost (\$):	\$1,000		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$1,200		

Estimated Annual Total Savings (\$):	\$194	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	6.19	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	6.19	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (C02e):	2	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	0.4%	Percent of Implementation Costs:	0.8%

Findings Details



Building: Walnut Hall

FWB Number:	14913	Eco Number:	5
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling (24/7): AIRCON-4	Date Identified:	1/15/2012
Description of Finding:	AIRCON-4: Found 24/7 operation via trend logs but building is not occupied 24/7. AHU includes: SF, CC, HC.		
Equipment or System(s):	AHU with heating and cooling	Finding Category:	Equipment Scheduling and Enabling
Finding Type:	Time of Day enabling is excessive		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trend SF fan amps for existing schedule and compare to printed schedules.		
Measure:	Install Webstat (remote programmable enable/disable point- CAT 5) to schedule equipment.		
Recommendation for Implementation:	AIRCON-4: Revise BAS schedule to match building operating schedule. Refer to supporting documentation spreadsheet- Calculations-Walnut.		
Evidence of Implementation Method:	AIRCON-4: Review fan amps via data loggers. Refer to supporting documentation spreadsheet- Calculations- Walnut for proposed schedule.		

Annual Electric Savings (kWh):	11,531	Annual Natural Gas Savings (therms):	1,488
Estimated Annual kWh Savings (\$):	\$648	Estimated Annual Natural Gas Savings (\$):	\$931
Contractor Cost (\$):	\$1,000		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$1,200		

Estimated Annual Total Savings (\$):	\$1,580	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.76	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.76	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (C02e):	18	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	3.5%	Percent of Implementation Costs:	0.8%

Investigation Checklist



Rev. 2.0 (12/16/2010)

14901 - Bemidji State- A.C. Clark Library

This checklist is designed to be a resource and reference for Providers and PBEEP.

Finding Category	Finding Type Number	Finding Type	Relevant Findings (if any)	Finding Location	Reason for no relevant finding	Notes
a. Equipment Scheduling and Enabling:	a.1 (1)	Time of Day enabling is excessive	Yes	AHU's, EF's, ect.		
	a.2 (2)	Equipment is enabled regardless of need, or such enabling is excessive	No		Investigation looked for, but did not find this issue.	
	a.3 (3)	Lighting is on more hours than necessary.	No		Investigation looked for, but did not find this issue.	
	a.4 (4)	OTHER Equipment Scheduling/Enabling	No		Investigation looked for, but did not find this issue.	Schedules checked but no additional opportunities found.
b. Economizer/Outside Air Loads:	b.1 (5)	Economizer Operation – Inadequate Free Cooling (Damper failed in minimum or closed position, economizer setpoints not optimized)	No		Investigation looked for, but did not find this issue.	
	b.2 (6)	Over-Ventilation – Outside air damper failed in an open position. Minimum outside air fraction not set to design specifications or occupancy.	No		Investigation looked for, but did not find this issue.	
	b.3 (7)	OTHER Economizer/OA Loads	No		Investigation looked for, but did not find this issue.	Economizer cycled checked while onsite; no opportunities found.
c. Controls Problems:	c.1 (8)	Simultaneous Heating and Cooling is present and excessive	No		Investigation looked for, but did not find this issue.	
	c.2 (9)	Sensor/Thermostat needs calibration, relocation/shielding, and/or replacement	No		Not cost-effective to investigate	
	c.3 (10)	Controls "hunt" and/or need Loop Tuning or separation of heating/cooling setpoints	No		Investigation looked for, but did not find this issue.	
	c.4 (11)	OTHER Controls	No		Investigation looked for, but did not find this issue.	Controls reviewed while onsite; no opportunities found
d. Controls (Setpoint Changes):	d.1 (12)	Daylighting controls or occupancy sensors need optimization.	No		Not cost-effective to investigate	
	d.2 (13)	Zone setpoint setup/setback are not implemented or are sub-optimal.	No		Investigation looked for, but did not find this issue.	
	d.3 (14)	Fan Speed Doesn't Vary Sufficiently	No		Investigation looked for, but did not find this issue.	
	d.4 (15)	Pump Speed Doesn't Vary Sufficiently	No		Investigation looked for, but did not find this issue.	
	d.5 (16)	VAV Box Minimum Flow Setpoint is higher than necessary	No		Investigation looked for, but did not find this issue.	
	d.6 (17)	Other Controls (Setpoint Changes)	No		Investigation looked for, but did not find this issue.	
e. Controls (Reset Schedules):	e.1 (18)	HW Supply Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	
	e.2 (19)	CHW Supply Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	
	e.3 (20)	Supply Air Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	Already has it.
	e.4 ()	Supply Duct Static Pressure Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	Within reason.
	e.5 (21)	Condenser Water Temperature Reset is not implemented or is sub-optimal	No		Not Relevant	Central plant.
	e.6 (22)	Other Controls (Reset Schedules)	No		Not Relevant	Central plant.
f. Equipment Efficiency Improvements / Load Reduction:	f.1 (23)	Daylighting Control needs optimization—Spaces are Over-Lit.	Yes	Retrofit lamps		
	f.2 (24)	Pump Discharge Throttled	No		Investigation looked for, but did not find this issue.	
	f.3 (25)	Over-Pumping	No		Investigation looked for, but did not find this issue.	
	f.4 (26)	Equipment is oversized for load.	No		Not Relevant	Central plant.
	f.5 (27)	OTHER Equipment Efficiency/Load Reduction	No		Investigation looked for, but did not find this issue.	
	g.1 (28)	VFD Retrofit - Fans	No		Investigation looked for, but did not find this issue.	Already have VFD's

Investigation Checklist



Rev. 2.0 (12/16/2010)

14901 - Bemidji State- A.C. Clark Library

This checklist is designed to be a resource and reference for Providers and PBEEP.

Finding Category	Finding Type Number	Finding Type	Relevant Findings (if any)	Finding Location	Reason for no relevant finding	Notes
g. Variable Frequency Drives (VFD):	g.2 (29)	VFD Retrofit - Pumps	No		Investigation looked for, but did not find this issue.	Already have VFD's
	g.3 (30)	VFD Retrofit - Motors (process)	No		Investigation looked for, but did not find this issue.	Already have.
	g.4 (31)	OTHER VFD	No		Investigation looked for, but did not find this issue.	
h. Retrofits:	h.1 (32)	Retrofit - Motors	No		Investigation looked for, but did not find this issue.	
	h.2 (33)	Retrofit - Chillers	No		Not Relevant	Central plant.
	h.3 (34)	Retrofit - Air Conditioners (Air Handling Units, Packaged Unitary Equipment)	No		Not Relevant	Central plant.
	h.4 (35)	Retrofit - Boilers	No		Not Relevant	Central plant.
	h.5 (36)	Retrofit - Packaged Gas fired heating	No		Not Relevant	Central plant.
	h.6 (37)	Retrofit - Heat Pumps	No		Not Relevant	Central plant.
	h.7 (38)	Retrofit - Equipment (custom)	No		Not Relevant	Central plant.
	h.8 (39)	Retrofit - Pumping distribution method	No		Not Relevant	Central plant.
	h.9 (40)	Retrofit - Energy/Heat Recovery	No		Not Relevant	Central plant.
	h.10 (41)	Retrofit - System (custom)	No		Not Relevant	Central plant.
	h.11 (42)	Retrofit - Efficient Lighting	Yes	T8 lamps 32W to 28W		
	h.12 (43)	Retrofit - Building Envelope	No		Not cost-effective to investigate	
	h.13 (44)	Retrofit - Alternative Energy	No		Not cost-effective to investigate	
	h.14 (45)	OTHER Retrofit	No		Not Relevant	
i. Maintenance Related Problems:	i.1 (46)	Differed Maintenance from Recommended/Standard	No		Investigation looked for, but did not find this issue.	
	i.2 (47)	Impurity/Contamination	No		Not cost-effective to investigate	
	i.3 ()	Leaky/Stuck Damper	No		Investigation looked for, but did not find this issue.	
	i.4 ()	Leaky/Stuck Valve	No		Investigation looked for, but did not find this issue.	
	i.5 (48)	OTHER Maintenance	No		Investigation looked for, but did not find this issue.	
j. OTHER	j.1 (49)	OTHER	No		Investigation looked for, but did not find this issue.	

Investigation Checklist



Rev. 2.0 (12/16/2010)

14902 - Bemidji State- AIRC

This checklist is designed to be a resource and reference for Providers and PBEEP.

Finding Category	Finding Type Number	Finding Type	Relevant Findings (if any)	Finding Location	Reason for no relevant finding	Notes
a. Equipment Scheduling and Enabling:	a.1 (1)	Time of Day enabling is excessive	Yes	AHU's, EF's, ect.		
	a.2 (2)	Equipment is enabled regardless of need, or such enabling is excessive	No		Investigation looked for, but did not find this issue.	
	a.3 (3)	Lighting is on more hours than necessary.	No		Investigation looked for, but did not find this issue.	
	a.4 (4)	OTHER Equipment Scheduling/Enabling	No		Investigation looked for, but did not find this issue.	Schedules checked but no additional opportunities found.
b. Economizer/Outside Air Loads:	b.1 (5)	Economizer Operation – Inadequate Free Cooling (Damper failed in minimum or closed position, economizer setpoints not optimized)	No		Investigation looked for, but did not find this issue.	
	b.2 (6)	Over-Ventilation – Outside air damper failed in an open position. Minimum outside air fraction not set to design specifications or occupancy.	No		Investigation looked for, but did not find this issue.	
	b.3 (7)	OTHER Economizer/OA Loads	No		Investigation looked for, but did not find this issue.	Economizer cycled checked while onsite; no opportunities found.
c. Controls Problems:	c.1 (8)	Simultaneous Heating and Cooling is present and excessive	No		Investigation looked for, but did not find this issue.	
	c.2 (9)	Sensor/Thermostat needs calibration, relocation/shielding, and/or replacement	No		Not cost-effective to investigate	
	c.3 (10)	Controls "hunt" and/or need Loop Tuning or separation of heating/cooling setpoints	No		Investigation looked for, but did not find this issue.	
	c.4 (11)	OTHER Controls	No		Investigation looked for, but did not find this issue.	Controls reviewed while onsite; no opportunities found
d. Controls (Setpoint Changes):	d.1 (12)	Daylighting controls or occupancy sensors need optimization.	No		Not cost-effective to investigate	
	d.2 (13)	Zone setpoint setup/setback are not implemented or are sub-optimal.	No		Investigation looked for, but did not find this issue.	
	d.3 (14)	Fan Speed Doesn't Vary Sufficiently	No		Investigation looked for, but did not find this issue.	
	d.4 (15)	Pump Speed Doesn't Vary Sufficiently	No		Investigation looked for, but did not find this issue.	
	d.5 (16)	VAV Box Minimum Flow Setpoint is higher than necessary	No		Investigation looked for, but did not find this issue.	
	d.6 (17)	Other Controls (Setpoint Changes)	No		Investigation looked for, but did not find this issue.	
e. Controls (Reset Schedules):	e.1 (18)	HW Supply Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	
	e.2 (19)	CHW Supply Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	
	e.3 (20)	Supply Air Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	Already has it.
	e.4 ()	Supply Duct Static Pressure Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	Within reason.
	e.5 (21)	Condenser Water Temperature Reset is not implemented or is sub-optimal	No		Not Relevant	Aircooled DX
	e.6 (22)	Other Controls (Reset Schedules)	No		Investigation looked for, but did not find this issue.	None
f. Equipment Efficiency Improvements / Load Reduction:	f.1 (23)	Daylighting Control needs optimization—Spaces are Over-Lit.	No	Retrofit lamps		
	f.2 (24)	Pump Discharge Throttled	No		Investigation looked for, but did not find this issue.	
	f.3 (25)	Over-Pumping	No		Investigation looked for, but did not find this issue.	
	f.4 (26)	Equipment is oversized for load.	No		Investigation looked for, but did not find this issue.	
	f.5 (27)	OTHER Equipment Efficiency/Load Reduction	No		Investigation looked for, but did not find this issue.	
	g.1 (28)	VFD Retrofit - Fans	No		Investigation looked for, but did not find this issue.	Already have VFD's

Investigation Checklist



Rev. 2.0 (12/16/2010)

14902 - Bemidji State- AIRC

This checklist is designed to be a resource and reference for Providers and PBEEP.

Finding Category	Finding Type Number	Finding Type	Relevant Findings (if any)	Finding Location	Reason for no relevant finding	Notes
g. Variable Frequency Drives (VFD):	g.2 (29)	VFD Retrofit - Pumps	No		Investigation looked for, but did not find this issue.	Already have VFD's
	g.3 (30)	VFD Retrofit - Motors (process)	No		Investigation looked for, but did not find this issue.	Already have.
	g.4 (31)	OTHER VFD	No		Investigation looked for, but did not find this issue.	
h. Retrofits:	h.1 (32)	Retrofit - Motors	No		Investigation looked for, but did not find this issue.	
	h.2 (33)	Retrofit - Chillers	No		Investigation looked for, but did not find this issue.	
	h.3 (34)	Retrofit - Air Conditioners (Air Handling Units, Packaged Unitary Equipment)	No		Investigation looked for, but did not find this issue.	
	h.4 (35)	Retrofit - Boilers	No		Investigation looked for, but did not find this issue.	
	h.5 (36)	Retrofit - Packaged Gas fired heating	No		Not Relevant	hot water hydronic system
	h.6 (37)	Retrofit - Heat Pumps	No		Not Relevant	existing system is newer.
	h.7 (38)	Retrofit - Equipment (custom)	No		Not Relevant	existing system is newer.
	h.8 (39)	Retrofit - Pumping distribution method	No		Not Relevant	existing system is newer.
	h.9 (40)	Retrofit - Energy/Heat Recovery	No		Not Relevant	existing system is newer.
	h.10 (41)	Retrofit - System (custom)	No		Not Relevant	existing system is newer.
	h.11 (42)	Retrofit - Efficient Lighting	Yes	T8 lamps 32W to 28W		
	h.12 (43)	Retrofit - Building Envelope	No		Not cost-effective to investigate	
	h.13 (44)	Retrofit - Alternative Energy	No		Not cost-effective to investigate	
	h.14 (45)	OTHER Retrofit	No		Not Relevant	
i. Maintenance Related Problems:	i.1 (46)	Differed Maintenance from Recommended/Standard	No		Investigation looked for, but did not find this issue.	
	i.2 (47)	Impurity/Contamination	No		Not cost-effective to investigate	
	i.3 ()	Leaky/Stuck Damper	No		Investigation looked for, but did not find this issue.	
	i.4 ()	Leaky/Stuck Valve	No		Investigation looked for, but did not find this issue.	
	i.5 (48)	OTHER Maintenance	No		Investigation looked for, but did not find this issue.	
j. OTHER	j.1 (49)	OTHER	No		Investigation looked for, but did not find this issue.	

Investigation Checklist



Rev. 2.0 (12/16/2010)

14903 - Bemidji State- Bridgeman-CAET

This checklist is designed to be a resource and reference for Providers and PBEEP.

Finding Category	Finding Type Number	Finding Type	Relevant Findings (if any)	Finding Location	Reason for no relevant finding	Notes
a. Equipment Scheduling and Enabling:	a.1 (1)	Time of Day enabling is excessive	Yes	AHU's, EF's, ect.		
	a.2 (2)	Equipment is enabled regardless of need, or such enabling is excessive	No		Investigation looked for, but did not find this issue.	
	a.3 (3)	Lighting is on more hours than necessary.	No		Investigation looked for, but did not find this issue.	
	a.4 (4)	OTHER Equipment Scheduling/Enabling	No		Not Relevant	
b. Economizer/Outside Air Loads:	b.1 (5)	Economizer Operation – Inadequate Free Cooling (Damper failed in minimum or closed position, economizer setpoints not optimized)	No		Investigation looked for, but did not find this issue.	
	b.2 (6)	Over-Ventilation – Outside air damper failed in an open position. Minimum outside air fraction not set to design specifications or occupancy.	No		Investigation looked for, but did not find this issue.	
	b.3 (7)	OTHER Economizer/OA Loads	No		Not Relevant	
c. Controls Problems:	c.1 (8)	Simultaneous Heating and Cooling is present and excessive	No		Investigation looked for, but did not find this issue.	
	c.2 (9)	Sensor/Thermostat needs calibration, relocation/shielding, and/or replacement	No		Not cost-effective to investigate	
	c.3 (10)	Controls "hunt" and/or need Loop Tuning or separation of heating/cooling setpoints	No		Investigation looked for, but did not find this issue.	
	c.4 (11)	OTHER Controls	No		Not Relevant	
d. Controls (Setpoint Changes):	d.1 (12)	Daylighting controls or occupancy sensors need optimization.	No		Not Relevant	
	d.2 (13)	Zone setpoint setup/setback are not implemented or are sub-optimal.	No		Investigation looked for, but did not find this issue.	
	d.3 (14)	Fan Speed Doesn't Vary Sufficiently	No		Investigation looked for, but did not find this issue.	
	d.4 (15)	Pump Speed Doesn't Vary Sufficiently	No		Investigation looked for, but did not find this issue.	
	d.5 (16)	VAV Box Minimum Flow Setpoint is higher than necessary	No		Investigation looked for, but did not find this issue.	
	d.6 (17)	Other Controls (Setpoint Changes)	No		Not Relevant	
e. Controls (Reset Schedules):	e.1 (18)	HW Supply Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	
	e.2 (19)	CHW Supply Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	
	e.3 (20)	Supply Air Temperature Reset is not implemented or is sub-optimal	No		Not Relevant	
	e.4 ()	Supply Duct Static Pressure Reset is not implemented or is sub-optimal	No		Not Relevant	
	e.5 (21)	Condenser Water Temperature Reset is not implemented or is sub-optimal	No		Not Relevant	
	e.6 (22)	Other Controls (Reset Schedules)	No		Not Relevant	
f. Equipment Efficiency Improvements / Load Reduction:	f.1 (23)	Daylighting Control needs optimization—Spaces are Over-Lit.	No		Not Relevant	
	f.2 (24)	Pump Discharge Throttled	No		Not Relevant	
	f.3 (25)	Over-Pumping	No		Not Relevant	
	f.4 (26)	Equipment is oversized for load.	No		Not Relevant	
	f.5 (27)	OTHER Equipment Efficiency/Load Reduction	No		Not Relevant	
	g.1 (28)	VFD Retrofit - Fans	No		Not Relevant	

Investigation Checklist



Rev. 2.0 (12/16/2010)

14903 - Bemidji State- Bridgeman-CAET

This checklist is designed to be a resource and reference for Providers and PBEEP.

Finding Category	Finding Type Number	Finding Type	Relevant Findings (if any)	Finding Location	Reason for no relevant finding	Notes
g. Variable Frequency Drives (VFD):	g.2 (29)	VFD Retrofit - Pumps	No		Not Relevant	
	g.3 (30)	VFD Retrofit - Motors (process)	No		Not Relevant	
	g.4 (31)	OTHER VFD	No		Not Relevant	
h. Retrofits:	h.1 (32)	Retrofit - Motors	No		Not Relevant	
	h.2 (33)	Retrofit - Chillers	No		Not Relevant	
	h.3 (34)	Retrofit - Air Conditioners (Air Handling Units, Packaged Unitary Equipment)	No		Not Relevant	
	h.4 (35)	Retrofit - Boilers	No		Not Relevant	
	h.5 (36)	Retrofit - Packaged Gas fired heating	No		Not Relevant	
	h.6 (37)	Retrofit - Heat Pumps	No		Not Relevant	
	h.7 (38)	Retrofit - Equipment (custom)	No		Not Relevant	
	h.8 (39)	Retrofit - Pumping distribution method	No		Not Relevant	
	h.9 (40)	Retrofit - Energy/Heat Recovery	No		Not Relevant	
	h.10 (41)	Retrofit - System (custom)	No		Not Relevant	
	h.11 (42)	Retrofit - Efficient Lighting	Yes	T8 lamps 32W to 28W		
	h.12 (43)	Retrofit - Building Envelope	No		Not cost-effective to investigate	
	h.13 (44)	Retrofit - Alternative Energy	No		Not cost-effective to investigate	
	h.14 (45)	OTHER Retrofit	No		Not Relevant	
i. Maintenance Related Problems:	i.1 (46)	Differed Maintenance from Recommended/Standard	No		Investigation looked for, but did not find this issue.	
	i.2 (47)	Impurity/Contamination	No		Not cost-effective to investigate	
	i.3 ()	Leaky/Stuck Damper	No		Investigation looked for, but did not find this issue.	
	i.4 ()	Leaky/Stuck Valve	No		Investigation looked for, but did not find this issue.	
	i.5 (48)	OTHER Maintenance	No		Not Relevant	
j. OTHER	j.1 (49)	OTHER	No		Not Relevant	

Investigation Checklist



Rev. 2.0 (12/16/2010)

14904 - Bemidji State- Deputy Hall

This checklist is designed to be a resource and reference for Providers and PBEEP.

Finding Category	Finding Type Number	Finding Type	Relevant Findings (if any)	Finding Location	Reason for no relevant finding	Notes
a. Equipment Scheduling and Enabling:	a.1 (1)	Time of Day enabling is excessive	AHU's, EF's, ect.	Investigation looked for, but did not find this issue.		
	a.2 (2)	Equipment is enabled regardless of need, or such enabling is excessive		Investigation looked for, but did not find this issue.		
	a.3 (3)	Lighting is on more hours than necessary.		Investigation looked for, but did not find this issue.		
	a.4 (4)	OTHER Equipment Scheduling/Enabling		Investigation looked for, but did not find this issue.	Schedules checked but no additional opportunities found.	
b. Economizer/Outside Air Loads:	b.1 (5)	Economizer Operation – Inadequate Free Cooling (Damper failed in minimum or closed position, economizer setpoints not optimized)		Investigation looked for, but did not find this issue.		
	b.2 (6)	Over-Ventilation – Outside air damper failed in an open position. Minimum outside air fraction not set to design specifications or occupancy.		Investigation looked for, but did not find this issue.		
	b.3 (7)	OTHER Economizer/OA Loads		Investigation looked for, but did not find this issue.	Economizer cycled checked while onsite; no opportunities found.	
c. Controls Problems:	c.1 (8)	Simultaneous Heating and Cooling is present and excessive		Investigation looked for, but did not find this issue.		
	c.2 (9)	Sensor/Thermostat needs calibration, relocation/shielding, and/or replacement		Not cost-effective to investigate		
	c.3 (10)	Controls "hunt" and/or need Loop Tuning or separation of heating/cooling setpoints		Investigation looked for, but did not find this issue.		
	c.4 (11)	OTHER Controls		Investigation looked for, but did not find this issue.	Controls reviewed while onsite; no opportunities found	
d. Controls (Setpoint Changes):	d.1 (12)	Daylighting controls or occupancy sensors need optimization.		Not cost-effective to investigate		
	d.2 (13)	Zone setpoint setup/setback are not implemented or are sub-optimal.		Investigation looked for, but did not find this issue.		
	d.3 (14)	Fan Speed Doesn't Vary Sufficiently		Investigation looked for, but did not find this issue.		
	d.4 (15)	Pump Speed Doesn't Vary Sufficiently		Investigation looked for, but did not find this issue.		
	d.5 (16)	VAV Box Minimum Flow Setpoint is higher than necessary		Investigation looked for, but did not find this issue.		
	d.6 (17)	Other Controls (Setpoint Changes)		Investigation looked for, but did not find this issue.		
e. Controls (Reset Schedules):	e.1 (18)	HW Supply Temperature Reset is not implemented or is sub-optimal		Investigation looked for, but did not find this issue.		
	e.2 (19)	CHW Supply Temperature Reset is not implemented or is sub-optimal		Investigation looked for, but did not find this issue.		
	e.3 (20)	Supply Air Temperature Reset is not implemented or is sub-optimal		Investigation looked for, but did not find this issue.	Already has it.	
	e.4 ()	Supply Duct Static Pressure Reset is not implemented or is sub-optimal		Investigation looked for, but did not find this issue.	Within reason.	
	e.5 (21)	Condenser Water Temperature Reset is not implemented or is sub-optimal		Not Relevant	Central plant.	
	e.6 (22)	Other Controls (Reset Schedules)		Not Relevant	Central plant.	
f. Equipment Efficiency Improvements / Load Reduction:	f.1 (23)	Daylighting Control needs optimization—Spaces are Over-Lit.	Retrofit lamps	Investigation looked for, but did not find this issue.		
	f.2 (24)	Pump Discharge Throttled		Investigation looked for, but did not find this issue.		
	f.3 (25)	Over-Pumping		Investigation looked for, but did not find this issue.		
	f.4 (26)	Equipment is oversized for load.		Not Relevant	Central plant.	
	f.5 (27)	OTHER Equipment Efficiency/Load Reduction		Investigation looked for, but did not find this issue.		
	g.1 (28)	VFD Retrofit - Fans		Investigation looked for, but did not find this issue.	Already have VFD's	

Investigation Checklist



Rev. 2.0 (12/16/2010)

14904 - Bemidji State- Deputy Hall

This checklist is designed to be a resource and reference for Providers and PBEEP.

Finding Category	Finding Type Number	Finding Type	Relevant Findings (if any)	Finding Location	Reason for no relevant finding	Notes	
g. Variable Frequency Drives (VFD):	g.2 (29)	VFD Retrofit - Pumps		Investigation looked for, but did not find this issue.	Already have VFD's		
	g.3 (30)	VFD Retrofit - Motors (process)		Investigation looked for, but did not find this issue.	Already have.		
	g.4 (31)	OTHER VFD		Investigation looked for, but did not find this issue.			
h. Retrofits:	h.1 (32)	Retrofit - Motors		Investigation looked for, but did not find this issue.			
	h.2 (33)	Retrofit - Chillers		Not Relevant	Central plant.		
	h.3 (34)	Retrofit - Air Conditioners (Air Handling Units, Packaged Unitary Equipment)		Not Relevant	Central plant.		
	h.4 (35)	Retrofit - Boilers		Not Relevant	Central plant.		
	h.5 (36)	Retrofit - Packaged Gas fired heating		Not Relevant	Central plant.		
	h.6 (37)	Retrofit - Heat Pumps		Not Relevant	Central plant.		
	h.7 (38)	Retrofit - Equipment (custom)		Not Relevant	Central plant.		
	h.8 (39)	Retrofit - Pumping distribution method		Not Relevant	Central plant.		
	h.9 (40)	Retrofit - Energy/Heat Recovery		Not Relevant	Central plant.		
	h.10 (41)	Retrofit - System (custom)		Not Relevant	Central plant.		
	h.11 (42)	Retrofit - Efficient Lighting	T8 lamps 32W to 28W				
	h.12 (43)	Retrofit - Building Envelope		Not cost-effective to investigate			
	h.13 (44)	Retrofit - Alternative Energy		Not cost-effective to investigate			
	h.14 (45)	OTHER Retrofit		Not Relevant			
i. Maintenance Related Problems:	i.1 (46)	Differed Maintenance from Recommended/Standard		Investigation looked for, but did not find this			
	i.2 (47)	Impurity/Contamination		Not cost-effective to investigate			
	i.3 ()	Leaky/Stuck Damper		Investigation looked for, but did not find this			
	i.4 ()	Leaky/Stuck Valve		Investigation looked for, but did not find this			
	i.5 (48)	OTHER Maintenance		Investigation looked for, but did not find this issue.			
j. OTHER	j.1 (49)	OTHER		Investigation looked for, but did not find this issue.			

Investigation Checklist



Rev. 2.0 (12/16/2010)

14905 - Bemidji State- Ed Arts

This checklist is designed to be a resource and reference for Providers and PBEEP.

Finding Category	Finding Type Number	Finding Type	Relevant Findings (if any)	Finding Location	Reason for no relevant finding	Notes
a. Equipment Scheduling and Enabling:	a.1 (1)	Time of Day enabling is excessive	Yes	AHU's, EF's, ect.		
	a.2 (2)	Equipment is enabled regardless of need, or such enabling is excessive	No		Investigation looked for, but did not find this issue.	
	a.3 (3)	Lighting is on more hours than necessary.	No		Investigation looked for, but did not find this issue.	
	a.4 (4)	OTHER Equipment Scheduling/Enabling	No		Investigation looked for, but did not find this issue.	Schedules checked but no additional opportunities found.
b. Economizer/Outside Air Loads:	b.1 (5)	Economizer Operation – Inadequate Free Cooling (Damper failed in minimum or closed position, economizer setpoints not optimized)	No		Investigation looked for, but did not find this issue.	
	b.2 (6)	Over-Ventilation – Outside air damper failed in an open position. Minimum outside air fraction not set to design specifications or occupancy.	No		Investigation looked for, but did not find this issue.	
	b.3 (7)	OTHER Economizer/OA Loads	No		Investigation looked for, but did not find this issue.	Economizer cycled checked while onsite; no opportunities found.
c. Controls Problems:	c.1 (8)	Simultaneous Heating and Cooling is present and excessive	No		Investigation looked for, but did not find this issue.	
	c.2 (9)	Sensor/Thermostat needs calibration, relocation/shielding, and/or replacement	No		Not cost-effective to investigate	
	c.3 (10)	Controls "hunt" and/or need Loop Tuning or separation of heating/cooling setpoints	No		Investigation looked for, but did not find this issue.	
	c.4 (11)	OTHER Controls	No		Investigation looked for, but did not find this issue.	Controls reviewed while onsite; no opportunities found
d. Controls (Setpoint Changes):	d.1 (12)	Daylighting controls or occupancy sensors need optimization.	No		Not cost-effective to investigate	
	d.2 (13)	Zone setpoint setup/setback are not implemented or are sub-optimal.	No		Investigation looked for, but did not find this issue.	
	d.3 (14)	Fan Speed Doesn't Vary Sufficiently	No		Investigation looked for, but did not find this issue.	
	d.4 (15)	Pump Speed Doesn't Vary Sufficiently	No		Investigation looked for, but did not find this issue.	
	d.5 (16)	VAV Box Minimum Flow Setpoint is higher than necessary	No		Investigation looked for, but did not find this issue.	
	d.6 (17)	Other Controls (Setpoint Changes)	No		Investigation looked for, but did not find this issue.	
e. Controls (Reset Schedules):	e.1 (18)	HW Supply Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	
	e.2 (19)	CHW Supply Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	
	e.3 (20)	Supply Air Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	Already has it.
	e.4 ()	Supply Duct Static Pressure Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	Within reason.
	e.5 (21)	Condenser Water Temperature Reset is not implemented or is sub-optimal	No		Not Relevant	Aircooled DX
	e.6 (22)	Other Controls (Reset Schedules)	No		Investigation looked for, but did not find this issue.	None
f. Equipment Efficiency Improvements / Load Reduction:	f.1 (23)	Daylighting Control needs optimization—Spaces are Over-Lit.	No	Retrofit lamps		
	f.2 (24)	Pump Discharge Throttled	No		Investigation looked for, but did not find this issue.	
	f.3 (25)	Over-Pumping	No		Investigation looked for, but did not find this issue.	
	f.4 (26)	Equipment is oversized for load.	No		Investigation looked for, but did not find this issue.	
	f.5 (27)	OTHER Equipment Efficiency/Load Reduction	No		Investigation looked for, but did not find this issue.	
	g.1 (28)	VFD Retrofit - Fans	No		Investigation looked for, but did not find this issue.	Already have VFD's

Investigation Checklist



Rev. 2.0 (12/16/2010)

14905 - Bemidji State- Ed Arts

This checklist is designed to be a resource and reference for Providers and PBEEP.

Finding Category	Finding Type Number	Finding Type	Relevant Findings (if any)	Finding Location	Reason for no relevant finding	Notes
g. Variable Frequency Drives (VFD):	g.2 (29)	VFD Retrofit - Pumps	No		Investigation looked for, but did not find this issue.	Already have VFD's
	g.3 (30)	VFD Retrofit - Motors (process)	No		Investigation looked for, but did not find this issue.	Already have.
	g.4 (31)	OTHER VFD	No		Investigation looked for, but did not find this issue.	
h. Retrofits:	h.1 (32)	Retrofit - Motors	No		Investigation looked for, but did not find this issue.	
	h.2 (33)	Retrofit - Chillers	No		Investigation looked for, but did not find this issue.	
	h.3 (34)	Retrofit - Air Conditioners (Air Handling Units, Packaged Unitary Equipment)	No		Investigation looked for, but did not find this issue.	
	h.4 (35)	Retrofit - Boilers	No		Investigation looked for, but did not find this issue.	
	h.5 (36)	Retrofit - Packaged Gas fired heating	No		Not Relevant	hot water hydronic system
	h.6 (37)	Retrofit - Heat Pumps	No		Not Relevant	existing system is newer.
	h.7 (38)	Retrofit - Equipment (custom)	No		Not Relevant	existing system is newer.
	h.8 (39)	Retrofit - Pumping distribution method	No		Not Relevant	existing system is newer.
	h.9 (40)	Retrofit - Energy/Heat Recovery	No		Not Relevant	existing system is newer.
	h.10 (41)	Retrofit - System (custom)	No		Not Relevant	existing system is newer.
	h.11 (42)	Retrofit - Efficient Lighting	Yes	T8 lamps 32W to 28W		
	h.12 (43)	Retrofit - Building Envelope	No		Not cost-effective to investigate	
	h.13 (44)	Retrofit - Alternative Energy	No		Not cost-effective to investigate	
	h.14 (45)	OTHER Retrofit	No		Not Relevant	
i. Maintenance Related Problems:	i.1 (46)	Differed Maintenance from Recommended/Standard	No		Investigation looked for, but did not find this issue.	
	i.2 (47)	Impurity/Contamination	No		Not cost-effective to investigate	
	i.3 ()	Leaky/Stuck Damper	No		Investigation looked for, but did not find this issue.	
	i.4 ()	Leaky/Stuck Valve	No		Investigation looked for, but did not find this issue.	
	i.5 (48)	OTHER Maintenance	No		Investigation looked for, but did not find this issue.	
j. OTHER	j.1 (49)	OTHER	No		Investigation looked for, but did not find this issue.	

Investigation Checklist



Rev. 2.0 (12/16/2010)

14906 - Bemidji State- Gillett Fitness

This checklist is designed to be a resource and reference for Providers and PBEEP.

Finding Category	Finding Type Number	Finding Type	Relevant Findings (if any)	Finding Location	Reason for no relevant finding	Notes
a. Equipment Scheduling and Enabling:	a.1 (1)	Time of Day enabling is excessive	Yes	AHU's, EF's, ect.		
	a.2 (2)	Equipment is enabled regardless of need, or such enabling is excessive	No		Investigation looked for, but did not find this issue.	
	a.3 (3)	Lighting is on more hours than necessary.	No		Investigation looked for, but did not find this issue.	
	a.4 (4)	OTHER Equipment Scheduling/Enabling	No		Investigation looked for, but did not find this issue.	Schedules checked but no additional opportunities found.
b. Economizer/Outside Air Loads:	b.1 (5)	Economizer Operation – Inadequate Free Cooling (Damper failed in minimum or closed position, economizer setpoints not optimized)	No		Investigation looked for, but did not find this issue.	
	b.2 (6)	Over-Ventilation – Outside air damper failed in an open position. Minimum outside air fraction not set to design specifications or occupancy.	No		Investigation looked for, but did not find this issue.	
	b.3 (7)	OTHER Economizer/OA Loads	No		Investigation looked for, but did not find this issue.	Economizer cycled checked while onsite; no opportunities found.
c. Controls Problems:	c.1 (8)	Simultaneous Heating and Cooling is present and excessive	No		Investigation looked for, but did not find this issue.	
	c.2 (9)	Sensor/Thermostat needs calibration, relocation/shielding, and/or replacement	No		Not cost-effective to investigate	
	c.3 (10)	Controls "hunt" and/or need Loop Tuning or separation of heating/cooling setpoints	No		Investigation looked for, but did not find this issue.	
	c.4 (11)	OTHER Controls	No		Investigation looked for, but did not find this issue.	Controls reviewed while onsite; no opportunities found
d. Controls (Setpoint Changes):	d.1 (12)	Daylighting controls or occupancy sensors need optimization.	No		Not cost-effective to investigate	
	d.2 (13)	Zone setpoint setup/setback are not implemented or are sub-optimal.	No		Investigation looked for, but did not find this issue.	
	d.3 (14)	Fan Speed Doesn't Vary Sufficiently	No		Investigation looked for, but did not find this issue.	
	d.4 (15)	Pump Speed Doesn't Vary Sufficiently	No		Investigation looked for, but did not find this issue.	
	d.5 (16)	VAV Box Minimum Flow Setpoint is higher than necessary	No		Investigation looked for, but did not find this issue.	
	d.6 (17)	Other Controls (Setpoint Changes)	No		Investigation looked for, but did not find this issue.	
e. Controls (Reset Schedules):	e.1 (18)	HW Supply Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	
	e.2 (19)	CHW Supply Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	
	e.3 (20)	Supply Air Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	Already has it.
	e.4 ()	Supply Duct Static Pressure Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	Within reason.
	e.5 (21)	Condenser Water Temperature Reset is not implemented or is sub-optimal	No		Not Relevant	Central plant.
	e.6 (22)	Other Controls (Reset Schedules)	No		Not Relevant	Central plant.
f. Equipment Efficiency Improvements / Load Reduction:	f.1 (23)	Daylighting Control needs optimization—Spaces are Over-Lit.	Yes	Retrofit lamps		
	f.2 (24)	Pump Discharge Throttled	No		Investigation looked for, but did not find this issue.	
	f.3 (25)	Over-Pumping	No		Investigation looked for, but did not find this issue.	
	f.4 (26)	Equipment is oversized for load.	No		Not Relevant	Central plant.
	f.5 (27)	OTHER Equipment Efficiency/Load Reduction	No		Investigation looked for, but did not find this issue.	
	g.1 (28)	VFD Retrofit - Fans	No		Investigation looked for, but did not find this issue.	Already have VFD's

Investigation Checklist



Rev. 2.0 (12/16/2010)

14906 - Bemidji State- Gillett Fitness

This checklist is designed to be a resource and reference for Providers and PBEEP.

Finding Category	Finding Type Number	Finding Type	Relevant Findings (if any)	Finding Location	Reason for no relevant finding	Notes
g. Variable Frequency Drives (VFD):	g.2 (29)	VFD Retrofit - Pumps	No		Investigation looked for, but did not find this issue.	Already have VFD's
	g.3 (30)	VFD Retrofit - Motors (process)	No		Investigation looked for, but did not find this issue.	Already have.
	g.4 (31)	OTHER VFD	No		Investigation looked for, but did not find this issue.	
h. Retrofits:	h.1 (32)	Retrofit - Motors	No		Investigation looked for, but did not find this issue.	
	h.2 (33)	Retrofit - Chillers	No		Not Relevant	Central plant.
	h.3 (34)	Retrofit - Air Conditioners (Air Handling Units, Packaged Unitary Equipment)	No		Not Relevant	Central plant.
	h.4 (35)	Retrofit - Boilers	No		Not Relevant	Central plant.
	h.5 (36)	Retrofit - Packaged Gas fired heating	No		Not Relevant	Central plant.
	h.6 (37)	Retrofit - Heat Pumps	No		Not Relevant	Central plant.
	h.7 (38)	Retrofit - Equipment (custom)	No		Not Relevant	Central plant.
	h.8 (39)	Retrofit - Pumping distribution method	No		Not Relevant	Central plant.
	h.9 (40)	Retrofit - Energy/Heat Recovery	No		Not Relevant	Central plant.
	h.10 (41)	Retrofit - System (custom)	No		Not Relevant	Central plant.
	h.11 (42)	Retrofit - Efficient Lighting	Yes	T8 lamps 32W to 28W		
	h.12 (43)	Retrofit - Building Envelope	No		Not cost-effective to investigate	
	h.13 (44)	Retrofit - Alternative Energy	No		Not cost-effective to investigate	
	h.14 (45)	OTHER Retrofit	No		Not Relevant	
i. Maintenance Related Problems:	i.1 (46)	Differed Maintenance from Recommended/Standard	No		Investigation looked for, but did not find this issue.	
	i.2 (47)	Impurity/Contamination	No		Not cost-effective to investigate	
	i.3 ()	Leaky/Stuck Damper	No		Investigation looked for, but did not find this issue.	
	i.4 ()	Leaky/Stuck Valve	No		Investigation looked for, but did not find this issue.	
	i.5 (48)	OTHER Maintenance	No		Investigation looked for, but did not find this issue.	
j. OTHER	j.1 (49)	OTHER	No		Investigation looked for, but did not find this issue.	

Investigation Checklist



Rev. 2.0 (12/16/2010)

14907 - Bemidji State- Hagg-Sauer

This checklist is designed to be a resource and reference for Providers and PBEEP.

Finding Category	Finding Type Number	Finding Type	Relevant Findings (if any)	Finding Location	Reason for no relevant finding	Notes
a. Equipment Scheduling and Enabling:	a.1 (1)	Time of Day enabling is excessive	Yes	AHU's, EF's, ect.		
	a.2 (2)	Equipment is enabled regardless of need, or such enabling is excessive	No		Investigation looked for, but did not find this issue.	
	a.3 (3)	Lighting is on more hours than necessary.	No		Investigation looked for, but did not find this issue.	
	a.4 (4)	OTHER Equipment Scheduling/Enabling	No		Investigation looked for, but did not find this issue.	Schedules checked but no additional opportunities found.
b. Economizer/Outside Air Loads:	b.1 (5)	Economizer Operation – Inadequate Free Cooling (Damper failed in minimum or closed position, economizer setpoints not optimized)	No		Investigation looked for, but did not find this issue.	
	b.2 (6)	Over-Ventilation – Outside air damper failed in an open position. Minimum outside air fraction not set to design specifications or occupancy.	No		Investigation looked for, but did not find this issue.	
	b.3 (7)	OTHER Economizer/OA Loads	No		Investigation looked for, but did not find this issue.	Economizer cycled checked while onsite; no opportunities found.
c. Controls Problems:	c.1 (8)	Simultaneous Heating and Cooling is present and excessive	No		Investigation looked for, but did not find this issue.	
	c.2 (9)	Sensor/Thermostat needs calibration, relocation/shielding, and/or replacement	No		Not cost-effective to investigate	
	c.3 (10)	Controls "hunt" and/or need Loop Tuning or separation of heating/cooling setpoints	No		Investigation looked for, but did not find this issue.	
	c.4 (11)	OTHER Controls	No		Investigation looked for, but did not find this issue.	Controls reviewed while onsite; no opportunities found
d. Controls (Setpoint Changes):	d.1 (12)	Daylighting controls or occupancy sensors need optimization.	No		Not cost-effective to investigate	
	d.2 (13)	Zone setpoint setup/setback are not implemented or are sub-optimal.	No		Investigation looked for, but did not find this issue.	
	d.3 (14)	Fan Speed Doesn't Vary Sufficiently	No		Investigation looked for, but did not find this issue.	
	d.4 (15)	Pump Speed Doesn't Vary Sufficiently	No		Investigation looked for, but did not find this issue.	
	d.5 (16)	VAV Box Minimum Flow Setpoint is higher than necessary	No		Investigation looked for, but did not find this issue.	
	d.6 (17)	Other Controls (Setpoint Changes)	No		Investigation looked for, but did not find this issue.	
e. Controls (Reset Schedules):	e.1 (18)	HW Supply Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	
	e.2 (19)	CHW Supply Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	
	e.3 (20)	Supply Air Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	Already has it.
	e.4 ()	Supply Duct Static Pressure Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	Within reason.
	e.5 (21)	Condenser Water Temperature Reset is not implemented or is sub-optimal	No		Not Relevant	Central plant.
	e.6 (22)	Other Controls (Reset Schedules)	No		Not Relevant	Central plant.
f. Equipment Efficiency Improvements / Load Reduction:	f.1 (23)	Daylighting Control needs optimization—Spaces are Over-Lit.	Yes	Retrofit lamps		
	f.2 (24)	Pump Discharge Throttled	No		Investigation looked for, but did not find this issue.	
	f.3 (25)	Over-Pumping	No		Investigation looked for, but did not find this issue.	
	f.4 (26)	Equipment is oversized for load.	No		Not Relevant	Central plant.
	f.5 (27)	OTHER Equipment Efficiency/Load Reduction	No		Investigation looked for, but did not find this issue.	
	g.1 (28)	VFD Retrofit - Fans	No		Investigation looked for, but did not find this issue.	Already have VFD's

Investigation Checklist



Rev. 2.0 (12/16/2010)

14907 - Bemidji State- Hagg-Sauer

This checklist is designed to be a resource and reference for Providers and PBEEP.

Finding Category	Finding Type Number	Finding Type	Relevant Findings (if any)	Finding Location	Reason for no relevant finding	Notes
g. Variable Frequency Drives (VFD):	g.2 (29)	VFD Retrofit - Pumps	No		Investigation looked for, but did not find this issue.	Already have VFD's
	g.3 (30)	VFD Retrofit - Motors (process)	No		Investigation looked for, but did not find this issue.	Already have.
	g.4 (31)	OTHER VFD	No		Investigation looked for, but did not find this issue.	
h. Retrofits:	h.1 (32)	Retrofit - Motors	No		Investigation looked for, but did not find this issue.	
	h.2 (33)	Retrofit - Chillers	No		Not Relevant	Central plant.
	h.3 (34)	Retrofit - Air Conditioners (Air Handling Units, Packaged Unitary Equipment)	No		Not Relevant	Central plant.
	h.4 (35)	Retrofit - Boilers	No		Not Relevant	Central plant.
	h.5 (36)	Retrofit - Packaged Gas fired heating	No		Not Relevant	Central plant.
	h.6 (37)	Retrofit - Heat Pumps	No		Not Relevant	Central plant.
	h.7 (38)	Retrofit - Equipment (custom)	No		Not Relevant	Central plant.
	h.8 (39)	Retrofit - Pumping distribution method	No		Not Relevant	Central plant.
	h.9 (40)	Retrofit - Energy/Heat Recovery	No		Not Relevant	Central plant.
	h.10 (41)	Retrofit - System (custom)	No		Not Relevant	Central plant.
	h.11 (42)	Retrofit - Efficient Lighting	Yes	T8 lamps 32W to 28W		
	h.12 (43)	Retrofit - Building Envelope	No		Not cost-effective to investigate	
	h.13 (44)	Retrofit - Alternative Energy	No		Not cost-effective to investigate	
	h.14 (45)	OTHER Retrofit	No		Not Relevant	
i. Maintenance Related Problems:	i.1 (46)	Differed Maintenance from Recommended/Standard	No		Investigation looked for, but did not find this issue.	
	i.2 (47)	Impurity/Contamination	No		Not cost-effective to investigate	
	i.3 ()	Leaky/Stuck Damper	No		Investigation looked for, but did not find this issue.	
	i.4 ()	Leaky/Stuck Valve	No		Investigation looked for, but did not find this issue.	
	i.5 (48)	OTHER Maintenance	No		Investigation looked for, but did not find this issue.	
j. OTHER	j.1 (49)	OTHER	No		Investigation looked for, but did not find this issue.	

Investigation Checklist



Rev. 2.0 (12/16/2010)

14909 - Bemidji State- Hobson Memorial

This checklist is designed to be a resource and reference for Providers and PBEEP.

Finding Category	Finding Type Number	Finding Type	Relevant Findings (if any)	Finding Location	Reason for no relevant finding	Notes
a. Equipment Scheduling and Enabling:	a.1 (1)	Time of Day enabling is excessive	Yes	AHU's, EF's, ect.		
	a.2 (2)	Equipment is enabled regardless of need, or such enabling is excessive	No		Investigation looked for, but did not find this issue.	
	a.3 (3)	Lighting is on more hours than necessary.	No		Investigation looked for, but did not find this issue.	
	a.4 (4)	OTHER Equipment Scheduling/Enabling	No		Investigation looked for, but did not find this issue.	Schedules checked but no additional opportunities found.
b. Economizer/Outside Air Loads:	b.1 (5)	Economizer Operation – Inadequate Free Cooling (Damper failed in minimum or closed position, economizer setpoints not optimized)	No		Investigation looked for, but did not find this issue.	
	b.2 (6)	Over-Ventilation – Outside air damper failed in an open position. Minimum outside air fraction not set to design specifications or occupancy.	No		Investigation looked for, but did not find this issue.	
	b.3 (7)	OTHER Economizer/OA Loads	No		Investigation looked for, but did not find this issue.	Economizer cycled checked while onsite; no opportunities found.
c. Controls Problems:	c.1 (8)	Simultaneous Heating and Cooling is present and excessive	No		Investigation looked for, but did not find this issue.	
	c.2 (9)	Sensor/Thermostat needs calibration, relocation/shielding, and/or replacement	No		Not cost-effective to investigate	
	c.3 (10)	Controls "hunt" and/or need Loop Tuning or separation of heating/cooling setpoints	No		Investigation looked for, but did not find this issue.	
	c.4 (11)	OTHER Controls	No		Investigation looked for, but did not find this issue.	Controls reviewed while onsite; no opportunities found
d. Controls (Setpoint Changes):	d.1 (12)	Daylighting controls or occupancy sensors need optimization.	No		Not cost-effective to investigate	
	d.2 (13)	Zone setpoint setup/setback are not implemented or are sub-optimal.	No		Investigation looked for, but did not find this issue.	
	d.3 (14)	Fan Speed Doesn't Vary Sufficiently	No		Investigation looked for, but did not find this issue.	
	d.4 (15)	Pump Speed Doesn't Vary Sufficiently	No		Investigation looked for, but did not find this issue.	
	d.5 (16)	VAV Box Minimum Flow Setpoint is higher than necessary	No		Investigation looked for, but did not find this issue.	
	d.6 (17)	Other Controls (Setpoint Changes)	No		Investigation looked for, but did not find this issue.	
e. Controls (Reset Schedules):	e.1 (18)	HW Supply Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	
	e.2 (19)	CHW Supply Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	
	e.3 (20)	Supply Air Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	Already has it.
	e.4 ()	Supply Duct Static Pressure Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	Within reason.
	e.5 (21)	Condenser Water Temperature Reset is not implemented or is sub-optimal	No		Not Relevant	Central plant.
	e.6 (22)	Other Controls (Reset Schedules)	No		Not Relevant	Central plant.
f. Equipment Efficiency Improvements / Load Reduction:	f.1 (23)	Daylighting Control needs optimization—Spaces are Over-Lit.	Yes	Retrofit lamps		
	f.2 (24)	Pump Discharge Throttled	No		Investigation looked for, but did not find this issue.	
	f.3 (25)	Over-Pumping	No		Investigation looked for, but did not find this issue.	
	f.4 (26)	Equipment is oversized for load.	No		Not Relevant	Central plant.
	f.5 (27)	OTHER Equipment Efficiency/Load Reduction	No		Investigation looked for, but did not find this issue.	
	g.1 (28)	VFD Retrofit - Fans	No		Investigation looked for, but did not find this issue.	Already have VFD's

Investigation Checklist



Rev. 2.0 (12/16/2010)

14909 - Bemidji State- Hobson Memorial

This checklist is designed to be a resource and reference for Providers and PBEEP.

Finding Category	Finding Type Number	Finding Type	Relevant Findings (if any)	Finding Location	Reason for no relevant finding	Notes
g. Variable Frequency Drives (VFD):	g.2 (29)	VFD Retrofit - Pumps	No		Investigation looked for, but did not find this issue.	Already have VFD's
	g.3 (30)	VFD Retrofit - Motors (process)	No		Investigation looked for, but did not find this issue.	Already have.
	g.4 (31)	OTHER VFD	No		Investigation looked for, but did not find this issue.	
h. Retrofits:	h.1 (32)	Retrofit - Motors	No		Investigation looked for, but did not find this issue.	
	h.2 (33)	Retrofit - Chillers	No		Not Relevant	Central plant.
	h.3 (34)	Retrofit - Air Conditioners (Air Handling Units, Packaged Unitary Equipment)	No		Not Relevant	Central plant.
	h.4 (35)	Retrofit - Boilers	No		Not Relevant	Central plant.
	h.5 (36)	Retrofit - Packaged Gas fired heating	No		Not Relevant	Central plant.
	h.6 (37)	Retrofit - Heat Pumps	No		Not Relevant	Central plant.
	h.7 (38)	Retrofit - Equipment (custom)	No		Not Relevant	Central plant.
	h.8 (39)	Retrofit - Pumping distribution method	No		Not Relevant	Central plant.
	h.9 (40)	Retrofit - Energy/Heat Recovery	No		Not Relevant	Central plant.
	h.10 (41)	Retrofit - System (custom)	No		Not Relevant	Central plant.
	h.11 (42)	Retrofit - Efficient Lighting	Yes	T8 lamps 32W to 28W		
	h.12 (43)	Retrofit - Building Envelope	No		Not cost-effective to investigate	
	h.13 (44)	Retrofit - Alternative Energy	No		Not cost-effective to investigate	
	h.14 (45)	OTHER Retrofit	No		Not Relevant	
i. Maintenance Related Problems:	i.1 (46)	Differed Maintenance from Recommended/Standard	No		Investigation looked for, but did not find this issue.	
	i.2 (47)	Impurity/Contamination	No		Not cost-effective to investigate	
	i.3 ()	Leaky/Stuck Damper	No		Investigation looked for, but did not find this issue.	
	i.4 ()	Leaky/Stuck Valve	No		Investigation looked for, but did not find this issue.	
	i.5 (48)	OTHER Maintenance	No		Investigation looked for, but did not find this issue.	
j. OTHER	j.1 (49)	OTHER	No		Investigation looked for, but did not find this issue.	

Investigation Checklist



Rev. 2.0 (12/16/2010)

14910 - Bemidji State- Memorial Hall

This checklist is designed to be a resource and reference for Providers and PBEEP.

Finding Category	Finding Type Number	Finding Type	Relevant Findings (if any)	Finding Location	Reason for no relevant finding	Notes
a. Equipment Scheduling and Enabling:	a.1 (1)	Time of Day enabling is excessive	Yes	AHU's, EF's, ect.		
	a.2 (2)	Equipment is enabled regardless of need, or such enabling is excessive	No		Investigation looked for, but did not find this issue.	
	a.3 (3)	Lighting is on more hours than necessary.	No		Investigation looked for, but did not find this issue.	
	a.4 (4)	OTHER Equipment Scheduling/Enabling	No		Investigation looked for, but did not find this issue.	Schedules checked but no additional opportunities found.
b. Economizer/Outside Air Loads:	b.1 (5)	Economizer Operation – Inadequate Free Cooling (Damper failed in minimum or closed position, economizer setpoints not optimized)	No		Investigation looked for, but did not find this issue.	
	b.2 (6)	Over-Ventilation – Outside air damper failed in an open position. Minimum outside air fraction not set to design specifications or occupancy.	No		Investigation looked for, but did not find this issue.	
	b.3 (7)	OTHER Economizer/OA Loads	No		Investigation looked for, but did not find this issue.	Economizer cycled checked while onsite; no opportunities found.
c. Controls Problems:	c.1 (8)	Simultaneous Heating and Cooling is present and excessive	No		Investigation looked for, but did not find this issue.	
	c.2 (9)	Sensor/Thermostat needs calibration, relocation/shielding, and/or replacement	No		Not cost-effective to investigate	
	c.3 (10)	Controls "hunt" and/or need Loop Tuning or separation of heating/cooling setpoints	No		Investigation looked for, but did not find this issue.	
	c.4 (11)	OTHER Controls	No		Investigation looked for, but did not find this issue.	Controls reviewed while onsite; no opportunities found
d. Controls (Setpoint Changes):	d.1 (12)	Daylighting controls or occupancy sensors need optimization.	No		Not cost-effective to investigate	
	d.2 (13)	Zone setpoint setup/setback are not implemented or are sub-optimal.	No		Investigation looked for, but did not find this issue.	
	d.3 (14)	Fan Speed Doesn't Vary Sufficiently	No		Investigation looked for, but did not find this issue.	
	d.4 (15)	Pump Speed Doesn't Vary Sufficiently	No		Investigation looked for, but did not find this issue.	
	d.5 (16)	VAV Box Minimum Flow Setpoint is higher than necessary	No		Investigation looked for, but did not find this issue.	
	d.6 (17)	Other Controls (Setpoint Changes)	No		Investigation looked for, but did not find this issue.	
e. Controls (Reset Schedules):	e.1 (18)	HW Supply Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	
	e.2 (19)	CHW Supply Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	
	e.3 (20)	Supply Air Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	Already has it.
	e.4 ()	Supply Duct Static Pressure Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	Within reason.
	e.5 (21)	Condenser Water Temperature Reset is not implemented or is sub-optimal	No		Not Relevant	Central plant.
	e.6 (22)	Other Controls (Reset Schedules)	No		Not Relevant	Central plant.
f. Equipment Efficiency Improvements / Load Reduction:	f.1 (23)	Daylighting Control needs optimization—Spaces are Over-Lit.	Yes	Retrofit lamps		
	f.2 (24)	Pump Discharge Throttled	No		Investigation looked for, but did not find this issue.	
	f.3 (25)	Over-Pumping	No		Investigation looked for, but did not find this issue.	
	f.4 (26)	Equipment is oversized for load.	No		Not Relevant	Central plant.
	f.5 (27)	OTHER Equipment Efficiency/Load Reduction	No		Investigation looked for, but did not find this issue.	
	g.1 (28)	VFD Retrofit - Fans	No		Investigation looked for, but did not find this issue.	Already have VFD's

Investigation Checklist



Rev. 2.0 (12/16/2010)

14910 - Bemidji State- Memorial Hall

This checklist is designed to be a resource and reference for Providers and PBEEP.

Finding Category	Finding Type Number	Finding Type	Relevant Findings (if any)	Finding Location	Reason for no relevant finding	Notes
g. Variable Frequency Drives (VFD):	g.2 (29)	VFD Retrofit - Pumps	No		Investigation looked for, but did not find this issue.	Already have VFD's
	g.3 (30)	VFD Retrofit - Motors (process)	No		Investigation looked for, but did not find this issue.	Already have.
	g.4 (31)	OTHER VFD	No		Investigation looked for, but did not find this issue.	
h. Retrofits:	h.1 (32)	Retrofit - Motors	No		Investigation looked for, but did not find this issue.	
	h.2 (33)	Retrofit - Chillers	No		Not Relevant	Central plant.
	h.3 (34)	Retrofit - Air Conditioners (Air Handling Units, Packaged Unitary Equipment)	No		Not Relevant	Central plant.
	h.4 (35)	Retrofit - Boilers	No		Not Relevant	Central plant.
	h.5 (36)	Retrofit - Packaged Gas fired heating	No		Not Relevant	Central plant.
	h.6 (37)	Retrofit - Heat Pumps	No		Not Relevant	Central plant.
	h.7 (38)	Retrofit - Equipment (custom)	No		Not Relevant	Central plant.
	h.8 (39)	Retrofit - Pumping distribution method	No		Not Relevant	Central plant.
	h.9 (40)	Retrofit - Energy/Heat Recovery	No		Not Relevant	Central plant.
	h.10 (41)	Retrofit - System (custom)	No		Not Relevant	Central plant.
	h.11 (42)	Retrofit - Efficient Lighting	Yes	T8 lamps 32W to 28W		
	h.12 (43)	Retrofit - Building Envelope	No		Not cost-effective to investigate	
	h.13 (44)	Retrofit - Alternative Energy	No		Not cost-effective to investigate	
	h.14 (45)	OTHER Retrofit	No		Not Relevant	
i. Maintenance Related Problems:	i.1 (46)	Differed Maintenance from Recommended/Standard	No		Investigation looked for, but did not find this issue.	
	i.2 (47)	Impurity/Contamination	No		Not cost-effective to investigate	
	i.3 ()	Leaky/Stuck Damper	No		Investigation looked for, but did not find this issue.	
	i.4 ()	Leaky/Stuck Valve	No		Investigation looked for, but did not find this issue.	
	i.5 (48)	OTHER Maintenance	No		Investigation looked for, but did not find this issue.	
j. OTHER	j.1 (49)	OTHER	No		Investigation looked for, but did not find this issue.	

Investigation Checklist



Rev. 2.0 (12/16/2010)

14911 - Bemidji State- Phy Ed-Glas FH

This checklist is designed to be a resource and reference for Providers and PBEEP.

Finding Category	Finding Type Number	Finding Type	Relevant Findings (if any)	Finding Location	Reason for no relevant finding	Notes
a. Equipment Scheduling and Enabling:	a.1 (1)	Time of Day enabling is excessive	Yes	AHU's, EF's, ect.		
	a.2 (2)	Equipment is enabled regardless of need, or such enabling is excessive	No		Investigation looked for, but did not find this issue.	
	a.3 (3)	Lighting is on more hours than necessary.	No		Investigation looked for, but did not find this issue.	
	a.4 (4)	OTHER Equipment Scheduling/Enabling	No		Investigation looked for, but did not find this issue.	Schedules checked but no additional opportunities found.
b. Economizer/Outside Air Loads:	b.1 (5)	Economizer Operation – Inadequate Free Cooling (Damper failed in minimum or closed position, economizer setpoints not optimized)	No		Investigation looked for, but did not find this issue.	
	b.2 (6)	Over-Ventilation – Outside air damper failed in an open position. Minimum outside air fraction not set to design specifications or occupancy.	No		Investigation looked for, but did not find this issue.	
	b.3 (7)	OTHER Economizer/OA Loads	No		Investigation looked for, but did not find this issue.	Economizer cycled checked while onsite; no opportunities found.
c. Controls Problems:	c.1 (8)	Simultaneous Heating and Cooling is present and excessive	No		Investigation looked for, but did not find this issue.	
	c.2 (9)	Sensor/Thermostat needs calibration, relocation/shielding, and/or replacement	No		Not cost-effective to investigate	
	c.3 (10)	Controls "hunt" and/or need Loop Tuning or separation of heating/cooling setpoints	No		Investigation looked for, but did not find this issue.	
	c.4 (11)	OTHER Controls	No		Investigation looked for, but did not find this issue.	Controls reviewed while onsite; no opportunities found
d. Controls (Setpoint Changes):	d.1 (12)	Daylighting controls or occupancy sensors need optimization.	No		Not cost-effective to investigate	
	d.2 (13)	Zone setpoint setup/setback are not implemented or are sub-optimal.	No		Investigation looked for, but did not find this issue.	
	d.3 (14)	Fan Speed Doesn't Vary Sufficiently	No		Investigation looked for, but did not find this issue.	
	d.4 (15)	Pump Speed Doesn't Vary Sufficiently	No		Investigation looked for, but did not find this issue.	
	d.5 (16)	VAV Box Minimum Flow Setpoint is higher than necessary	No		Investigation looked for, but did not find this issue.	
	d.6 (17)	Other Controls (Setpoint Changes)	No		Investigation looked for, but did not find this issue.	
e. Controls (Reset Schedules):	e.1 (18)	HW Supply Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	
	e.2 (19)	CHW Supply Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	
	e.3 (20)	Supply Air Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	Already has it.
	e.4 ()	Supply Duct Static Pressure Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	Within reason.
	e.5 (21)	Condenser Water Temperature Reset is not implemented or is sub-optimal	No		Not Relevant	Central plant.
	e.6 (22)	Other Controls (Reset Schedules)	No		Not Relevant	Central plant.
f. Equipment Efficiency Improvements / Load Reduction:	f.1 (23)	Daylighting Control needs optimization—Spaces are Over-Lit.	Yes	Retrofit lamps		
	f.2 (24)	Pump Discharge Throttled	No		Investigation looked for, but did not find this issue.	
	f.3 (25)	Over-Pumping	No		Investigation looked for, but did not find this issue.	
	f.4 (26)	Equipment is oversized for load.	No		Not Relevant	Central plant.
	f.5 (27)	OTHER Equipment Efficiency/Load Reduction	No		Investigation looked for, but did not find this issue.	
	g.1 (28)	VFD Retrofit - Fans	No		Investigation looked for, but did not find this issue.	Already have VFD's

Investigation Checklist



Rev. 2.0 (12/16/2010)

14911 - Bemidji State- Phy Ed-Glas FH

This checklist is designed to be a resource and reference for Providers and PBEEP.

Finding Category	Finding Type Number	Finding Type	Relevant Findings (if any)	Finding Location	Reason for no relevant finding	Notes
g. Variable Frequency Drives (VFD):	g.2 (29)	VFD Retrofit - Pumps	No		Investigation looked for, but did not find this issue.	Already have VFD's
	g.3 (30)	VFD Retrofit - Motors (process)	No		Investigation looked for, but did not find this issue.	Already have.
	g.4 (31)	OTHER VFD	No		Investigation looked for, but did not find this issue.	
h. Retrofits:	h.1 (32)	Retrofit - Motors	No		Investigation looked for, but did not find this issue.	
	h.2 (33)	Retrofit - Chillers	No		Not Relevant	Central plant.
	h.3 (34)	Retrofit - Air Conditioners (Air Handling Units, Packaged Unitary Equipment)	No		Not Relevant	Central plant.
	h.4 (35)	Retrofit - Boilers	No		Not Relevant	Central plant.
	h.5 (36)	Retrofit - Packaged Gas fired heating	No		Not Relevant	Central plant.
	h.6 (37)	Retrofit - Heat Pumps	No		Not Relevant	Central plant.
	h.7 (38)	Retrofit - Equipment (custom)	No		Not Relevant	Central plant.
	h.8 (39)	Retrofit - Pumping distribution method	No		Not Relevant	Central plant.
	h.9 (40)	Retrofit - Energy/Heat Recovery	No		Not Relevant	Central plant.
	h.10 (41)	Retrofit - System (custom)	No		Not Relevant	Central plant.
	h.11 (42)	Retrofit - Efficient Lighting	Yes	T8 lamps 32W to 28W		
	h.12 (43)	Retrofit - Building Envelope	No		Not cost-effective to investigate	
	h.13 (44)	Retrofit - Alternative Energy	No		Not cost-effective to investigate	
	h.14 (45)	OTHER Retrofit	No		Not Relevant	
i. Maintenance Related Problems:	i.1 (46)	Differed Maintenance from Recommended/Standard	No		Investigation looked for, but did not find this issue.	
	i.2 (47)	Impurity/Contamination	No		Not cost-effective to investigate	
	i.3 ()	Leaky/Stuck Damper	No		Investigation looked for, but did not find this issue.	
	i.4 ()	Leaky/Stuck Valve	No		Investigation looked for, but did not find this issue.	
	i.5 (48)	OTHER Maintenance	No		Investigation looked for, but did not find this issue.	
j. OTHER	j.1 (49)	OTHER	No		Investigation looked for, but did not find this issue.	

Investigation Checklist



Rev. 2.0 (12/16/2010)

14912 - Bemidji State- Sattgast Hall

This checklist is designed to be a resource and reference for Providers and PBEEP.

Finding Category	Finding Type Number	Finding Type	Relevant Findings (if any)	Finding Location	Reason for no relevant finding	Notes
a. Equipment Scheduling and Enabling:	a.1 (1)	Time of Day enabling is excessive	Yes	AHU's, EF's, ect.		
	a.2 (2)	Equipment is enabled regardless of need, or such enabling is excessive	No		Investigation looked for, but did not find this issue.	
	a.3 (3)	Lighting is on more hours than necessary.	No		Investigation looked for, but did not find this issue.	
	a.4 (4)	OTHER Equipment Scheduling/Enabling	No		Investigation looked for, but did not find this issue.	Schedules checked but no additional opportunities found.
b. Economizer/Outside Air Loads:	b.1 (5)	Economizer Operation – Inadequate Free Cooling (Damper failed in minimum or closed position, economizer setpoints not optimized)	No		Investigation looked for, but did not find this issue.	
	b.2 (6)	Over-Ventilation – Outside air damper failed in an open position. Minimum outside air fraction not set to design specifications or occupancy.	No		Investigation looked for, but did not find this issue.	
	b.3 (7)	OTHER Economizer/OA Loads	No		Investigation looked for, but did not find this issue.	Economizer cycled checked while onsite; no opportunities found.
c. Controls Problems:	c.1 (8)	Simultaneous Heating and Cooling is present and excessive	No		Investigation looked for, but did not find this issue.	
	c.2 (9)	Sensor/Thermostat needs calibration, relocation/shielding, and/or replacement	No		Not cost-effective to investigate	
	c.3 (10)	Controls "hunt" and/or need Loop Tuning or separation of heating/cooling setpoints	No		Investigation looked for, but did not find this issue.	
	c.4 (11)	OTHER Controls	No		Investigation looked for, but did not find this issue.	Controls reviewed while onsite; no opportunities found
d. Controls (Setpoint Changes):	d.1 (12)	Daylighting controls or occupancy sensors need optimization.	No		Not cost-effective to investigate	
	d.2 (13)	Zone setpoint setup/setback are not implemented or are sub-optimal.	No		Investigation looked for, but did not find this issue.	
	d.3 (14)	Fan Speed Doesn't Vary Sufficiently	No		Investigation looked for, but did not find this issue.	
	d.4 (15)	Pump Speed Doesn't Vary Sufficiently	No		Investigation looked for, but did not find this issue.	
	d.5 (16)	VAV Box Minimum Flow Setpoint is higher than necessary	No		Investigation looked for, but did not find this issue.	
	d.6 (17)	Other Controls (Setpoint Changes)	No		Investigation looked for, but did not find this issue.	
e. Controls (Reset Schedules):	e.1 (18)	HW Supply Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	
	e.2 (19)	CHW Supply Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	
	e.3 (20)	Supply Air Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	Already has it.
	e.4 ()	Supply Duct Static Pressure Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	Within reason.
	e.5 (21)	Condenser Water Temperature Reset is not implemented or is sub-optimal	No		Not Relevant	Central plant.
	e.6 (22)	Other Controls (Reset Schedules)	No		Not Relevant	Central plant.
f. Equipment Efficiency Improvements / Load Reduction:	f.1 (23)	Daylighting Control needs optimization—Spaces are Over-Lit.	Yes	Retrofit lamps		
	f.2 (24)	Pump Discharge Throttled	No		Investigation looked for, but did not find this issue.	
	f.3 (25)	Over-Pumping	No		Investigation looked for, but did not find this issue.	
	f.4 (26)	Equipment is oversized for load.	No		Not Relevant	Central plant.
	f.5 (27)	OTHER Equipment Efficiency/Load Reduction	No		Investigation looked for, but did not find this issue.	
	g.1 (28)	VFD Retrofit - Fans	No		Investigation looked for, but did not find this issue.	Already have VFD's

Investigation Checklist



Rev. 2.0 (12/16/2010)

14912 - Bemidji State- Sattgast Hall

This checklist is designed to be a resource and reference for Providers and PBEEP.

Finding Category	Finding Type Number	Finding Type	Relevant Findings (if any)	Finding Location	Reason for no relevant finding	Notes
g. Variable Frequency Drives (VFD):	g.2 (29)	VFD Retrofit - Pumps	No		Investigation looked for, but did not find this issue.	Already have VFD's
	g.3 (30)	VFD Retrofit - Motors (process)	No		Investigation looked for, but did not find this issue.	Already have.
	g.4 (31)	OTHER VFD	No		Investigation looked for, but did not find this issue.	
h. Retrofits:	h.1 (32)	Retrofit - Motors	No		Investigation looked for, but did not find this issue.	
	h.2 (33)	Retrofit - Chillers	No		Not Relevant	Central plant.
	h.3 (34)	Retrofit - Air Conditioners (Air Handling Units, Packaged Unitary Equipment)	No		Not Relevant	Central plant.
	h.4 (35)	Retrofit - Boilers	No		Not Relevant	Central plant.
	h.5 (36)	Retrofit - Packaged Gas fired heating	No		Not Relevant	Central plant.
	h.6 (37)	Retrofit - Heat Pumps	No		Not Relevant	Central plant.
	h.7 (38)	Retrofit - Equipment (custom)	No		Not Relevant	Central plant.
	h.8 (39)	Retrofit - Pumping distribution method	No		Not Relevant	Central plant.
	h.9 (40)	Retrofit - Energy/Heat Recovery	No		Not Relevant	Central plant.
	h.10 (41)	Retrofit - System (custom)	No		Not Relevant	Central plant.
	h.11 (42)	Retrofit - Efficient Lighting	Yes	T8 lamps 32W to 28W		
	h.12 (43)	Retrofit - Building Envelope	No		Not cost-effective to investigate	
	h.13 (44)	Retrofit - Alternative Energy	No		Not cost-effective to investigate	
	h.14 (45)	OTHER Retrofit	No		Not Relevant	
i. Maintenance Related Problems:	i.1 (46)	Differed Maintenance from Recommended/Standard	No		Investigation looked for, but did not find this issue.	
	i.2 (47)	Impurity/Contamination	No		Not cost-effective to investigate	
	i.3 ()	Leaky/Stuck Damper	No		Investigation looked for, but did not find this issue.	
	i.4 ()	Leaky/Stuck Valve	No		Investigation looked for, but did not find this issue.	
	i.5 (48)	OTHER Maintenance	No		Investigation looked for, but did not find this issue.	
j. OTHER	j.1 (49)	OTHER	No		Investigation looked for, but did not find this issue.	

Investigation Checklist



Rev. 2.0 (12/16/2010)

14912 - Bemidji State- Sattgast Hall

This checklist is designed to be a resource and reference for Providers and PBEEP.

Finding Category	Finding Type Number	Finding Type	Relevant Findings (if any)	Finding Location	Reason for no relevant finding	Notes
a. Equipment Scheduling and Enabling:	a.1 (1)	Time of Day enabling is excessive	Yes	AHU's, EF's, ect.		
	a.2 (2)	Equipment is enabled regardless of need, or such enabling is excessive	No		Investigation looked for, but did not find this issue.	
	a.3 (3)	Lighting is on more hours than necessary.	No		Investigation looked for, but did not find this issue.	
	a.4 (4)	OTHER Equipment Scheduling/Enabling	No		Investigation looked for, but did not find this issue.	Schedules checked but no additional opportunities found.
b. Economizer/Outside Air Loads:	b.1 (5)	Economizer Operation – Inadequate Free Cooling (Damper failed in minimum or closed position, economizer setpoints not optimized)	No		Investigation looked for, but did not find this issue.	
	b.2 (6)	Over-Ventilation – Outside air damper failed in an open position. Minimum outside air fraction not set to design specifications or occupancy.	No		Investigation looked for, but did not find this issue.	
	b.3 (7)	OTHER Economizer/OA Loads	No		Investigation looked for, but did not find this issue.	Economizer cycled checked while onsite; no opportunities found.
c. Controls Problems:	c.1 (8)	Simultaneous Heating and Cooling is present and excessive	No		Investigation looked for, but did not find this issue.	
	c.2 (9)	Sensor/Thermostat needs calibration, relocation/shielding, and/or replacement	No		Not cost-effective to investigate	
	c.3 (10)	Controls "hunt" and/or need Loop Tuning or separation of heating/cooling setpoints	No		Investigation looked for, but did not find this issue.	
	c.4 (11)	OTHER Controls	No		Investigation looked for, but did not find this issue.	Controls reviewed while onsite; no opportunities found
d. Controls (Setpoint Changes):	d.1 (12)	Daylighting controls or occupancy sensors need optimization.	No		Not cost-effective to investigate	
	d.2 (13)	Zone setpoint setup/setback are not implemented or are sub-optimal.	No		Investigation looked for, but did not find this issue.	
	d.3 (14)	Fan Speed Doesn't Vary Sufficiently	No		Investigation looked for, but did not find this issue.	
	d.4 (15)	Pump Speed Doesn't Vary Sufficiently	No		Investigation looked for, but did not find this issue.	
	d.5 (16)	VAV Box Minimum Flow Setpoint is higher than necessary	No		Investigation looked for, but did not find this issue.	
	d.6 (17)	Other Controls (Setpoint Changes)	No		Investigation looked for, but did not find this issue.	
e. Controls (Reset Schedules):	e.1 (18)	HW Supply Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	
	e.2 (19)	CHW Supply Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	
	e.3 (20)	Supply Air Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	Already has it.
	e.4 ()	Supply Duct Static Pressure Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	Within reason.
	e.5 (21)	Condenser Water Temperature Reset is not implemented or is sub-optimal	No		Not Relevant	Central plant.
	e.6 (22)	Other Controls (Reset Schedules)	No		Not Relevant	Central plant.
f. Equipment Efficiency Improvements / Load Reduction:	f.1 (23)	Daylighting Control needs optimization—Spaces are Over-Lit.	Yes	Retrofit lamps		
	f.2 (24)	Pump Discharge Throttled	No		Investigation looked for, but did not find this issue.	
	f.3 (25)	Over-Pumping	No		Investigation looked for, but did not find this issue.	
	f.4 (26)	Equipment is oversized for load.	No		Not Relevant	Central plant.
	f.5 (27)	OTHER Equipment Efficiency/Load Reduction	No		Investigation looked for, but did not find this issue.	
	g.1 (28)	VFD Retrofit - Fans	No		Investigation looked for, but did not find this issue.	Already have VFD's

Investigation Checklist



Rev. 2.0 (12/16/2010)

14912 - Bemidji State- Sattgast Hall

This checklist is designed to be a resource and reference for Providers and PBEEP.

Finding Category	Finding Type Number	Finding Type	Relevant Findings (if any)	Finding Location	Reason for no relevant finding	Notes
g. Variable Frequency Drives (VFD):	g.2 (29)	VFD Retrofit - Pumps	No		Investigation looked for, but did not find this issue.	Already have VFD's
	g.3 (30)	VFD Retrofit - Motors (process)	No		Investigation looked for, but did not find this issue.	Already have.
	g.4 (31)	OTHER VFD	No		Investigation looked for, but did not find this issue.	
h. Retrofits:	h.1 (32)	Retrofit - Motors	No		Investigation looked for, but did not find this issue.	
	h.2 (33)	Retrofit - Chillers	No		Not Relevant	Central plant.
	h.3 (34)	Retrofit - Air Conditioners (Air Handling Units, Packaged Unitary Equipment)	No		Not Relevant	Central plant.
	h.4 (35)	Retrofit - Boilers	No		Not Relevant	Central plant.
	h.5 (36)	Retrofit - Packaged Gas fired heating	No		Not Relevant	Central plant.
	h.6 (37)	Retrofit - Heat Pumps	No		Not Relevant	Central plant.
	h.7 (38)	Retrofit - Equipment (custom)	No		Not Relevant	Central plant.
	h.8 (39)	Retrofit - Pumping distribution method	No		Not Relevant	Central plant.
	h.9 (40)	Retrofit - Energy/Heat Recovery	No		Not Relevant	Central plant.
	h.10 (41)	Retrofit - System (custom)	No		Not Relevant	Central plant.
	h.11 (42)	Retrofit - Efficient Lighting	Yes	T8 lamps 32W to 28W		
	h.12 (43)	Retrofit - Building Envelope	No		Not cost-effective to investigate	
	h.13 (44)	Retrofit - Alternative Energy	No		Not cost-effective to investigate	
	h.14 (45)	OTHER Retrofit	No		Not Relevant	
i. Maintenance Related Problems:	i.1 (46)	Differed Maintenance from Recommended/Standard	No		Investigation looked for, but did not find this issue.	
	i.2 (47)	Impurity/Contamination	No		Not cost-effective to investigate	
	i.3 ()	Leaky/Stuck Damper	No		Investigation looked for, but did not find this issue.	
	i.4 ()	Leaky/Stuck Valve	No		Investigation looked for, but did not find this issue.	
	i.5 (48)	OTHER Maintenance	No		Investigation looked for, but did not find this issue.	
j. OTHER	j.1 (49)	OTHER	No		Investigation looked for, but did not find this issue.	

Investigation Checklist



Rev. 2.0 (12/16/2010)

14913 - Bemidji State- Walnut Hall

This checklist is designed to be a resource and reference for Providers and PBEEP.

Finding Category	Finding Type Number	Finding Type	Relevant Findings (if any)	Finding Location	Reason for no relevant finding	Notes
a. Equipment Scheduling and Enabling:	a.1 (1)	Time of Day enabling is excessive	Yes	AHU's, EF's, ect.		
	a.2 (2)	Equipment is enabled regardless of need, or such enabling is excessive	No		Investigation looked for, but did not find this issue.	
	a.3 (3)	Lighting is on more hours than necessary.	No		Investigation looked for, but did not find this issue.	
	a.4 (4)	OTHER Equipment Scheduling/Enabling	No		Investigation looked for, but did not find this issue.	Schedules checked but no additional opportunities found.
b. Economizer/Outside Air Loads:	b.1 (5)	Economizer Operation – Inadequate Free Cooling (Damper failed in minimum or closed position, economizer setpoints not optimized)	No		Investigation looked for, but did not find this issue.	
	b.2 (6)	Over-Ventilation – Outside air damper failed in an open position. Minimum outside air fraction not set to design specifications or occupancy.	No		Investigation looked for, but did not find this issue.	
	b.3 (7)	OTHER Economizer/OA Loads	No		Investigation looked for, but did not find this issue.	Economizer cycled checked while onsite; no opportunities found.
c. Controls Problems:	c.1 (8)	Simultaneous Heating and Cooling is present and excessive	No		Investigation looked for, but did not find this issue.	
	c.2 (9)	Sensor/Thermostat needs calibration, relocation/shielding, and/or replacement	No		Not cost-effective to investigate	
	c.3 (10)	Controls "hunt" and/or need Loop Tuning or separation of heating/cooling setpoints	No		Investigation looked for, but did not find this issue.	
	c.4 (11)	OTHER Controls	No		Investigation looked for, but did not find this issue.	Controls reviewed while onsite; no opportunities found
d. Controls (Setpoint Changes):	d.1 (12)	Daylighting controls or occupancy sensors need optimization.	No		Not cost-effective to investigate	
	d.2 (13)	Zone setpoint setup/setback are not implemented or are sub-optimal.	No		Investigation looked for, but did not find this issue.	
	d.3 (14)	Fan Speed Doesn't Vary Sufficiently	No		Investigation looked for, but did not find this issue.	
	d.4 (15)	Pump Speed Doesn't Vary Sufficiently	No		Investigation looked for, but did not find this issue.	
	d.5 (16)	VAV Box Minimum Flow Setpoint is higher than necessary	No		Investigation looked for, but did not find this issue.	
	d.6 (17)	Other Controls (Setpoint Changes)	No		Investigation looked for, but did not find this issue.	
e. Controls (Reset Schedules):	e.1 (18)	HW Supply Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	
	e.2 (19)	CHW Supply Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	
	e.3 (20)	Supply Air Temperature Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	Already has it.
	e.4 ()	Supply Duct Static Pressure Reset is not implemented or is sub-optimal	No		Investigation looked for, but did not find this issue.	Within reason.
	e.5 (21)	Condenser Water Temperature Reset is not implemented or is sub-optimal	No		Not Relevant	Central plant.
	e.6 (22)	Other Controls (Reset Schedules)	No		Not Relevant	Central plant.
f. Equipment Efficiency Improvements / Load Reduction:	f.1 (23)	Daylighting Control needs optimization—Spaces are Over-Lit.	Yes	Retrofit lamps		
	f.2 (24)	Pump Discharge Throttled	No		Investigation looked for, but did not find this issue.	
	f.3 (25)	Over-Pumping	No		Investigation looked for, but did not find this issue.	
	f.4 (26)	Equipment is oversized for load.	No		Not Relevant	Central plant.
	f.5 (27)	OTHER Equipment Efficiency/Load Reduction	No		Investigation looked for, but did not find this issue.	
	g.1 (28)	VFD Retrofit - Fans	No		Investigation looked for, but did not find this issue.	Already have VFD's

Investigation Checklist



Rev. 2.0 (12/16/2010)

14913 - Bemidji State- Walnut Hall

This checklist is designed to be a resource and reference for Providers and PBEEP.

Finding Category	Finding Type Number	Finding Type	Relevant Findings (if any)	Finding Location	Reason for no relevant finding	Notes
g. Variable Frequency Drives (VFD):	g.2 (29)	VFD Retrofit - Pumps	No		Investigation looked for, but did not find this issue.	Already have VFD's
	g.3 (30)	VFD Retrofit - Motors (process)	No		Investigation looked for, but did not find this issue.	Already have.
	g.4 (31)	OTHER VFD	No		Investigation looked for, but did not find this issue.	
h. Retrofits:	h.1 (32)	Retrofit - Motors	No		Investigation looked for, but did not find this issue.	
	h.2 (33)	Retrofit - Chillers	No		Not Relevant	Central plant.
	h.3 (34)	Retrofit - Air Conditioners (Air Handling Units, Packaged Unitary Equipment)	No		Not Relevant	Central plant.
	h.4 (35)	Retrofit - Boilers	No		Not Relevant	Central plant.
	h.5 (36)	Retrofit - Packaged Gas fired heating	No		Not Relevant	Central plant.
	h.6 (37)	Retrofit - Heat Pumps	No		Not Relevant	Central plant.
	h.7 (38)	Retrofit - Equipment (custom)	No		Not Relevant	Central plant.
	h.8 (39)	Retrofit - Pumping distribution method	No		Not Relevant	Central plant.
	h.9 (40)	Retrofit - Energy/Heat Recovery	No		Not Relevant	Central plant.
	h.10 (41)	Retrofit - System (custom)	No		Not Relevant	Central plant.
	h.11 (42)	Retrofit - Efficient Lighting	Yes	T8 lamps 32W to 28W		
	h.12 (43)	Retrofit - Building Envelope	No		Not cost-effective to investigate	
	h.13 (44)	Retrofit - Alternative Energy	No		Not cost-effective to investigate	
	h.14 (45)	OTHER Retrofit	No		Not Relevant	
i. Maintenance Related Problems:	i.1 (46)	Differed Maintenance from Recommended/Standard	No		Investigation looked for, but did not find this issue.	
	i.2 (47)	Impurity/Contamination	No		Not cost-effective to investigate	
	i.3 ()	Leaky/Stuck Damper	No		Investigation looked for, but did not find this issue.	
	i.4 ()	Leaky/Stuck Valve	No		Investigation looked for, but did not find this issue.	
	i.5 (48)	OTHER Maintenance	No		Investigation looked for, but did not find this issue.	
j. OTHER	j.1 (49)	OTHER	No		Investigation looked for, but did not find this issue.	

Deleted Findings Summary

Building: Deputy Hall
Site: Bemidji State



Eco #	Investigation Finding	Total Cost	Savings	Payback	Co-Funding	Payback Co-Funding	GHG
1	Inadequate Free Cooling	\$0	\$0	0.00	\$0	0.00	0
2	Leaky/Stuck Damper	\$0	\$0	0.00	\$0	0.00	0
	Total for Findings with Payback 3 years or less:	\$0	\$0	0.00	\$0	0.00	0
	Total for all Findings:	\$0	\$0	0.00	\$0	0.00	0

Deleted Findings Details



Building: Deputy Hall

FWB Number:	14904	Eco Number:	1
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Inadequate Free Cooling	Date Identified:	11/29/2011
Description of Finding:	AHU-9(SE 2nd FL): DX cooling is activated even though OA temp. is adequate to provide cooling and meet DAT.		
Equipment or System(s):	AHU with cooling only	Finding Category:	Deleted
Finding Type:	Finding Deleted by Provider		

Implementer:	Controls Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended data: OAT, DAT, DX status.		
Measure:	Revise BAS damper & economizer controls		
Recommendation for Implementation:	AHU-9: Review BAS OA, and MA dampers for proper operation. Review economizer sequence for proper operation.		
Evidence of Implementation Method:	AHU-9: Review DX cooling & OA trends. Refer to supporting documentation spreadsheet- Calculations- DEP.		

Estimated Annual Total Savings (\$):	\$0	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.00	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.00	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO2e):	0	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	0.0%	Percent of Implementation Costs:	0.0%

Deleted Findings Details



Building: Deputy Hall

FWB Number:	14904	Eco Number:	2
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Leaky/Stuck Damper	Date Identified:	11/29/2011
Description of Finding:	TV RM 265: Very cold room. Trends show RM Temp. at 55F but setpoint at 66. Room is only used a short portion of the day in the evening but room is kept cold 24/7. Possible uncontrolled SA duct into room because VAV trends show closed.		
Equipment or System(s):	AHU with cooling only	Finding Category:	Deleted
Finding Type:	Finding Deleted by Provider		

Implementer:	Controls Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended date: VAV Box airflow, Rm temp., RM Setpoint.		
Measure:	Review BAS controls to room.		
Recommendation for Implementation:	TV RM 265: Review BAS dampers for proper operation. Review SA inlets into room.		
Evidence of Implementation Method:	TV RM 265: Review damper trends in BAS.		

Estimated Annual Total Savings (\$):	\$0	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.00	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.00	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO2e):	0	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	0.0%	Percent of Implementation Costs:	0.0%

Deleted Findings Summary

Building: Gillett Rec/Fitness

Site: Bemidji State



Eco #	Investigation Finding	Total Cost	Savings	Payback	Co-Funding	Payback Co-Funding	GHG
4	Simultaneous Heating & Cooling: AHU-7	\$700	\$0	0.00	\$0	0.00	0
	Total for Findings with Payback 3 years or less:	\$0	\$0	0.00	\$0	0.00	0
	Total for all Findings:	\$700	\$0	0.00	\$0	0.00	0

Deleted Findings Details



Building: Gillett Rec/Fitness

FWB Number:	14906	Eco Number:	4
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Simultaneous Heating & Cooling: AHU-7	Date Identified:	11/16/2011
Description of Finding:	AHU-7(Dance Studio): Found DX cooling when OA temp. ~40F		
Equipment or System(s):	AHU with heating and cooling	Finding Category:	Deleted
Finding Type:	Finding Deleted by Provider		

Implementer:	Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended Dx cooling and hydronic heating valve operating simultaneously.		
Measure:	Review heating and cooling setpoints and revise as necessary		
Recommendation for Implementation:	AHU-7: Have controls reviewed by controls contractor and implement control changes to avoid simultaneous heating and cooling.		
Evidence of Implementation Method:	AHU-7: Review DX cooling status trends. Refer to supporting documentation spreadsheet- Calculations- FIT for proposed schedule.		

Contractor Cost (\$):	\$500
PBEEEP Provider Cost for Implementation Assistance (\$):	\$200
Total Estimated Implementation Cost (\$):	\$700

Estimated Annual Total Savings (\$):	\$0	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.00	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.00	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO2e):	0	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	0.0%	Percent of Implementation Costs:	0.5%



Deleted Findings Summary

Building: Hobson Memorial
 Site: Bemidji State

Eco #	Investigation Finding	Total Cost	Savings	Payback	Co-Funding	Payback Co-Funding	GHG
1	Excessive Enabling of Equipment	\$400	\$0	0.00	\$0	0.00	0
2	Economizer Operation: AHU-1	\$500	\$0	0.00	\$0	0.00	0
3	Economizer Operation: AHU-2	\$500	\$0	0.00	\$0	0.00	0
4	Economizer Operation: AHU-3	\$500	\$0	0.00	\$0	0.00	0
	Total for Findings with Payback 3 years or less:	\$0	\$0	0.00	\$0	0.00	0
	Total for all Findings:	\$1,900	\$0	0.00	\$0	0.00	0

Deleted Findings Details



Building: Hobson Memorial

FWB Number:	14909	Eco Number:	1
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling of Equipment	Date Identified:	11/22/2011
Description of Finding:	EF-3 (Kitchen): Found 24/7 operation via trend logs but kitchen is not used 24/7.		
Equipment or System(s):	Other	Finding Category:	Deleted
Finding Type:	Finding Deleted by Provider		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended EF fan status for existing schedule and compare to AHU schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	EF-3: Revise BAS schedule to match building operating schedule. Refer to supporting documentation spreadsheet- Calculations-HOBS.		
Evidence of Implementation Method:	EF-3: Review fan status trends. Refer to supporting documentation spreadsheet- Calculations- HOBS for proposed schedule.		

Contractor Cost (\$):	\$200
PBEEEP Provider Cost for Implementation Assistance (\$):	\$200
Total Estimated Implementation Cost (\$):	\$400

Estimated Annual Total Savings (\$):	\$0	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.00	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.00	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO ₂ e):	0	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	0.0%	Percent of Implementation Costs:	0.3%

Deleted Findings Details



Building: Hobson Memorial

FWB Number:	14909	Eco Number:	2
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Economizer Operation: AHU-1	Date Identified:	11/22/2011
Description of Finding:	AHU-1 (Lower- Court Side): OA damper 100% open but cooling coil is cooling, bypass damper is 0% (Face) when it should be bypassing heating coil; economizer is indicated as off but OA damper is 100%.		
Equipment or System(s):	AHU with heating and cooling	Finding Category:	Deleted
Finding Type:	Finding Deleted by Provider		

Implementer:	Controls Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trends & screen captures show improper damper operation and cooling while economizing.		
Measure:	Revise BAS damper & economizer controls		
Recommendation for Implementation:	AHU-1: Review BAS OA, MA, and bypass dampers for proper operation. Review economizer sequence for proper operation. Refer to supporting documentation spreadsheet- Calculations -HOBS.		
Evidence of Implementation Method:	AHU-1: Review OA damper, bypass damper, cooling coil status trends. Refer to supporting documentation spreadsheet- Calculations- HOBS for proposed schedule.		

Contractor Cost (\$):	\$500
PBEEP Provider Cost for Implementation Assistance (\$):	\$0
Total Estimated Implementation Cost (\$):	\$500

Estimated Annual Total Savings (\$):	\$0	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.00	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.00	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO2e):	0	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	0.0%	Percent of Implementation Costs:	0.3%

Deleted Findings Details



Building: Hobson Memorial

FWB Number:	14909	Eco Number:	3
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Economizer Operation: AHU-2	Date Identified:	11/22/2011
Description of Finding:	AHU-2 (Lower- 2nd FL Offices-Mtg RM's): OA damper 100% open but cooling coil is cooling, bypass damper is 0% (Face) when it should be bypassing heating coil; economizer is indicated as off but OA damper is 100%.		
Equipment or System(s):	AHU with heating and cooling	Finding Category:	Deleted
Finding Type:	Finding Deleted by Provider		

Implementer:	Controls Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trends & screen captures show improper damper operation and cooling while economizing.		
Measure:	Revise BAS damper & economizer controls		
Recommendation for Implementation:	AHU-2: Review BAS OA, MA, and bypass dampers for proper operation. Review economizer sequence for proper operation. Refer to supporting documentation spreadsheet- Calculations -HOBS.		
Evidence of Implementation Method:	AHU-2: Review OA damper, bypass damper, cooling coil status trends. Refer to supporting documentation spreadsheet- Calculations- HOBS for proposed schedule.		

Contractor Cost (\$):	\$500
PBEEP Provider Cost for Implementation Assistance (\$):	\$0
Total Estimated Implementation Cost (\$):	\$500

Estimated Annual Total Savings (\$):	\$0	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.00	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.00	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO2e):	0	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	0.0%	Percent of Implementation Costs:	0.3%

Deleted Findings Details



Building: Hobson Memorial

FWB Number:	14909	Eco Number:	4
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Economizer Operation: AHU-3	Date Identified:	11/22/2011
Description of Finding:	AHU-3 (Lower- Kitchen): OA damper 100% open but cooling coil is cooling, bypass damper is 0% (Face) when it should be bypassing heating coil.		
Equipment or System(s):	AHU with heating and cooling	Finding Category:	Deleted
Finding Type:	Finding Deleted by Provider		

Implementer:	Controls Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trends & screen captures show improper damper operation and cooling while economizing.		
Measure:	Revise BAS damper.		
Recommendation for Implementation:	AHU-3: Review BAS OA, MA, and bypass dampers for proper operation. Review economizer sequence for proper operation. Refer to supporting documentation spreadsheet- Calculations -HOBS.		
Evidence of Implementation Method:	AHU-3: Review OA damper, bypass damper, cooling coil status trends. Refer to supporting documentation spreadsheet- Calculations- HOBS for proposed schedule.		

Contractor Cost (\$):	\$500
PBEEEP Provider Cost for Implementation Assistance (\$):	\$0
Total Estimated Implementation Cost (\$):	\$500

Estimated Annual Total Savings (\$):	\$0	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.00	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.00	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO ₂ e):	0	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	0.0%	Percent of Implementation Costs:	0.3%

Deleted Findings Summary

Building: Memorial Hall
 Site: Bemidji State



Eco #	Investigation Finding	Total Cost	Savings	Payback	Co-Funding	Payback Co-Funding	GHG
2	Retrofit-Efficient Lighting	\$17,835	\$296	60.30	\$0	60.30	5
Total for Findings with Payback 3 years or less:		\$0	\$0	0.00	\$0	0.00	0
Total for all Findings:		\$17,835	\$296	60.30	\$0	60.30	5

Deleted Findings Details



Building: Memorial Hall

FWB Number:	14910	Eco Number:	2
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Retrofit-Efficient Lighting	Date Identified:	12/20/2011
Description of Finding:	Efficiency of installed lamps, ballasts or fixtures are much lower than efficiency of currently available lamps, ballasts or fixtures.		
Equipment or System(s):	Interior Lighting	Finding Category:	Deleted
Finding Type:	Finding Deleted by PBEEP		

Implementer:	In-house Staff	Benefits:	Energy Savings
Baseline Documentation Method:	Verified installed lamps; counted total fixtures per room and lamps per fixture.		
Measure:	Replace existing 32 watt T8 lamps with lower wattage 28 watt T8 lamps.		
Recommendation for Implementation:	Whole Building: Replace existing 32 watt T8 lamps with lower wattage 28 watt T8 lamps. Refer to supporting documentation spreadsheet- Lighting Calcs.		
Evidence of Implementation Method:	Spot check 10% of affected areas and take photos.		

Annual Electric Savings (kWh):	5,260	Peak Demand Savings (kWh):	8
Estimated Annual kWh Savings (\$):	\$296	Estimated Annual Demand Savings (\$):	\$0
Contractor Cost (\$):	\$17,635		
PBEEP Provider Cost for Implementation Assistance (\$):	\$200		
Total Estimated Implementation Cost (\$):	\$17,835		

Estimated Annual Total Savings (\$):	\$296	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	60.30	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	60.30	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO2e):	5	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	0.7%	Percent of Implementation Costs:	11.7%



Deleted Findings Summary

Building: Physical Education
Site: Bemidji State

Eco #	Investigation Finding	Total Cost	Savings	Payback	Co-Funding	Payback Co-Funding	GHG
1	Excessive Enabling (24/7): AHU-1 (GLAS - Old Ice Rink)	\$400	\$0	0.00	\$0	0.00	0
2	Excessive Enabling (24/7): AHU-2 (GLAS - Classrooms & Offices)	\$400	\$0	0.00	\$0	0.00	0
5	Zone Setpoint Setback	\$200	\$0	0.00	\$0	0.00	0
	Total for Findings with Payback 3 years or less:	\$0	\$0	0.00	\$0	0.00	0
	Total for all Findings:	\$1,000	\$0	0.00	\$0	0.00	0

Deleted Findings Details



Building: Physical Education

FWB Number:	14911	Eco Number:	1
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling (24/7): AHU-1 (GLAS - Old Ice Rink)	Date Identified:	11/8/2011
Description of Finding:	AHU-1 (GLAS- Old Ice Rink): Found 24/7 operation via trend logs but building is not occupied 24/7. AHU includes: SF, HC.		
Equipment or System(s):	AHU with heating only	Finding Category:	Deleted
Finding Type:	Finding Deleted by Provider		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended SF fan status for existing schedule and compare to printed schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	AHU-1(GLAS): Revise BAS schedule to match building operating schedule with unit starting 1hr before occupancy. Refer to supporting documentation spreadsheet- Calculations-GLAS.		
Evidence of Implementation Method:	AHU-1: Review fan statuses trends. Refer to supporting documentation spreadsheet- Calculations- GLAS for proposed schedule.		

Contractor Cost (\$):	\$200
PBEEEP Provider Cost for Implementation Assistance (\$):	\$200
Total Estimated Implementation Cost (\$):	\$400

Estimated Annual Total Savings (\$):	\$0	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.00	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.00	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO2e):	0	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	0.0%	Percent of Implementation Costs:	0.3%

Deleted Findings Details



Building: Physical Education

FWB Number:	14911	Eco Number:	2
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Excessive Enabling (24/7): AHU-2 (GLAS - Classrooms & Offices)	Date Identified:	11/8/2011
Description of Finding:	AHU-2 (GLAS- Classrooms & Offices): Found 24/7 operation via trend logs but building is not occupied 24/7. AHU includes: SF, HC.		
Equipment or System(s):	AHU with heating only	Finding Category:	Deleted
Finding Type:	Finding Deleted by Provider		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trended SF fan status for existing schedule and compare to printed schedules.		
Measure:	Revise BAS schedule to match building operation schedule.		
Recommendation for Implementation:	AHU-2(GLAS): Revise BAS schedule to match building operating schedule with unit starting 1hr before occupancy. Refer to supporting documentation spreadsheet- Calculations-GLAS.		
Evidence of Implementation Method:	AHU-2: Review fan statuses trends. Refer to supporting documentation spreadsheet- Calculations- GLAS for proposed schedule.		

Contractor Cost (\$):	\$200
PBEEP Provider Cost for Implementation Assistance (\$):	\$200
Total Estimated Implementation Cost (\$):	\$400

Estimated Annual Total Savings (\$):	\$0	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.00	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.00	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO2e):	0	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	0.0%	Percent of Implementation Costs:	0.3%

Deleted Findings Details



Building: Physical Education

FWB Number:	14911	Eco Number:	5
Site:	Bemidji State	Date/Time Created:	4/27/2012

Investigation Finding:	Zone Setpoint Setback	Date Identified:	11/18/2011
Description of Finding:	AHU-1 (GLAS- Old Ice Rink): Zone setpoint found to be 65F but space is not used frequently. AHU includes: SF, HC.		
Equipment or System(s):	AHU with heating only	Finding Category:	Deleted
Finding Type:	Finding Deleted by Provider		

Implementer:	In-house Staff, Contractor	Benefits:	Energy Savings
Baseline Documentation Method:	Trends show space temperature during winter season at 65F.		
Measure:	Change zone setback to lower temperature; 55-60F via BAS.		
Recommendation for Implementation:	AHU-1(GLAS): Revise zone setback temperature via BAS.		
Evidence of Implementation Method:	AHU-1: Review room setpoint trends. Refer to supporting documentation spreadsheet- Calculations- PE for proposed schedule.		

Contractor Cost (\$):	\$100
PBEEEP Provider Cost for Implementation Assistance (\$):	\$100
Total Estimated Implementation Cost (\$):	\$200

Estimated Annual Total Savings (\$):	\$0	Utility Co-Funding for kWh (\$):	\$0
Initial Simple Payback (years):	0.00	Utility Co-Funding for kW (\$):	\$0
Simple Payback w/ Utility Co-Funding (years):	0.00	Utility Co-Funding for therms (\$):	\$0
GHG Avoided in U.S. Tons (CO2e):	0	Utility Co-Funding - Estimated Total (\$):	\$0

Current Project as Percentage of Total project			
Percent Savings (Costs basis)	0.0%	Percent of Implementation Costs:	0.1%

Building: AC Clark Library
Air Handler: AHU-W
Serves: West
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	24 hrs	6:45AM - 10:45PM
Tuesday	24 hrs	6:45AM - 10:45PM
Wednesday	24 hrs	6:45AM - 10:45PM
Thursday	24 hrs	6:45AM - 10:45PM
Friday	24 hrs	6:45AM - 4:45PM
Saturday	24 hrs	10:00AM - 4:45PM
Sunday	24 hrs	12:00PM - 10:45PM

Building: AC Clark Library
Air Handler: AHU-E
Serves: East
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	5:00AM - 1:00AM	6:45AM - 10:45PM
Tuesday	5:00AM - 11:00PM	6:45AM - 10:45PM
Wednesday	5:00AM - 11:00PM	6:45AM - 10:45PM
Thursday	5:00AM - 1:00AM	6:45AM - 10:45PM
Friday	5:00AM - 5:00PM	6:45AM - 4:45PM
Saturday	6:00AM - 5:00PM	10:00AM - 4:45PM
Sunday	8:00AM - 11:00PM	12:00PM - 10:45PM

Building: AC Clark Library
Air Handler: EF-5
Serves: Shipping
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	24 hrs	6:45AM - 10:45PM
Tuesday	24 hrs	6:45AM - 10:45PM
Wednesday	24 hrs	6:45AM - 10:45PM
Thursday	24 hrs	6:45AM - 10:45PM
Friday	24 hrs	6:45AM - 4:45PM
Saturday	24 hrs	10:00AM - 4:45PM
Sunday	24 hrs	12:00PM - 10:45PM

Building: AIRC
Air Handler: AHU-1 **Supply Fan**
Serves: Main Floor
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	6:00AM - 7:00PM	6:00AM - 9:00PM
Tuesday	6:00AM - 7:00PM	6:00AM - 9:00PM
Wednesday	6:00AM - 2:00AM	6:00AM - 9:00PM
Thursday	6:00AM - 12:00AM	6:00AM - 9:00PM
Friday	12:00AM - 8:00AM	6:00AM - 9:00PM
Saturday	8:00AM - 8:00PM	8:00AM - 8:00PM
Sunday	8:00AM - 8:00PM	8:00AM - 8:00PM

Building: AC Clark Library
Air Handler: AHU-1 **Return Fan**
Serves: Main Floor
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	2:00AM - 9:00PM	6:00AM - 9:00PM
Tuesday	2:00AM - 7:00PM	6:00AM - 9:00PM
Wednesday	2:00AM - 12:00AM	6:00AM - 9:00PM
Thursday	12:00AM - 9:00PM	6:00AM - 9:00PM
Friday	2:00AM - 12:00AM	6:00AM - 9:00PM
Saturday	12:00AM - 8:00PM	8:00AM - 8:00PM
Sunday	8:00AM - 8:00PM	8:00AM - 8:00PM

Building: Bridgeman
 Air Handler: AHU-7 Supply Fan
 Serves: SE
 Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	24 hrs	5:00AM - 8:00PM
Tuesday	24 hrs	5:00AM - 8:00PM
Wednesday	24 hrs	5:00AM - 8:00PM
Thursday	24 hrs	5:00AM - 8:00PM
Friday	24 hrs	5:00AM - 8:00PM
Saturday	24 hrs	OFF
Sunday	24 hrs	OFF

Building: Bridgeman
 Air Handler: AHU-7 Return Fan
 Serves: SE
 Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	5:00AM - 8:00PM	5:00AM - 8:00PM
Tuesday	5:00AM - 8:00PM	5:00AM - 8:00PM
Wednesday	5:00AM - 8:00PM	5:00AM - 8:00PM
Thursday	5:00AM - 8:00PM	5:00AM - 8:00PM
Friday	5:00AM - 8:00PM	5:00AM - 8:00PM
Saturday	OFF	OFF
Sunday	OFF	OFF

Building: Bridgeman
 Air Handler: AHU-11 Supply Fan
 Serves: SE
 Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	5:00AM - 8:00PM	5:00AM - 8:00PM
Tuesday	5:00AM - 8:00PM	5:00AM - 8:00PM
Wednesday	5:00AM - 8:00PM	5:00AM - 8:00PM
Thursday	5:00AM - 8:00PM	5:00AM - 8:00PM
Friday	5:00AM - 8:00PM	5:00AM - 8:00PM
Saturday	OFF	OFF
Sunday	OFF	OFF

Building: Bridgeman
 Air Handler: AHU-11 Return Fan
 Serves: SE
 Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	24 hrs	5:00AM - 8:00PM
Tuesday	24 hrs	5:00AM - 8:00PM
Wednesday	24 hrs	5:00AM - 8:00PM
Thursday	24 hrs	5:00AM - 8:00PM
Friday	24 hrs	5:00AM - 8:00PM
Saturday	24 hrs	OFF
Sunday	24 hrs	OFF

Building: Deputy
Air Handler: AHU-1
Serves: 1st Floor
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	6:00AM - 12:00AM	6:00AM - 8:00PM
Tuesday	6:00AM - 8:00PM	6:00AM - 8:00PM
Wednesday	6:00AM - 1:00AM	6:00AM - 8:00PM
Thursday	6:00AM - 8:00PM	6:00AM - 8:00PM
Friday	6:00AM - 8:00PM	6:00AM - 8:00PM
Saturday	7:00AM - 6:00PM	7:00AM - 6:00PM
Sunday	7:00AM - 5:00PM	7:00AM - 5:00PM

Building: Deputy
Air Handler: AHU-2
Serves: 2nd Floor
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	6:00AM - 12:00AM	6:00AM - 8:00PM
Tuesday	6:00AM - 8:00PM	6:00AM - 8:00PM
Wednesday	6:00AM - 1:00AM	6:00AM - 8:00PM
Thursday	6:00AM - 8:00PM	6:00AM - 8:00PM
Friday	6:00AM - 8:00PM	6:00AM - 8:00PM
Saturday	7:00AM - 6:00PM	7:00AM - 6:00PM
Sunday	7:00AM - 5:00PM	7:00AM - 5:00PM

Building: Deputy
Air Handler: AHU-3
Serves: 3rd Floor
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	6:00AM - 12:00AM	6:00AM - 8:00PM
Tuesday	6:00AM - 8:00PM	6:00AM - 8:00PM
Wednesday	6:00AM - 1:00AM	6:00AM - 8:00PM
Thursday	6:00AM - 8:00PM	6:00AM - 8:00PM
Friday	6:00AM - 8:00PM	6:00AM - 8:00PM
Saturday	7:00AM - 6:00PM	7:00AM - 6:00PM
Sunday	7:00AM - 5:00PM	7:00AM - 5:00PM

Building: Deputy
Air Handler: AHU-4
Serves: 1st Floor
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	5:00AM - 12:00AM	6:00AM - 8:00PM
Tuesday	5:00AM - 12:00AM	6:00AM - 8:00PM
Wednesday	5:00AM - 12:00AM	6:00AM - 8:00PM
Thursday	12:00AM - 8:00PM	6:00AM - 8:00PM
Friday	5:00AM - 8:00PM	6:00AM - 8:00PM
Saturday	3:00PM - 6:00PM	7:00AM - 6:00PM
Sunday	7:00AM - 5:00PM	7:00AM - 5:00PM

Building: Deputy
Air Handler: AHU-5
Serves: 1st Floor
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	5:00AM - 12:00AM	6:00AM - 8:00PM
Tuesday	12:00AM - 8:00PM	6:00AM - 8:00PM
Wednesday	6:00AM - 1:00AM	6:00AM - 8:00PM
Thursday	6:00AM - 8:00PM	6:00AM - 8:00PM
Friday	6:00AM - 8:00PM	6:00AM - 8:00PM
Saturday	7:00AM - 6:00PM	7:00AM - 6:00PM
Sunday	7:00AM - 5:00PM	7:00AM - 5:00PM

Building: Deputy
Air Handler: AHU-6
Serves: 1st Floor
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	5:00AM - 12:00AM	6:00AM - 8:00PM
Tuesday	12:00AM - 8:00PM	6:00AM - 8:00PM
Wednesday	6:00AM - 1:00AM	6:00AM - 8:00PM
Thursday	6:00AM - 8:00PM	6:00AM - 8:00PM
Friday	6:00AM - 8:00PM	6:00AM - 8:00PM
Saturday	7:00AM - 6:00PM	7:00AM - 6:00PM
Sunday	7:00AM - 5:00PM	7:00AM - 5:00PM

Building: Ed Arts
Air Handler: AHU-1
Serves: 1st and 2nd Floors
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	24 hrs	6:00AM - 11:00PM
Tuesday	24 hrs	6:00AM - 11:00PM
Wednesday	24 hrs	6:00AM - 11:00PM
Thursday	24 hrs	6:00AM - 11:00PM
Friday	24 hrs	6:00AM - 11:00PM
Saturday	24 hrs	7:00AM - 11:00PM
Sunday	24 hrs	7:00AM - 11:00PM

Building: Ed Arts
Air Handler: EF-15
Serves:
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	24 hrs	6:00AM - 11:00PM
Tuesday	24 hrs	6:00AM - 11:00PM
Wednesday	24 hrs	6:00AM - 11:00PM
Thursday	24 hrs	6:00AM - 11:00PM
Friday	24 hrs	6:00AM - 11:00PM
Saturday	24 hrs	7:00AM - 11:00PM
Sunday	24 hrs	7:00AM - 11:00PM

Building: Ed Arts
Air Handler: EF-19
Serves:
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	24 hrs	6:00AM - 11:00PM
Tuesday	24 hrs	6:00AM - 11:00PM
Wednesday	24 hrs	6:00AM - 11:00PM
Thursday	24 hrs	6:00AM - 11:00PM
Friday	24 hrs	6:00AM - 11:00PM
Saturday	24 hrs	7:00AM - 11:00PM
Sunday	24 hrs	7:00AM - 11:00PM

Building: Ed Arts
Air Handler: EF-14
Serves:
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	24 hrs	6:00AM - 11:00PM
Tuesday	24 hrs	6:00AM - 11:00PM
Wednesday	24 hrs	6:00AM - 11:00PM
Thursday	24 hrs	6:00AM - 11:00PM
Friday	24 hrs	6:00AM - 11:00PM
Saturday	24 hrs	7:00AM - 11:00PM
Sunday	24 hrs	7:00AM - 11:00PM

Building: Gillett Fitness
Air Handler: AHU-6
Serves: Lobby
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	24 hrs	4:30AM - 10:00PM
Tuesday	24 hrs	4:30AM - 10:00PM
Wednesday	24 hrs	4:30AM - 10:00PM
Thursday	24 hrs	4:30AM - 10:00PM
Friday	24 hrs	4:30AM - 10:00PM
Saturday	24 hrs	7:00AM - 10:00PM
Sunday	24 hrs	11:00AM - 10:00PM

Building: Gillett Fitness
Air Handler: AHU-8
Serves: Offices near Lobby
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	24 hrs	4:30AM - 10:00PM
Tuesday	24 hrs	4:30AM - 10:00PM
Wednesday	24 hrs	4:30AM - 10:00PM
Thursday	24 hrs	4:30AM - 10:00PM
Friday	24 hrs	4:30AM - 10:00PM
Saturday	24 hrs	7:00AM - 10:00PM
Sunday	24 hrs	11:00AM - 10:00PM

Building: Gillett Fitness
Air Handler: AHU-9
Serves: Locker Room
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	24 hrs	4:30AM - 11:00PM
Tuesday	24 hrs	4:30AM - 11:00PM
Wednesday	24 hrs	4:30AM - 11:00PM
Thursday	24 hrs	4:30AM - 11:00PM
Friday	24 hrs	4:30AM - 11:00PM
Saturday	24 hrs	7:00AM - 11:00PM
Sunday	24 hrs	11:00AM - 11:00PM

Building: Hagg Sauer
Air Handler: AHU-1
Serves: SE
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	6:00AM - 10:00PM	6:00AM - 9:00PM
Tuesday	6:00AM - 10:00PM	6:00AM - 9:00PM
Wednesday	6:00AM - 10:00PM	6:00AM - 9:00PM
Thursday	6:00AM - 10:00PM	6:00AM - 9:00PM
Friday	6:00AM - 10:00PM	6:00AM - 9:00PM
Saturday	7:00AM - 8:00PM	7:00AM - 7:00PM
Sunday	7:00AM - 8:00PM	7:00AM - 7:00PM

Building: Hagg Sauer
Air Handler: AHU-2
Serves: SE
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	6:00AM - 10:00PM	6:00AM - 9:00PM
Tuesday	6:00AM - 10:00PM	6:00AM - 9:00PM
Wednesday	6:00AM - 10:00PM	6:00AM - 9:00PM
Thursday	6:00AM - 10:00PM	6:00AM - 9:00PM
Friday	6:00AM - 10:00PM	6:00AM - 9:00PM
Saturday	7:00AM - 8:00PM	7:00AM - 7:00PM
Sunday	7:00AM - 8:00PM	7:00AM - 7:00PM

Building: Hobson Memorial
 Air Handler: AHU-1 Supply Fan
 Serves: Lower
 Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	6:00AM - 8:00PM	6:00AM - 8:00PM
Tuesday	6:00AM - 1:00AM	6:00AM - 8:00PM
Wednesday	6:00AM - 8:00PM	6:00AM - 8:00PM
Thursday	6:00AM - 1:00AM	6:00AM - 8:00PM
Friday	6:00AM - 8:00PM	6:00AM - 8:00PM
Saturday	7:00AM - 7:00PM	OFF
Sunday	OFF	OFF

Building: Hobson Memorial
 Air Handler: AHU-1 Return Fan
 Serves: Lower
 Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	7:00AM - 12:00AM	6:00AM - 8:00PM
Tuesday	12:00AM - 9:00PM	6:00AM - 8:00PM
Wednesday	7:00AM - 2:00AM	6:00AM - 8:00PM
Thursday	7:00AM - 9:00PM	6:00AM - 8:00PM
Friday	7:00AM - 9:00PM	6:00AM - 8:00PM
Saturday	8:00AM - 8:00PM	OFF
Sunday	OFF	OFF

Building: Hobson Memorial
 Air Handler: AHU-2 Supply Fan
 Serves: Lower
 Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	4:00AM - 7:00PM	5:00AM - 6:00PM
Tuesday	4:00AM - 7:00PM	5:00AM - 6:00PM
Wednesday	4:00AM - 7:00PM	5:00AM - 6:00PM
Thursday	4:00AM - 1:00AM	5:00AM - 6:00PM
Friday	4:00AM - 7:00PM	5:00AM - 6:00PM
Saturday	5:00AM - 6:00PM	9:00AM - 10:00PM
Sunday	9:00AM - 6:00PM	9:00AM - 10:00PM

Building: Hobson Memorial
 Air Handler: AHU-2 Return Fan
 Serves: Lower
 Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	4:00AM - 7:00PM	5:00AM - 6:00PM
Tuesday	4:00AM - 7:00PM	5:00AM - 6:00PM
Wednesday	4:00AM - 7:00PM	5:00AM - 6:00PM
Thursday	4:00AM - 7:00PM	5:00AM - 6:00PM
Friday	4:00AM - 1:00AM	5:00AM - 6:00PM
Saturday	5:00AM - 6:00PM	9:00AM - 10:00PM
Sunday	9:00AM - 6:00PM	9:00AM - 10:00PM

Building: Hobson Memorial
Air Handler: AHU-3
Serves: Lower
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	4:00AM - 7:00PM	7:00AM - 10:00PM
Tuesday	4:00AM - 7:00PM	7:00AM - 10:00PM
Wednesday	4:00AM - 7:00PM	7:00AM - 10:00PM
Thursday	4:00AM - 7:00PM	7:00AM - 10:00PM
Friday	4:00AM - 1:00AM	7:00AM - 10:00PM
Saturday	5:00AM - 6:00PM	9:00AM - 6:00PM
Sunday	9:00AM - 6:00PM	9:00AM - 6:00PM

Building: Hobson Memorial
Air Handler: EF-3
Serves: Kitchen, Lower
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	24 hrs	7:00AM - 10:00PM
Tuesday	24 hrs	7:00AM - 10:00PM
Wednesday	24 hrs	7:00AM - 10:00PM
Thursday	24 hrs	7:00AM - 10:00PM
Friday	24 hrs	7:00AM - 10:00PM
Saturday	24 hrs	9:00AM - 6:00PM
Sunday	24 hrs	9:00AM - 6:00PM

Building: Memorial Hall
Air Handler: AHU-1
Serves: Computer Lab & Nursing
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	24 hrs	6:00AM - 6:00PM
Tuesday	24 hrs	6:00AM - 6:00PM
Wednesday	24 hrs	6:00AM - 6:00PM
Thursday	24 hrs	6:00AM - 6:00PM
Friday	24 hrs	6:00AM - 6:00PM
Saturday	24 hrs	8:00AM - 5:00PM
Sunday	24 hrs	8:00AM - 5:00PM

Building: Phy Ed
Air Handler: AHU-2
Serves: East Gym
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	24 hrs	4:30AM - 10:00PM
Tuesday	24 hrs	4:30AM - 10:00PM
Wednesday	24 hrs	4:30AM - 10:00PM
Thursday	24 hrs	4:30AM - 10:00PM
Friday	24 hrs	4:30AM - 10:00PM
Saturday	24 hrs	7:00AM - 10:00PM
Sunday	24 hrs	11:00AM - 10:00PM

Building: Phy Ed
Air Handler: AHU-4
Serves: Locker Room and Training Room
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	24 hrs	4:30AM - 10:00PM
Tuesday	24 hrs	4:30AM - 10:00PM
Wednesday	24 hrs	4:30AM - 10:00PM
Thursday	24 hrs	4:30AM - 10:00PM
Friday	24 hrs	4:30AM - 10:00PM
Saturday	24 hrs	7:00AM - 10:00PM
Sunday	24 hrs	11:00AM - 10:00PM

Building: Sattgast
Air Handler: AHU-6
Serves: SE
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	24 hrs	6:15AM - 6:45PM
Tuesday	24 hrs	6:15AM - 6:45PM
Wednesday	24 hrs	6:15AM - 6:45PM
Thursday	24 hrs	6:15AM - 6:45PM
Friday	24 hrs	6:15AM - 6:45PM
Saturday	24 hrs	6:15AM - 5:45PM
Sunday	24 hrs	6:15AM - 5:45PM

Building: Walnut
Air Handler: AIRCON-1
Serves:
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	24 hrs	5:00AM - 8:30PM
Tuesday	24 hrs	5:00AM - 8:30PM
Wednesday	24 hrs	5:00AM - 8:30PM
Thursday	24 hrs	5:00AM - 8:30PM
Friday	24 hrs	5:00AM - 8:00PM
Saturday	24 hrs	6:30AM - 8:00PM
Sunday	24 hrs	6:30AM - 8:00PM

Building: Walnut
Air Handler: AIRCON-2
Serves:
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	24 hrs	5:00AM - 8:30PM
Tuesday	24 hrs	5:00AM - 8:30PM
Wednesday	24 hrs	5:00AM - 8:30PM
Thursday	24 hrs	5:00AM - 8:30PM
Friday	24 hrs	5:00AM - 8:00PM
Saturday	24 hrs	6:30AM - 8:00PM
Sunday	24 hrs	6:30AM - 8:00PM

Building: Walnut
Air Handler: AIRCON-3
Serves:
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	24 hrs	5:00AM - 8:30PM
Tuesday	24 hrs	5:00AM - 8:30PM
Wednesday	24 hrs	5:00AM - 8:30PM
Thursday	24 hrs	5:00AM - 8:30PM
Friday	24 hrs	5:00AM - 8:00PM
Saturday	24 hrs	6:30AM - 8:00PM
Sunday	24 hrs	6:30AM - 8:00PM

Building: Walnut
Air Handler: AIRCON-4
Serves:
Notes:

Temperature Setpoints

	Summer	Winter
Current Occupied	N/A	N/A
Current Unoccupied	N/A	N/A
Proposed Occupied	N/A	N/A
Proposed Unoccupied	N/A	N/A

Scheduling

	Current Occupied	Proposed Occupied
Monday	24 hrs	5:00AM - 8:30PM
Tuesday	24 hrs	5:00AM - 8:30PM
Wednesday	24 hrs	5:00AM - 8:30PM
Thursday	24 hrs	5:00AM - 8:30PM
Friday	24 hrs	5:00AM - 8:00PM
Saturday	24 hrs	6:30AM - 8:00PM
Sunday	24 hrs	6:30AM - 8:00PM

1) Based on Provider feedback, any linear fluorescent lamps throughout each building are subject to retrofit from 32W to 28W T8 variety.

2) Existing lamps/fixture = Proposed lamps/fixture (i.e. 3 lamp 32W T8 = 3 lamp 28W T8)

Building	Proposed Lamp Retrofit Quantity
AC Clark Library	1929
American Indian Resource Center	230
Bridgeman	1684
Hagg-Sauer Hall	2820
Rec Center & Field House	1530
Education-Art Building	1725
Sattgast Hall	3145
Deputy Hall	2219
Boiler House (Deleted: Measure Exceeds 15 Years Payback)	194
Hobson Memorial Union - Lower	819
Hobson Memorial Union - Upper	609
Memorial Hall (Deleted: Measure Exceeds 15 Years Payback)	641
Walnut Food Service	1168

Lamp Quantity* **17,878**
Cost (\$ 5/lamp cost to replace) \$ **89,390.00**

**Excludes Boiler House and Memorial Hall*

PBEEEP

State Government

Public Buildings Enhanced Energy Efficiency Program

ATTACHMENT 4: SCREENING RESULTS FOR BEMIDJI STATE UNIVERSITY



BEMIDJI
STATE UNIVERSITY



Minnesota
STATE COLLEGES
& UNIVERSITIES

March 23, 2011

Campus Overview

Bemidji State University	
Location	1500 Birchmont Avenue NE, Bemidji, MN 56601
Facility Manager	Jeff Sande, Physical Plant Manager
Number of Buildings	27
Interior Square Footage	1,579,243
PBEEEP Provider	Center for Energy and Environment (Angela Vreeland and Neal Ray)
Date Visited	1/18 – 1/19/2011
Annual Energy Cost	\$1,757,118 (from 2009 utility data)
Utility Company	Electric: Otter Tail Power Company Natural Gas: Minnesota Energy Resources
Site Energy Use Index (EUI)	106 kBtu/sqft (from 2009 utility data)
Benchmark EUI (from B3)	128 kBtu/sqft

Bemidji State University is comprised of 27 buildings ranging in size from 10,388 to 128,550 square feet. The total area of the buildings on campus is 1,579,243 square feet. The campus has eight classroom/laboratory buildings, three administration buildings, three athletics buildings, seven dormitories, a dining hall, a library, a student union, a skyway, a warehouse, and a heating plant. Some of the buildings are attached to other buildings via open hallways or are additions to buildings. All of the buildings are located on campus, which is on the shore of Lake Bemidji and stretches six blocks long. There is a map of the campus showing the location of each building within the site at the end of this report.

Screening Overview

The goal of screening is to select buildings where an in-depth energy investigation can be performed to identify energy savings opportunities that will generate savings with a relatively short (1 to 5 years) and certain payback. The screening of Bemidji State University was performed by the Center for Energy and Environment (CEE) with the assistance of the facility staff. Walk-throughs were conducted on January 19, 2011 and interviews with the facility staff were carried out to fully explore the status of the energy consuming equipment and their potential for recommissioning. This report is the result of that information.

Recommendation

A detailed investigation of the energy usage and energy savings opportunities of the fourteen buildings listed below totaling 878,529 interior square feet at Bemidji State University is recommended at this time. These buildings will be referred to as the “recommended buildings” throughout this report. The floor areas listed in the table have not been verified.

Building Name	State ID	Building Type	Area (sq ft)	Year Built
A.C. Clark Library	E26070S1366	Library	71,462	1966
American Indian Resource Center	E26070S9302	Administration	10,388	2002
Bridgeman Hall	E26070S1264	Academic	33,772	1964
CAET	E26070S9403	Academic	25,349	2003
Deputy Hall	E26070S0118	Administration	78,656	1918
Education-Art Building	E26070S0650	Academic	53,342	1950
Gillett Recreation-Fitness Center	E26070S2189	Athletic	85,765	1989
Hagg-Sauer Hall	E26070S1570	Academic	82,478	1970
Heating Plant	E26070S0325	Mechanical	20,317	1925
Hobson Memorial Student Union	E26070S8067	Student Union	76,756	1967
Memorial Hall	E26070S0540	Mixed Use	53,893	1940
Phy Ed-Glas Field House	E26070S0959	Athletic	121,586	1959
Sattgast Hall of Science	E26070S1162	Academic	107,598	1962
Walnut Hall	E26070S5669	Dining Hall	57,167	1969

There are many factors that are part of the decision to recommend an energy investigation of a building; at Bemidji State University some of the characteristics that were taken into account during the building selection process include:

- Potential energy savings opportunities observed during screening phase
- Large square footage
- Level of control by the building automation system
- Equipment size and quantity
- Frequency and severity of comfort and/or control issues
- Support from the staff and management to include building in an investigation

From a campus-wide standpoint, there are two main reasons for recommending that Bemidji State University move forward with the investigation of a selection of buildings:

- The annual energy cost averages \$1.11 per square foot; a reduction in this cost should support the cost of the energy investigation
- B3 data shows that while the campus is 17% below its benchmark, the average of all State buildings is 23% below their corresponding benchmarks.

The remaining buildings on campus that are not recommended for investigation are listed in the table below. Birch Hall, Oak Hall, and Tamarack Hall are not recommended because significant air handler retrofits or remodeling are planned to begin in 2011. Sanford Hall is not recommended because it is scheduled for demolition. The remainder of the buildings on the list are small, have low Energy Use Indexes (EUIs), or limited equipment, thus making them less likely to have cost-effective energy saving potential.

Building Name	State ID	Building Type	Area	Year
Bangsberg Hall	E26070S1671	Academic	86,878	1971
Birch Hall	E26070S5052	Dormitory	62,184	1952
Cedar Hall	E26070S5259	Dormitory	39,133	1959
Decker/Hickory Hall	E26070S9657	Academic	29,424	1957
Linden Hall	E26070S5159	Dormitory	57,565	1959
Maintenance/Receiving	E26070S1878	Warehouse/Shop	14,320	1978
Maple Hall	E26070S5567	Dormitory	94,635	1967
Oak Hall	E26070S5466	Dormitory	128,550	1966
Pine Hall	E26070S5361	Dormitory	50,264	1961
Sanford Hall	E26070S0220	Administration	17,012	1920
Skyway	E26070S1979	Skyway	2,428	1979
Stadium	E26070S0438	Stadium	19,911	1938
Tamarack Hall	E26070S5769	Dormitory	88,410	1969

Recommended Buildings Descriptions

Details obtained through the screening process regarding the recommended buildings are included in the following:

Mechanical Equipment

The Heating Plant houses the central steam and chilled water plant for the campus. There are three high pressure steam boilers that operate during the fall, winter, and spring and a low pressure steam boiler that is used during the summer. The high pressure steam boilers operate between 80 and 100 psi and the “summer boiler” operates around 11 psi. During the winter, one or two boilers operate at a time, and even during extremely cold weather, the largest boiler alone can handle the heating load for the entire campus. All four boilers are shut down for two to three weeks during the spring for annual maintenance, during which electric water heaters provide domestic hot water to the buildings. There are two chillers in the Heating Plant that provide chilled water to the campus. Only one operates at a time due to the constraints of the cooling tower capacity. All of the recommended buildings use steam and chilled water from the Heating Plant except for the American Indian Resource Center (AIRC), which has its own boilers and chiller, and the Physical Education and Glas Field House, which use steam from the Heating Plant and has some Direct Expansion (DX) cooling, but is mostly not cooled. All of the recommended buildings

that use steam from the Heating Plant have their own converters and pumps that circulate hot water to the air handlers, reheats, and radiation for heating.

The following table lists the key mechanical equipment in the buildings recommended for investigation.

Mechanical Equipment Summary Table*	
3	Building Automation Systems (Honeywell, Johnson Controls, Trane)
14	Buildings
878,529	Interior Square Feet
79	Air Handlers
281	VAV Boxes
124	Exhaust Fans and Power Roof Ventilators
53	Unit Heaters
3	Chillers
1	Cooling Tower
4	Steam Boilers (dual fuel- natural gas or fuel oil)
2	Hot Water Boilers
71	Pumps (HW, CHW, etc)
20	Heat Exchangers
2,343	Minimum points for trending per PBEEEP Guidelines
4,289	Points available for trending
84	Data loggers required (52 temperature, 27 motor status, 5 current)

*NOTE: This table does not include equipment that is no longer in use, including the chiller in Hobson Memorial Student Union and the refrigeration system for the ice rink at Phy Ed-Glas Field House.

Controls and Trending

There are three automation systems that control the equipment in the buildings on campus. There is a Honeywell Excel Building Supervisor System that controls the majority of the buildings on campus. The chillers in the heating plant are controlled by a Trane Tracer Summit System and the Sattgast Hall addition is controlled by a Johnson Controls Metasys System. Neither the boilers in the Heating Plant nor any of the equipment in Walnut Hall is on any of the automation systems. Daily logs are kept on the boiler operation in the Heating Plant, but otherwise data logging will be required for these buildings.

The Honeywell BAS is capable of trending at 15 minute intervals for an extended period and the data can be exported to an Excel spreadsheet for analysis. There are outdated panels in Sattgast Hall, Linden Hall, and Gillett Recreation-Fitness Center, which are all going to be upgraded starting in May 2011 when the school year is over. Once those panels are upgraded, all of the points on the Honeywell system will be able to be trended. There are also plans to upgrade the entire system to a Honeywell Enterprise Building Integrator (EBI) system. According to the controls contractor, the switch to the new system will impact trending very little, if at all. It is not certain when and if this system upgrade will occur, but the plan is for it to be done in 2011.

The Trane BAS controls the chiller and the system is capable of trending, but upgrades may be necessary to store the data. The current system can trend all of the points, but downloading the data would be slightly time consuming and it would need to be done frequently because the data would be stored on the local hard drive of the PC that is running the Trane system. The controls contractor estimated that data

would need to be downloaded once or even twice a week to avoid losing data. Adding an SQL server and the required software would allow for much more data to be stored and would allow for faster data download.

The Johnson Controls BAS is not capable of trending because it doesn't have a SQL server. Typically this would require the Metasys system to have the ADS or ADX package which the current system does not have. Upgrades would need to be done on the system for trending to be an option.

The points for each building in the automation system are listed in the following building summary tables.

Lighting

The majority of interior lighting on campus is 25 watt T8s. The A.C. Clark Library has a stand-alone light control system and there are some motion sensors throughout the campus, but otherwise the majority of interior lighting is controlled by manual switches.

Approximately 90% of the exterior lighting is high pressure sodium fixtures and 10% are metal halide. Most of the lighting is 100 or 250 watt. All exterior lights are controlled by a photocell.

Energy Use Index and B3 Benchmark

The site Energy Use Index (EUI) is 106 kBtu/sqft, which is 17% lower than the B3 Benchmark of 128 kBtu/sqft. The median site EUI for State of Minnesota buildings are 23% lower than their corresponding B3 Benchmarks. This indicates that Bemidji State University has the potential to further reduce its energy use.

The electricity and steam used by the buildings is sub-metered and the usage data is collected and stored electronically. The building staff is aware that the steam meters are prone to getting out of calibration and so buildings can have much higher reported energy use than is actually occurring. In monthly sub-metering reports, it was found that the steam produced by the heating plant was lower than the total amount of steam used in each building, according to the sub-metering data. Therefore, although the data is useful in providing relative usage, it is not accurate for absolute values. The chilled water use of the buildings is not sub-metered, so that portion of energy used by each building is not being tracked. Because the steam metering is inaccurate and chilled water use is not being sub-metered, the EUI for each building cannot be calculated for this site.

Metering

There are two electric meters on campus; one main meter for the campus sub-station that each building is sub-metered off of and one for the Maintenance/Receiving Building. Even the chillers in the Heating Plant are sub-metered off the main meter.

There are seven natural gas meters. The main gas meter serves the boilers in the Heating Plant. The AIRC, Education-Arts Building, Linden Hall, Maintenance/Receiving Building, Sattgast Hall, and Walnut Hall also have natural gas meters; however, they are quite small in comparison to the main gas meter and serve equipment such as the laboratory in the Ed-Arts Building, the fireplace in Linden Hall, and the kitchen in Walnut Hall.

There is one fuel oil meter that serves the boilers in the Heating Plant.

The Maintenance and Receiving Building is the only building on campus that is individually metered. As mentioned in the previous section, the steam and electricity use of the other buildings are being sub-metered.

Documentation

There is a significant amount of mechanical documentation, including building plans, equipment schedules, operations and maintenance manuals, balance reports, and control sequences, that are located in the Heating Plan. Although the plans are well organized, many of the buildings have had multiple renovations over the years and locating the most recent information for a given building can be difficult. Very little of the documentation is available in electronic form.

Building Summary Tables

The following tables are based on information gathered from interviews with facility staff, building walk-throughs, automation system screen-captures, and equipment documentation. The purpose of these tables is to provide the size and quantity of equipment and the level of control present in each building. It is complete and accurate to the best of our knowledge.

A.C. Clark Library					
State ID# E26070S1366					
Area (sqft)	71,462	Year Built	1966	EUI/Benchmark	70 / 118
HVAC Equipment					
Description	Type	Size	Notes		
AHU West	VAV AHU	32,000 cfm 30 hp SF 15 hp RF	Installed in 1996. Both SF and RF contain VFDs. Contains 39 VAV boxes.		
AHU East	VAV AHU	36,300 cfm 40 hp SF 20 hp RF	Installed in 1996. Both SF and RF contain VFDs. Contains 41 VAV boxes.		
P-5	Variable Volume CHWP	5 hp 375 gpm	Serves the AHU cooling coils, the pump contains VFD		
Steam to HW HX	Steam to Hot Water Heat Exchanger	5,500 kBtu/hr 550 gpm			
P-1 P-2	Variable Volume HWPs	7.5 hp 320 gpm	Serves radiation and VAV reheat coils. Both pumps contain a VFD		
P-3 P-4	Variable Volume HWPs	5 hp 250 gpm	Serves AHU heating coils, but these pumps are never used. Both pumps contain a VFD.		
11 UHs	Unit Heaters	18.8 to 29.8 kBtu/hr	Units are not on the automation system		
Domestic HW Heater	Electric Storage Tank	15 kW 120 gallons			
80 VAV boxes	Single duct reheat Variable Air Volume Boxes	250 to 4,680 cfm			

Points on BAS- A.C. Clark Library

Description	Points
AHU West AHU East	RARH, RAT, Econ damper position, MAT, Preheat coil, Cooling coil, DAT, DA DSP, DARH, RF status, RF VFD speed, SF status, SF VFD speed, DAT setpoint, DA DSP setpoint, DA reset temps, OAT, OARH, Econ on/off, MA reset, Room CO2, CO2 reset, Warm-up on/off, Warm-up setpoint
Cooling System	CHWRT, CHW DP, CHWST, CHWP status, CHWP speed, OAT, OARH
Heating System	HWST, HWST reset, Reheat HWRT, AHU HWRT, Reheat HW DP, AHU HW DP, Reheat HWST, AHU HWST, Pump status (4), Pump VFD speed (4), OAT
VAV Box	Max flow setpoint, Min flow setpoint, Reheat flow setpoint, Supply damper position, Reheat valve, Space temp, Space temp setpoint, Occupancy

Additional Comments

- All equipment is from 1996
- According to the building staff, hot water pumps P-3 and P-4 are never operated. These pumps circulate hot water to the air handler heating coils, but are never used because the reheats in the VAV boxes are used for heating. It was reported that the lighting in the building heats the building even during extremely cold weather.
- This building uses steam and chilled water from the Heating Plant.

American Indian Center

State ID# E26070S9302

Area (sqft)	10,388	Year Built	2002	EUI/Benchmark	138/ 102
-------------	--------	------------	------	---------------	----------

HVAC Equipment

Description	Type	Size	Notes
AHU-1	VAV AHU	18,420 cfm 25 hp SF 3 hp RF	Both SF and RF contain VFDs
20 VAV Boxes	Variable Air Volume Boxes		HW reheat
AIRC Chiller	Air Cooled Chiller	531 kBtu/hr	
P-7	Constant Volume	5 hp	
P-8	CHWPs	100 gpm	
Boiler-1	Hot Water Boilers	546 kBtu/hr out	
Boiler-2		700 kBtu/hr in	
P-1 through P-4	Constant Volume Primary HWP	0.5 hp each 48 gpm each	
P-5	Variable Volume	5 hp each	
P-6	Secondary HWP	125 gpm each	
SF-2	Constant Volume Fan	1/30 hp 300 cfm	Supply fan for the boiler room
5 EFs	Constant Volume EFs	150 to 2,850 cfm	
3 CUHs	Hot Water Cabinet Unit Heaters	24 to 81 kBtu/hr	
1 UH	Hot Water Unit Heater	95 kBtu/hr	
Domestic HW Heater	Gas Water Heater	120 kBtu/hr	

Points on BAS

Description	Points
AHU-1	RAT, RA CO2, Econ damper position, MAT, Heating valve, Cooling valve, DAT, DA DSP, MAT, MA reset, SF status, SF VFD speed, RF status, RF VFD speed, OAT, OARH, DA reset, EF status, DA DSP setpoint, DAT reset, Room temp, Min room temp, Max room temp, RA CO2 reset
VAV Boxes	Damper position, Supply air flow setpoint, Supply air flow, Reheat valve, Space temp, Space temp setpoint, Occupancy, Space temp setpoints (6), Radiator valve
EFs	EF status
CUHs	Space temp, Space temp setpoint, Heat enable, Fan enable
UH	Status
Cooling System	CHWST, CHWRT, Pump status (2), OAT, OARH, Chiller enable, Space temps
Heating Systems	HWST, HWRT, HW DP, Pump status (4), Pump VFD speed (2), Occupancy, OAT, OARH, HW reset, Boiler status

Additional Comments

- Staff stated this building has the most issues and should be looked at, including issues with the primary and secondary hot water loops. The staff would like this building to be connected to the campus steam system.
- This building is not connected to the campus steam or chilled water loops.

Bridgeman Hall and CAET
State ID# E26070S1264 / E26070S9403

Area (sqft)	59,121	Year Built	1964 / 2003	EUI/Benchmark	89/ 107
-------------	--------	------------	-------------	---------------	---------

HVAC Equipment			
Description	Type	Size	Notes
AHU-1	VAV AHU	5,300 cfm 10 hp SF 15 hp EF	Contains energy recovery wheel
AHU-2	VAV AHU	20,000 cfm 30 hp SF 25 hp EF	Contains energy recovery wheel
AHU-3	VAV AHU	3,500 cfm 7.5 hp SF 7.5 hp EF	Contains energy recovery wheel
AHU-4	VAV AHU	13,000 cfm 25 hp SF 15 hp EF	Contains energy recovery wheel
AHU-5	VAV AHU	8,000 cfm 10 hp SF 10 hp EF	Contains energy recovery wheel
AHU-6	VAV AHU	7,300 cfm 15 hp SF 7.5 hp EF	Contains energy recovery wheel
AHU-7	VAV AHU	4,900 cfm 10 hp SF 7.5 hp EF	Contains energy recovery wheel
AHU-8	VAV AHU	8,000 cfm 10 hp SF 10 hp EF	Contains energy recovery wheel
AHU-9	VAV AHU	6,000 cfm 10 hp SF	
AHU-10	VAV AHU	6,000 cfm 10 hp SF	
AHU-11	VAV AHU	5,600 cfm 10 hp SF 7.5 hp RF	Contains energy recovery wheel
AHU-12	VAV AHU	2,000 cfm 3 hp SF 3 hp RF	
AHU-13	VAV AHU	2,000 cfm 3 hp SF 3 hp RF	
24 VAV boxes	Single duct reheat	150 to 3,000 cfm	Serve CAET-1
27 VAV boxes	Single duct reheat	250 to 3,150 cfm	Serve CAET-2

HVAC Equipment Cont'd- CAET and Bridgeman

Description	Type	Size	Notes
2 HWP's		15 hp each 580 gpm each	Serve CAET-1
HX-1		5,185 kBtu/hr	Serve CAET-1
Radiation HX			Serve CAET-2
2 Radiation HWP's	Variable Volume HWP's		Serve CAET-2
5 CUHs	Unit Heaters		HW, serve CAET-1
6 CUHs	Unit Heaters		HW, serve CAET-2
8 EFs		3 hp or less each	Serve CAET-2
FTR			Serves CAET-2

Points on BAS

Description	Points
AHU-1 thru AHU-8, AHU-11	RA CO2, RAT, RAT after heat wheel, Relief air flow, Econ damper positions, OA flow, OAT after heat wheel, MAT, Heating valve, Cooling valve, DAT, DA DSP, Occupancy, RF status, RF VFD speed, SF status, SF VFD speed, DAT setpoint, DA DSP setpoint, DAT reset, OAT, OARH, Chiller status, MAT reset, Heat wheel status, Heat wheel bypass damper position, RA CO2 reset, EA flow
AHU-9 AHU-10	RAT, RA CO2, Econ damper positions, MAT, Heating valve, Cooling valve, DAT, DA DSP, SF status, SF VFD speed, DAT setpoint, RAT setpoint, DAT reset, MAT setpoint, RA CO2 reset, EF status, Occupancy, Space static, Space static setpoint
AHU-12 AHU-13	RAT, RA CO2, Econ damper position, MAT, Heating valve, DX cooling stage, DAT, DA DSP, SF status, SF VFD speed, RF status, RF VFD speed, Occupancy, OAT, OA RH, Econ setpoint, Room temp, DAT reset, DAT setpoint, RA CO2 reset
VAV Boxes	Damper position, Supply flow, Supply flow setpoint, Reheat valve, Space temp, Space temp setpoint, Occupancy, Temp setpoints (6)
Heating System	HWST, HWRT, HW DP, Pump status, Pump VFD speed, HW DP setpoint, HWST reset, Steam valve position
CUHs (CAET-1)	Room temp, Status
CUHs (CAET-2)	Room temp, Room temp setpoint, Heating valve, Status
EFs	Status
FTR	Room temp, Room temp setpoint, Heating valve, Status

Additional Comments

- This building uses steam and chilled water from the Heating Plant.

Deputy Hall
State ID# E26070S0118

Area (sqft)	78,656	Year Built	1918	EUI/Benchmark	84/ 90
-------------	--------	------------	------	---------------	--------

HVAC Equipment

Description	Type	Size	Notes
S-1	VAV AHU	7,448 cfm	Serves 1 st floor
S-2	VAV AHU	6,745 cfm	Serves 2 nd floor
S-3	VAV AHU	7,200 cfm	Serves 3 rd floor
S-4	VAV AHU	4,845 cfm 5 hp SF	Serves 1 st floor
S-5	VAV AHU	5,000 cfm	Serves 2 nd floor
S-6	VAV AHU	6,985 cfm	Serves 3 rd floor
S-7	VAV AHU	2,060 cfm 2 hp SF	Serves basement
S-8	VAV AHU	4,635 cfm 5 hp SF	Serves 1 st floor
S-9	VAV AHU	12,110 cfm 7.5 hp SF	3-stage DX cooling, serves 8 VAV boxes on 2 nd floor
S-10	VAV AHU	Unknown design conditions	Serves 2 nd floor, small unit up in the ceiling estimated to be 2 hp and 2,000 cfm constant volume unit
2 Steam to HW HXs	Steam to Hot Water Converters		
P1 and P2 (NW)	Variable Volume HW Pumps	1 hp each 90 gpm each	Associated with the northwest reheat loop.
P1 and P2 (SW)	Variable Volume HW Pumps	2 hp each	Associated with the southeast reheat loop.
P-11 and P-12	Constant Volume CHW Pumps		Associated with the southeast chilled water loop.
6 Relief Fans	Constant Volume Fans		
49 VAV Boxes	Variable Air Volume Boxes		HW reheat, 8 are DDC and the rest are pneumatic

Points on BAS- Deputy Hall

Description	Points
S-1	RAT, RA CO2, Econ damper position, MAT, Cooling valve, DAT, SF status, SF
S-2	VFD speed, VFD reset (based on RA CO2 and RAT), CO2 reset, Occupancy, DA
S-3	DSP, DA DSP setpoint, DAT setpoint, Room temp, Room temp setpoint, DAT
S-4	reset, MAT reset, OAT, OA RH
S-5	
S-6	
S-7	RAT, RA CO2, Econ damper position, MAT, Face/Bypass damper position, Heating valve, Cooling valve, DAT, SF status, SF VFD speed, RA CO2 reset, SF VFD reset, DAT setpoint, Room temp, Room temp setpoint, DAT reset, MAT reset, OAT, OARH, EF status
S-8	RAT, RARH, RA CO2, Econ damper position, MAT, DX cooling stages (2), DAT, SF status, SF VFD speed, VFD reset (based on RA CO2 and RAT), CO2 reset, Occupancy, DA DSP, DA DSP setpoint, DAT setpoint, Room temp, Room temp setpoint, DAT reset, MAT reset, OAT, OA RH
S-10	
S-9	RA CO2, Econ damper position, MAT, DX cooling stages (3), Cooling coil, DAT, SF status, SF VFD speed, CO2 reset, Occupancy, DA DSP, DA DSP setpoint, DAT setpoint, Hi room temp, Room temps (8), DAT reset, OAT, OA RH
VAV Boxes (only 8 are on the BAS)	Damper position, Supply flow, Supply flow setpoint, Reheat valve, Space temp, Space temp setpoint, Occupancy, Mode
Reheat System	Steam valve, HWST, HWST reset, Pump status (2), Pump VFD speed (2), Converter status
Cooling System	CHWRT, CHWST, CHWS GPM, CHWS valve, Pump status (2), CHWRT setpoint
Relief Fans	Fan status, OAT, OARH, OA damper, Static pressure, Static pressure setpoint

Additional Comments

- This building uses steam and chilled water from the Heating Plant.

Education-Art Building

State ID# E26070S0650

Area (sqft)	53,342	Year Built	1950	EUI/Benchmark	84/ 103
-------------	--------	------------	------	---------------	---------

HVAC Equipment

Description	Type	Size	Notes
AHU-1	VAV AHU	16,000 cfm 20 hp SF 5 hp RF	VFD on SF and RF, serves 1 st and 2 nd floor
AHU-2	VAV AHU	16,500 cfm 20 hp SF 5 hp RF	VFD on SF and RF, serves 3 rd and 4 th floor
AHU-3	VAV AHU	2,900 cfm 3 hp SF 1.5 hp RF	VFD on SF and RF, serves 2 nd floor
AHU-4	VAV Multizone AHU	8,500 cfm 7.5 hp SF 3 hp RF	VFD on SF and RF, Multizone, serves 5 zones in 1 st through 4 th floor
20 EFs			
1 Steam to HW HX	Steam to HW Converter		
HWP-1		1.5 hp	
HWP-2		3 hp	
1 CHWP		3 hp	

Points on BAS

Description	Points
AHU-1	RA CO2, RAT, RA cfm, Econ damper position, MAT, Percent heating/cooling, DA DSP, DAT, DA cfm, RF status, RF VFD speed, SF status, SF VFD speed, RA CO2 reset, Occupancy, DA DSP setpoint, Room temp, Room temp setpoint, DAT reset, OAT, OARH, MAT reset
AHU-2	
AHU-3	
AHU-4	RAT, RA CO2, Econ damper position, MAT, Heating valve, Cooling valve, Hot deck temp, Cold deck temp, Zone damper positions (5), RF status, RF VFD speed, SF status, SF VFD speed, SF VFD reset, Hot deck temp setpoint, Cold deck temp setpoint, Hot deck reset, OAT, OARH, MAT reset, RA CO2 reset, Occupancy
EFs	Fan status
Reheat System	Steam valve, HWST, HWST reset, System status, Pump status (2)
Cooling System	CHWP status, Chiller status

Additional Comments

- This building uses steam and chilled water from the Heating Plant.

Gillett Recreation-Fitness Center

State ID# E26070S2189

Area (sqft)	85,765	Year Built	1989	EUI/Benchmark	89/ 107
-------------	--------	------------	------	---------------	---------

HVAC Equipment

Description	Type	Size	Notes
AHU-1	Constant Volume AHU	20,000 cfm 10 hp SF 7.5 hp RF	Both SF and RF contain VFDs, but operate at a constant speed. Serves NE Fitness Center.
AHU-2	Constant Volume AHU	20,000 cfm 10 hp SF 7.5 hp RF	Both SF and RF contain VFDs, but operate at a constant speed. Serves SE Fitness Center.
AHU-3	Constant Volume AHU	20,000 cfm 10 hp SF 7.5 hp RF	Both SF and RF contain VFDs, but operate at a constant speed. Serves NW Fitness Center.
AHU-4	Constant Volume AHU	20,000 cfm 10 hp SF 7.5 hp RF	Both SF and RF contain VFDs, but operate at a constant speed. Serves SW Fitness Center.
AHU-5	AHU	9,650 cfm 5 hp SF 5 hp RF	VFD operates at constant speed, serves Weight Room.
AHU-6	Constant Volume AHU	15,670 cfm 15 hp SF 5 hp RF	Both SF and RF contain VFDs. Serves courts and lobby.
AHU-7	Constant Volume AHU	4,310 cfm 3 hp SF 1.5 hp RF	Both SF and RF contain VFDs. Serves Dance Studio.
AHU-8	Constant Volume AHU	5,000 cfm 5 hp SF 1 hp RF	Both SF and RF contain VFDs. Serves front desk.
AHU-9	AHU	Unknown cfm 5 hp SF	VFD operated at constant speed. A heat pump transfers heat from exhaust air to outside air. Serves Phy Ed Locker Room.
SF-1 thru SF-10	Constant Volume AHU	18,500 cfm 10 hp each	Serve the Gym
PRV-1 thru PRV-4		60 to 2,000 cfm each	
1 Steam to HW HX	Steam to HW Converter		
Pump-1 Pump-2	Variable Volume HW Pumps	5 hp 120 gpm each	Have VFDs, serve reheat
42 VAV boxes		75 to 3,000 cfm each	Associated with AHU-6 through AHU-8
11 CUHs		12.4 to 96 kBtu/hr each	
5 UHs		9 to 63.1 kBtu/hr each	
3 EFs		500 to 1560 cfm each	

Points on BAS- Gillett Recreation-Fitness Center

Description	Points
AHU-1 AHU-2 AHU-3 AHU-4 AHU-5	RARH, RAT, Econ damper position, MAT, Heating valve, DAT, SF status, RF status, RF VFD Hz, SF VFD Hz, MAT setpoint, DAT setpoint, Room temp, Room temp setpoint, Winter/summer mode, Occupancy
AHU-6	RARH, RAT, Econ damper position, MAT, Heating valve, DAT, DA DSP, SF status, SF VFD speed, RF status, RF VFD speed, MAT setpoint, DAT setpoint, DA DSP setpoint, Room temp, Room temp setpoint, Occupancy
AHU-7 AHU-8	RARH, RAT, Econ damper position, MAT, DX cooling stage (2), Heating valve, DAT, DA DSP, SF status, SF VFD speed, RF status, RF VFD speed, MAT setpoint, DAT setpoint, DA DSP setpoint, Room temp, Room temp setpoint, Occupancy
AHU-9	OAT after heat pump coil, Heating valve (2), DAT, RF status, SF status, Heat pump loop temp, Heat pump valve, DAT setpoint, Room temp, Occupancy
SF-1	Econ damper position, MAT, MAT setpoint, DAT, SF status
SF-2 thru SF-10	Econ damper position, MAT, MAT setpoint, OAT, SF status
PRVs	Status
EFs	Status
Reheat System	Steam valve, HWST, HWRT, HWST setpoint, Pump status (2)

Additional Comments

- It was reported that AHU-1 through AHU-4 are alternated on run time and only 2 run at a time.
- All the VFDs for AHU-1 through AHU-4 are running at 54 Hz for the supply fans and 47 Hz for the return fans.
- This building uses steam and chilled water from the Heating Plant.

Hagg-Sauer
State ID# E26070S1570

Area (sqft)	82,478	Year Built	1970	EUI/Benchmark	187/ 100
-------------	--------	------------	------	---------------	----------

HVAC Equipment

Description	Type	Size	Notes
S-1	VAV AHU	15 hp SF	Primarily serves 3 rd floor.
S-2	VAV AHU	20 hp SF	Serves 1 st and 2 nd floors.
S-3	VAV AHU	5 hp SF	Serves Room 100 on 1 st floor.
1 Steam to HW HX			For reheat
P-1	Variable Volume	2 hp	Serve reheat
P-2	HW Pumps		
3 EFs			

Points on BAS

Description	Points
S-1	RAT, RA CO2, RARH, RARH setpoint, Econ damper position, MAT, Face/Bypass damper position, Heating valve, Cooling valve, DAT, SF status, SF VFD speed, RAT setpoint, DAT setpoint, Room temp, DAT reset, MAT reset, SF VFD reset, RA CO2 reset, Occupancy, OAT, OARH
S-2	
S-3	
Reheat System	Steam valve, HWST, System status, HWST reset, Pump status (2)
EFs	Status

Additional Comments

- This building had a chiller and two chilled water pumps that are no longer in use.
- This building uses steam and chilled water from the Heating Plant.

Heating Plant
State ID# E26070S0325

Area (sqft)	20,317	Year Built	1925	EUI/Benchmark	72/ 69
-------------	--------	------------	------	---------------	--------

HVAC Equipment

Description	Type	Size	Notes
Heat Plant AHU-1		3,200 cfm	
SF-1 and SF-2	Constant Volume	Unknown capacities	Serve the EMS office
Chiller-1	Water cooled	500 tons	
Chiller-2	Water cooled	570 tons	
Cooling Tower			VFDs on fans
P-1	Variable Volume Secondary CHW Pump	75 hp	VFD, serve Secondary Loop
P-2 P-6	Constant Volume Primary CHW Pumps	15 hp each	Serve Primary Loop
P-3	Variable Volume CDW Pump	1,250 gpm 15 hp	VFD
P-7	Variable Volume CDW Pump	1,340 gpm 15 hp	VFD
P-8 P-9	Constant Volume CDW Pumps	1,820 gpm each 15 hp each	
Boiler-2	High Pressure Steam Boiler	53,600 kBtu/hr	Provides 80-100 psi steam to campus steam system. Installed in 2009 to replace two smaller boilers. Highest efficiency boiler. Operates fall – spring.
Boiler-3 Boiler-4	High Pressure Steam Boilers	29,900 kBtu/hr each	Provide 80-100 psi steam to campus steam system. Installed in 1991. Operate fall – spring.
Boiler-5	Low Pressure Steam Boiler	10,500 kBtu/hr	“Summer Boiler”, provides 11-12 psi steam for showers, pool, and Bangsberg heating.
3 HW feedwater pumps		30 hp	

Points on BAS

Description	Points
CHW System	Chiller CHWST (2), Chiller CHWRT (2), Secondary loop CHWST, Secondary loop CHWRT, Primary CHW pump status, Secondary CHW pump status (2), CDW pump status (4), CDW pump VFD speed (2), CHWST setpoint, Chiller CDWST (2), Chiller CDWRT (2), Tower CDWST, Tower CDWRT, Cond./Main header valve, Cond/Main header pressure, Cond/Main header pressure setpoint, CDW flow rate (2), Refrigerant temp (2), Refrigerant pressure (2), Evaporator water flow rate (2), Chiller status (2), Tower fan speed (2)

- *There are no points on the BAS for the boilers and associated pumps.*

Additional Comments- Heating Plant

- This building houses the central steam and chilled water plants for the campus.
- Almost all buildings on campus use steam from the Heating Plant.
- One or two boilers are operated at a time. Boiler 2 alone can handle the heating load of the campus during extremely cold weather.
- The entire heating plant is shut down for annual maintenance in the spring. The shut down starts around Memorial Day and lasts for two to three weeks. Electric water heaters are operated during this time.
- It was reported that 4,000 gallons per day of make-up water is used each day in the heating plant.
- One chiller runs at a time during the summer. The staff cannot operate both chillers at the same time based on the limited capacity of the cooling tower.

Hobson Memorial Student Union

State ID# E26070S8067

Area (sqft)	76,756	Year Built	1967	EUI/Benchmark	111/ 108
-------------	--------	------------	------	---------------	----------

HVAC Equipment

Description	Type	Size	Notes
Upper AHU-1	VAV AHU	43,000 cfm 25 hp SF 10 hp RF	VFDs, this AHU is original to the building.
Lower AHU-1	VAV AHU	13,750 cfm 10 hp SF 3 RF hp	VFDs, this AHU is original to the building.
Lower AHU-2	VAV AHU	15,500 cfm 10 hp SF 5 RF hp	VFDs, this AHU is original to the building.
Lower AHU-3	100 % OA, VAV AHU	6,300 cfm 5 hp SF	VFDs, this AHU is original to the building. There is 1 EF associated with this unit
Lower AHU-4	100 % OA, VAV AHU	8,540 cfm 15 hp SF	VFD, this unit was upgraded in 1999. There are 3 EFs associated with this unit.
Hobson Chiller	Air-cooled Chiller	Unknown	No longer used. This building gets chilled water from the Heating Plant.
Upper CHWP	Constant Volume CHW Pumps	7.5 hp 300 gpm	
Lower CHWP	Constant Volume CHW Pumps	5 hp	
2 Upper Steam to HW HXs	Steam to HW Converters		One for reheat and one for radiation.
Upper P-1 Upper P-2 (radiation)	Variable Volume HW Pumps	2 hp 120 gpm each	VFDs, Serve Upper Hobson radiation
Upper P-1 Upper P-2 (reheat)	Variable Volume HW Pumps	2 hp 130 gpm each	VFDs, Serve Upper Hobson reheats
1 Lower Steam to HW HX	Steam to HW Converter		Reheat
Lower P-1 Lower P-2	Variable Volume HW Pumps	2 hp	VFDs, Serve Lower Hobson reheats
10 EFs	Constant volume	500 to 6,300 cfm	
3 Unit Heaters	Two are steam on is hot water	22 to 96 kBtu/hr	
2 CUH	Hot water	35 kBtu/hr	

Points on BAS- Hobson Memorial Student Union

Description	Points
Upper AHU-1	RAT, RA CO2, Econ damper position, MAT, Cooling valve, DAT, RF status, RF VFD speed, SF status, SF VFD speed, RA CO2 reset, Occupancy, DAT reset, MAT setpoint, OAT, OARH, Economizer status, Cooling/Heating mode
Lower AHU-1 AHU-2	RAT, RAT setpoint, RA CO2, Econ damper position, Face/Bypass damper position, MAT, Heating valve, Cooling valve, DAT, SF status, SF VFD speed, RF status, RF VFD speed, RA CO2 reset, DAT reset, Room temp, MAT reset, Occupancy
Lower AHU-3 AHU-4	OA damper, MAT, Face/Bypass damper position, Steam valve, Cooling valve, DAT, SF status, SF VFD speed, DAT reset, Occupancy, EF status
Upper Heating Systems	Steam valve, HWST, HWRT, HWST reset, Pump status (4), Status, OAT enable
Lower Heating Systems	Steam valve, HWST, HWRT, HWST reset, Pump status (2), Status, OAT enable
Cooling System	CHWST, CHWRT, CHW DP, Chiller status, Chiller kW, Pump status, OAT, CHW DP setpoint

Additional Comments

- This building is divided into Hobson Upper and Hobson Lower.
- Plans state the building contains a chiller, it was decommissioned at some point and the building is now part of the central loop.
- It is believed that all equipment in this building is original except for AHU-4.
- This building uses steam and chilled water from the Heating Plant.

Memorial Hall
State ID# E26070S0540

Area (sqft)	53,893	Year Built	1940	EUI/Benchmark	155/ 137
-------------	--------	------------	------	---------------	----------

HVAC Equipment

Description	Type	Size	Notes
AHU-1	VAV AHU	10,150 cfm (estimated) 10 hp SF 3 hp RF	Serves 7 VAV boxes. Unit was installed in 2001
Print Shop DX Unit	DX Unit		Provides cooling to print shop.
7 VAV Boxes	Variable Air Volume Boxes	850 to 3,000 cfm each	No reheats, installed in 2001
1 Steam to HW HX	Steam to HW Converter		
2 HWP's	Constant Volume HW Pumps	1/8 hp each	Not on the automation system

Points on BAS

Description	Points
AHU-1	RAT, RA CO2, Econ damper position, MAT, Heating valve, Cooling valve, DAT, DA DSP, SF status, SF VFD speed, RF status, RF VFD speed, DA DSP setpoint, DAT reset, RA CO2 reset, Occupancy
VAV Boxes	Room temp, Room temp setpoint, Damper position, cfm setpoint, cfm, Max cfm, Min cfm
Print Shop DX Unit	DX cooling, Room temp, Room temp reset, Humidity reset, OAT, OARH
Heating System	<i>This equipment is not on the BAS.</i>

Additional Comments

- Staff stated that this building is scheduled for a remodel at some point in the future.
- This building uses steam and chilled water from the Heating Plant.

Phy Ed-Glas Field House

State ID# E26070S0959

Area (sqft)	121,586	Year Built	1959	EUI/Benchmark	89/ 107
-------------	---------	------------	------	---------------	---------

HVAC Equipment			
Description	Type	Size	Notes
S-1 (Glas FH)	VAV AHU	Unknown Design Specifications	VFD, serves the Hockey Rink
S-2 (Glas FH)	VAV AHU	Unknown cfm 5 hp SF	VFD
Steam to HW HX (Glas FH)	Steam to HW Converter		For Glas Field House Reheat
P-1 P-2	Constant Volume HW Pumps		Serves Glas Field House Reheat
3 Chillers	Water cooled	60 ton	No longer in use.
2 Primary Brine Pumps		275 gpm	No longer in use.
2 Secondary Brine Pumps		290 gpm	No longer in use.
1 Cooling Tower		400 gpm	No longer in use.
2 Cooling tower pumps		425 gpm	No longer in use.
S-1 (Phy Ed)	VAV AHU	10 hp SF	VFD, serves Gym.
S-2 (Phy Ed)	VAV AHU	10 hp SF	VFD, serves Gym.
S-3 (Phy Ed)	VAV AHU	10 hp SF 7.5 hp RF	VFD, serves Pool.
S-4 (Phy Ed)	VAV AHU	10 hp SF	VFD, serves Locker Rooms.
Steam to HW HX (Phy Ed)	Steam to HW Converter		For Phy Ed Radiation
P-1 P-2	Variable Volume HW Pumps		Serves Phy Ed Radiation
Pool Steam to HW HX	Steam to HW Converter		For Pool
Pool P-1	Pool Pump		Serves Pool heating system

Points on BAS- Phy Ed Glas Field House

Description	Points
S-1 (Glas FH)	RAT, RA CO2, Econ damper position, MAT, Face/Bypass damper position, Steam valve (2), DAT, SF status, SF VFD speed, SF VFD reset, RA CO2 reset, Room static pressure setpoint, Room static pressure, Relief damper position, DAT reset, MAT reset, OAT, OARH, Econ mode, Occupancy
S-2 (Glas FH)	RAT, RA CO2, Econ damper position, MAT, Zone damper positions (3), SF status, SF VFD speed, Zone heating valve (3), Zone temp (3), Zone temp setpoints (3)
Reheat System (Glas FH)	Steam valve, HWST, HWST reset, Pump status (2), System status
Ice Arena Refrig System	<i>Points for the refrigeration system are on the BAS, but are not listed here because the equipment is no longer operated.</i>
S-1 thru S-3 (Phy Ed)	RAT, RA CO2, Econ damper position, MAT, Face/Bypass damper position, Heating valve, DAT, SF status, SF VFD speed, RF status, RF VFD speed, SF VFD reset, RA CO2 reset, Room temp, Room temp setpoint, DAT reset, MAT reset, OAT, OARH, Occupancy
S-4 (Phy Ed)	RAT, RA CO2, Econ damper position, MAT, Zone damper position (4), SF status, SF VFD speed, RF status, RF VFD speed, SF VFD reset, RA CO2 reset, MAT reset, Zone heating valve (4), Zone temp (4), Zone temp setpoint (4), Occupancy, OAT, OARH
Radiation System	Steam valve, HWST, HWST reset, Pump status, System status
Pool Heating System	Steam valve, HWST, HWRT, 3-way valve position (Converter vs Recirc water), HWST reset, Pool room temp

Additional Comments

- The refrigeration system for the ice sheets is no longer being used. Hockey activities are now being held off campus.
- This building uses steam from the Heating Plant.

Sattgast Hall of Science

State ID# E26070S1162

Area (sqft)	107,598	Year Built	1962	EUI/Benchmark	89/ 217
-------------	---------	------------	------	---------------	---------

HVAC Equipment

Description	Type	Size	Notes
S-1	VAV AHU	7.5 hp SF	VFD, serves make-up air plenum for lab hoods
S-2	VAV AHU	15 hp SF 5 hp RF	VFD
S-3	Constant Volume AHU	7.5 hp SF	
S-4	VAV AHU		VFD
S-5	VAV AHU		VFD, serves make-up air plenum for lab hoods
S-6	VAV AHU	15 hp SF	VFD
S-7	VAV AHU	15 hp SF 5 hp RF	VFD
AHU-1	VAV AHU	28,650 cfm 50 hp SF 50 hp RF	VFDs, has an energy recovery wheel, on Metasys system
32 VAV Boxes	Variable Air Volume Boxes	200 – 2,800 cfm each	Some have HW reheats
HX-1 HX-2 HX-3	Steam to HW Converters		For air handler heating coils, radiation, and reheats
HWP-1 HWP-2	Constant Volume HW Pumps		Circulate HW to radiation and reheats.
HWP-3 HWP-4	Variable Volume HW Pumps	7.5 hp 195 gpm	These pumps are associated with HX-2 on the Johnson Metasys system each contain a VFD
HWP-5 HWP-6	Constant Volume HW Pumps		Circulate HW to AHUs 1 and 5
1 Steam to Glycol HX	Steam to Glycol Converter		Takes HW from HX-2 to heat Glycol for AHU-1
GHWP-1 GHWP-2	Constant Volume Glycol-HW Pumps	3 hp 145 GPM each	
~ 50 EFs/ Fume Hoods	Exhaust Fans	<2 hp each	

Points on BAS- Sattgast Hall of Science

Description	Points
S-1 S-5	Face/Bypass damper position, Heating valve, Cooling valve, CHWST, CHWRT, DAT, DA DSP, DAT reset, SF status, SF VFD speed
S-2 S-4 S-6 S-7	RA cfm, RA DSP, RAT, RAT setpoint, RARH, RARH setpoint, Econ damper position, MAT, MAT setpoint, Cooling valve, CHWST, CHWST setpoint, Heating valve, DAT, DAT setpoint, DA DSP, DA cfm, RF status, RF VFD speed, SF status, SF VFD speed, DAT reset
S-3	RAT, RAT setpoint, Econ damper position, MAT, MAT setpoint, Heating valve, Cooling valve, CHWST, CHWRT, Hot deck temp, Hot deck temp setpoint, Cold deck temp, Cold deck temp setpoint, Hot deck temp reset, Cold deck temp reset, SF status, OAT
AHU-1	RAT, RA CFM, RF status, RF VFD speed, EA pressure, EA pressure setpoint, EAT, EA heat recovery temp, EA CFM, EF status, EF VFD speed, Heat recovery DP setpoint, Plate exchanger DP, OA CFM, Heat recovery bypass damper, Plate exchanger supply temp, MAT, Reheat output, Cooling output, SF status, SF VFD speed, Supply air CFM, DAT, DAT setpoint, DA DSP, DA DSP setpoint, Occupancy, OAT
VAV Boxes	Flow setpoint, Flow, Damper position, Heating output, Zone temperature, Zone temp setpoint, Effective cooling setpoint, Effective heating setpoint, Radiant ceiling panel valve
Fume Hoods	Hood CFM, Damper position, Face velocity, Face velocity setpoint, Low face velocity setpoint
Hot Water System (HX-1 & HX-3)	Steam valve, OAT, HWST, HWST setpoint, Pump status
HX-2	Steam valves, Calc HWST setpoint, HWST, HWP status, HWP VFD speed, HW DP setpoint, HW DP, HWRT, HWS reset temps, OAT
Glycol Heating System	HWST, HWRT, GHWST, GHWRT, GHWP status, OA heating lockout, OAT
EF	Status

Additional Comments

- The AHUs contain pneumatic dampers, heat valves, and cooling valves
- This building uses steam and chilled water from the Heating Plant.

Walnut Hall
State ID# E26070S5669

Area (sqft)	57,167	Year Built	1969	EUI/Benchmark	198/ 106
-------------	--------	------------	------	---------------	----------

HVAC Equipment			
Description	Type	Size	Notes
HV-1	Constant Volume AHU	15,000 cfm 5 hp SF	100% OA, original from 1966
HV-2	Constant Volume AHU	15,000 cfm 5 hp SF	100% OA, original from 1966
AC-1	Constant Volume AHU	8,440 cfm 5 hp	
AC-2	Constant Volume AHU	4,920 cfm 5 hp SF	Original from 1966
AC-3	Constant Volume AHU	7,220 cfm 5 hp SF	Original from 1966
AC-4	Constant Volume AHU	14,920 cfm 15 hp SF	Original from 1966
21 EFs	Constant Volume Exhaust Fans	240 to 4,200 cfm	21 exhaust fans were installed with the original building in 1966 and 11 more were installed in an upgrade in 1990. It is not sure if any of the fans are new in 1990 or replaced old fans. 21 exhaust fans is an estimate.
6 UHs	Hot Water Unit Heaters	19.1 to 35.5 kBtu/hr	Installed in 1990
1 Steam to HW HX	Steam to HW Converter		
CP-1 (2 pumps)	Constant Volume HW Pumps	1 hp 31 gpm each	Serves heating zone #1. Both pumps are named CP-1
CP-2 (2 pumps)	Constant Volume HW Pumps	0.5 hp 38 gpm each	Serves heating zone #2. Both pumps are named CP-2
CP-3 (2 pumps)	Constant Volume CHW Pumps	2 hp each	Both pumps are named CP-3
CP-4 (2 pumps)	Constant Volume CDW Pumps	5 hp each	Both pumps are named CP-4

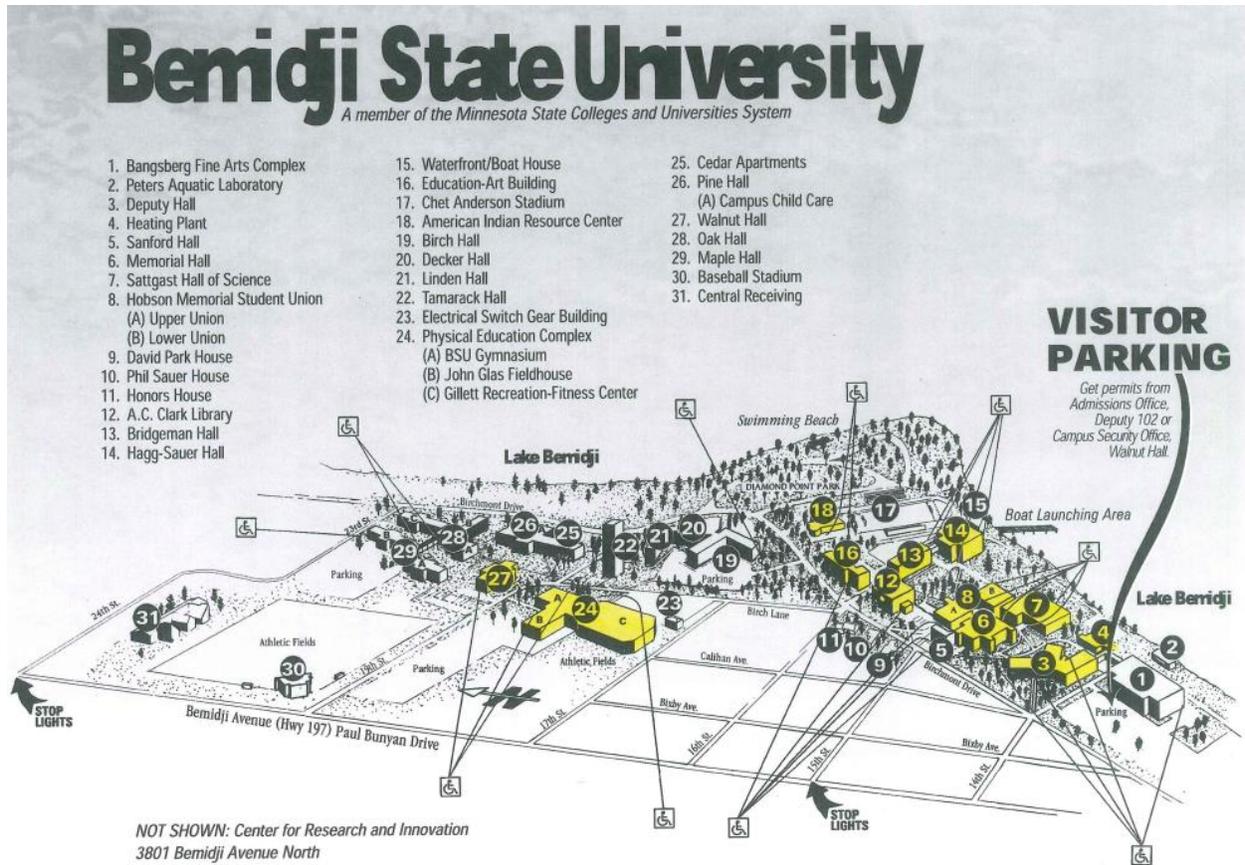
Points on BAS

- *System is not automated; therefore, none of the equipment is on the automation system.*

Additional Comments

- There is a commercial kitchen with four walk-in coolers and three walk-in freezers.
- Plans state the building contains a chiller, it was decommissioned at some point and the building is now part of the central loop.
- There is also various kitchen equipment, such as a dishwasher, facets, and drains. This equipment list can be found in WorkZone.
- The AHUs in this building have steam heating coils.
- This building uses steam and chilled water from the Heating Plant.

Campus Map



NOTE: Buildings highlighted yellow are recommended for Investigation.

PBEEEP Abbreviation Descriptions			
AHU	Air Handling Unit	hp	Horsepower
BAS	Building Automation System	HRU	Heat Recovery Unit
CD	Cold Deck	HW	Hot Water
CDW	Condenser Water	HWDP	Hot Water Differential Pressure
CDWRT	Condenser Water Return Temperature	HWP	Hot Water Pump
CDWST	Condenser Water Supply Temperature	HWRT	Hot Water Return Temperature
cfm	Cubic Feet per Minute	HWST	Hot Water Supply Temperature
CHW	Chilled Water	HX	Heat Exchanger
CHWRT	Chilled Water Return Temperature	kW	Kilowatt
CHWDP	Chilled Water Differential Pressure	kWh	Kilowatt-hour
CHWP	Chilled Water Pump	MA	Mixed Air
CHWST	Chilled Water Supply Temperature	MA Enth	Mixed Air Enthalpy
CRAC	Computer Room Air Conditioner	MARH	Mixed Air Relative Humidity
CV	Constant Volume	MAT	Mixed Air Temperature
DA	Discharge Air	MAU	Make-up Air Unit
DA Enth	Discharge Air Enthalpy	OA	Outside Air
DARH	Discharge Air Relative Humidity	OA Enth	Outside Air Enthalpy
DAT	Discharge Air Temperature	OARH	Outside Air Relative Humidity
DDC	Direct Digital Control	OAT	Outside Air Temperature
DP	Differential Pressure	Occ	Occupied
DSP	Duct Static Pressure	PTAC	Packaged Terminal Air Conditioner
DX	Direct Expansion	RA	Return Air
EA	Exhaust Air	RA Enth	Return Air Enthalpy
EAT	Exhaust Air Temperature	RARH	Return Air Relative Humidity
Econ	Economizer	RAT	Return Air Temperature
EF	Exhaust Fan	RF	Return Fan
Enth	Enthalpy	RH	Relative Humidity
ERU	Energy Recovery Unit	RTU	Rooftop Unit
FCU	Fan Coil Unit	SF	Supply Fan
FPVAV	Fan Powered VAV	Unocc	Unoccupied
FTR	Fin Tube Radiation	VAV	Variable Air Volume
GPM	Gallons per Minute	VFD	Variable Frequency Drive
HD	Hot Deck	VIGV	Variable Inlet Guide Vanes

Conversions
1 kWh = 3.412 kBtu
1 Therm = 100 kBtu
1 kBtu/hr = 1 MBH