

PBEEEP

State Government

Public Buildings Enhanced Energy Efficiency Program

SCREENING RESULTS FOR RIDEWATER COLLEGE WILLMAR



RIDGEWATER
COLLEGE

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DATE

July 21, 2011

Summary Table

Ridgewater Community College Willmar	
Location	2101 15 th Ave NW, PO Box 1097 Willmar MN 56201
Facility Manager	Kip Oveson
Number of Buildings	32
Interior Square Footage	497,164
PBEEEP Provider	Center for Energy and Environment (Neal Ray)
Date Visited	February 10, 2011
Annual Energy Cost (from B3)	\$415,095 (2010)
Utility Company	Willmar Municipal Utilities-Electric CenterPoint Energy-Gas
Site Energy Use Index (from B3)	71 kBtu/sq ft(2010)
Benchmark EUI (from B3)	191 kBtu/sq ft

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 Ridgewater Community College was performed by the Center for Energy and Environment (CEE) with the assistance of the facility staff. A walk-through was conducted on February 10, 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.

Ridgewater Community College Willmar consists of a total of 497,164 square foot (sqft). The campus is primarily two different detached buildings consisting of the Transfer building and Technical Building. These buildings are further sub divided into different sections from various construction projects over the history of the campus which equate to a total of 32 different building names. They are all centrally located in one area.

Recommendation for Investigation

An investigation of the energy usage and energy savings opportunities of Ridgewater Community College Willmar is not recommended because of the current low energy use of the facility and good energy management practices.

Building Name	State ID	Square Footage	Year Built
Addition Campus Center Link - H	E26145C0788	4,989	1988
Administration Bldg (Helland Hall) - H	E26145C0169	5,964	1969
Campus Center	E26145C0574	13,292	1974
CES Bldg	E26272T1077	2,250	1977
Chiller Bldg	E26145C1191	2,128	1991
Cosmetology	E26272T0450	8,250	1950
Dog Kennel	E26272T1893	1,500	1993
Electrician	E26272T1692	1,950	1990
EMS/Electrician	E26272T0250	8,000	1950
Fine Arts Bldg - FA	E26145C0471	64,791	1971
Fine Arts Bldg 2nd Expansion - FA	E26145C1091	11,291	1991
Fine Arts Bldg Expansion - FA	E26145C0888	5,319	1988
Hazardous Storage	E26272T1900	600	2000
Library - L	E26145C0269	31,601	1969
Management Center	E26272T0350	1,600	1950
Phase I - B	E26272T0568	42,744	1968
Phase II - C	E26272T0670	48,315	1970
Phase III - A & B	E26272T0771	62,299	1971
Phase IV - C & D	E26272T0872	37,079	1972
Phase IX - C	E26272T1792	9,525	1992
Phase V - A	E26272T0973	13,950	1973
Phase VI - B	E26272T1178	23,444	1978
Phase VII - C	E26272T1484	19,137	1984
Phase VIII - C	E26272T1585	12,000	1985
Science	E26145C0369	27,509	1969
Science Addition - S	E26145C1291	4,365	1991
Science/Library/Fine Arts Link - L	E26145C0991	13,088	1988
Storage 154	E26272T1283	4,500	1983
Storage 155	E26272T1383	4,500	1983
Storage Bldg	E26145C0678	1,344	1978
Walkways (2)	E26272T2005	2,800	1980
Water Supply Storage - Well House	E26272T0150	840	1950

Building Overview Section

Mechanical Equipment

Overall in the entire complex there are a total of nine boilers. Seven of the boilers were recently installed and supply hot water for the technical building. There are also two boilers which serve the transfer building. These 9 boilers have a total of 35 hot water pumps associated with them.

There are also a total of 2 air cooled chillers at the campus one serving the technical building and the other serving the transfer building. These two chillers have a total of 5 chilled water pumps associated with them.

Overall the complex has a total of 47 AHUs. These AHUs have a wide range of age, some are still original units and others are newly renovated. Some of the AHUs contain VFDs and others are constant volume.

The following table lists the key mechanical equipment at the facility.

Mechanical Equipment Summary Table	
Quantity	Equipment Description
1	Schneider Electric-IA automation system
32	Buildings
497,164	Interior Square Feet
47	Air Handlers
30	VAV Boxes
3	ERUs
7	Hot Water Boilers
2	Steam Boilers
35	Hot Water Pumps
2	Steam to hot water heat exchangers
2	Air cooled chillers
2	Primary chilled water pumps
3	Secondary chilled water pumps

Controls and Trending

The main campus building runs on a Schneider Electric-IA automation system. The system is capable of trending and archiving trend information. A log in to Workplace Pro would be required by a provider to further set up trends. This log in can be granted by working with Ridgewater Staff and the control contractor for the site, there is no additional cost to the provider to gain this log in. Currently all major mechanical equipment located within the main campus structure is automated.

Lighting

Indoor lighting- Interior lighting consists of T8 32 watts lamps. There are few areas which still have T12 lights, but these areas rarely have the lights on and the savings associated from replacing them would not be significant. Most of the lights are controlled by light switches.\

Energy Use Index B3 Benchmark

The site Energy Use Index (EUI) for the building is 72 kBtu/sqft, which is 62%% lower than the B3 Benchmark of 191 kBtu/sqft. The site EUIs for State of Minnesota buildings are 23% lower than their corresponding B3 Benchmarks on average. This shows the Ridgewater College Willmar may not be a good candidate for an energy investigation.

Metering

The building contains two electrical meters, one hot water meter for district hot water, one chilled water meter for district chilled water, and one natural gas meter.

Documentation

There is limited documentation at this complex. For new equipment which was installed there are as built plans and balance reports for certain projects.

Reasons for Not Recommending

This screening report is based on the PBEEEP Guidelines. It is based on one site visit, review of the facility documentation, building automation system, a limited inspection of the facility and interviews with the staff. The purpose of the screening report is to evaluate the potential of the facility for the implementation of cost-effective energy efficiency savings through recommissioning. To the best of our knowledge the information here is accurate. It provides a high level view of many of the important parameters of the mechanical equipment in the facility. Because it is the result of a limited audit survey of the facility, it may not be completely accurate or inclusive.

The main reason this complex was not recommended for an energy investigation is the low energy use at the complex. The staff has done an excellent job implementing energy savings strategies. It is believed not very many energy saving opportunities will be found and the cost of an investigation would not be cost effective.

Building Summary Table

The following tables are based on information gathered from interviews with facility staff, a building walk-through, automation system screen-captures, and equipment documentation. The purpose of the 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.

Ridgewater Community College Willmar

Area (sqft)	497,164	Year Built	1950-2000	EUI/B3 Benchmark	71/191
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HVAC Equipment

Air Handlers (Total)

Description	Type	Size	Notes
AHU-A1A	Constant volume	5 HP SF	Part of the Technical Building
AHU-A1B	Constant volume	5 HP SF	Part of the Technical Building
AHU-A02	Constant volume	20 HP SF	Part of the Technical Building
AHU-A03	Variable air volume with VFD and 13 VAV boxes with reheat coils	7.5 HP SF	Part of the Technical Building
AHU-A04	Constant volume	8,100 CFM 10 HP SF 5 HP RF	Part of the Technical Building
AHU-A05	Variable air volume with inlet guide vanes and 5 VAV boxes with reheat coils.	10,000 10 HP SF 5 RF HP	Part of the Technical Building
AHU-B01	Variable air volume with VFD on SF and 10 VAVs with Reheats	9,000 CFM 3 HP SF	Part of the Technical Building
AHU-B03	Constant volume	3 HP SF	Part of the Technical Building
AHU-B04	Constant volume	5 HP SF	Part of the Technical Building
AHU-B05	Constant volume	5 HP SF	Part of the Technical Building
AHU-B06	Constant volume.	10 HP SF	Part of the Technical Building
AHU-B07	Constant volume	3 HP SF	Part of the Technical Building
AHU-B08	Constant volume		Part of the Technical Building
Business RTU	Constant volume and gas fired unit		Part of the Technical Building
AHU-C01	Variable air volume SF contains a VFD and 8 VAVs with reheats	4,430 CFM 5 HP SF	Unit has an ERU associated with it. Part of the Technical Building
AHU-N01	Constant volume	5,000 CFM 3 HP SF	Part of the Technical Building
AHU-N02	Constant volume	3,800 CFM 3 HP SF	Part of the Technical Building
AHU-N03	Constant volume	3,800 CFM 3 HPSF	Part of the Technical Building
AHU-N04	Constant volume	3 HP SF	Part of the Technical Building
AHU-N05	Constant volume	3 HP SF	Part of the Technical Building
AHU-N06	Constant volume	1 HP SF	Part of the Technical Building
AHU-N07	Constant volume	1 HP SF	Part of the Technical Building
AHU-D01	Variable air volume with SF and RF which	9,500 CFM 7.5 HP SF	Part of the Technical Building

HVAC Equipment Cont'd

Air Handlers (Cont)

Description	Type	Size	Notes
AHU-D02	Variable air volume with a VFD on the SF and 8 VAVS with reheats.	4,465 CFM 3 HP SF	There is an ERU associated with this unit. Part of the Technical Building.
AHU-D03	Variable air volume with a VFD on the SF	2,745 CFM 3 HP SF	There is an ERU associated with this unit. Part of the Technical Building.
AHU-F01	Variable air volume with VFD on SF	10 HP SF	Part of the Transfer Building
AHU-F02	Variable air volume with VFD on SF	5 HP SF	Part of the Transfer Building
AHU-F03	Variable air volume with VFD on SF	15 HP SF	Part of the Transfer Building
AHU-F04	Constant volume	1 HP SF	Part of the Transfer Building. Only recirculates air no outside air on this unit
AHU-F05	Constant volume	1 HP SF	Part of the Transfer Building
AHU-F06	Constant volume	1 HP SF	Part of the Transfer Building
AHU-F07	Constant volume	1.5 HP SF	Part of the Transfer Building
AHU-F08	Variable air volume with VFD on SF	10 HP SF	Part of the Transfer Building
AHU-F09	Constant volume	7.5 HP SF	Part of the Transfer Building
AHU-F10	Constant volume		Part of the Transfer Building
AHU-H01	Variable air volume with VFD on SF	3 HP SF	Part of the Transfer Building
AHU-H02	Multi-zone constant volume unit	3 HP SF	Part of the Transfer Building
AHU-H03	Variable air volume with VFD on SF	3 HP SF	Part of the Transfer Building
AHU-H04	Constant volume	3 HP SF	Part of the Transfer Building
AHU-L01	Variable air volume with VFD on SF	15 HP SF	Part of the Transfer Building
AHU-L02	Variable air volume with VFD s of the SF and RF	15 HP SF	Part of the Transfer Building
AHU-L03	Variable air volume with VFDs on both SF and the RF	15 HP SF	Part of the Transfer Building
AHU-S01	Constant volume with an energy recovery wheel	2,650 CFM 2 HP SF 2 HP EF	Part of the Transfer Building
AHU-S02	Variable air volume with VFDs on the SF and RF. Contains a energy recovery wheel	5,120 CFM 7.5 HP SF 5 HP RF	Part of the Transfer Building

HVAC Equipment Cont'd

Air Handlers (Cont)

Description	Type	Size	Notes
AHU-S10	Variable air volume with VFD on the SF		Part of the Transfer Building
AHU-S11	Variable air volume with VFD on the SF	7.5 HP SF	Part of the Transfer Building
AHU-S18	Variable air volume with VFD on the SF	10 HP SF	Part of the Transfer Building

ERUs (3 total)

Description	Type	Size	Notes
ERU—1	Variable air volume with VFD SF and EF	1,980 CFM 2 HP SF & EF	Associated with AHU-D02
ERU-2	Variable air volume with VFD SF and EF	1,875 CFM 2 HP SF & EF	Associated with AHU-D03
ERU-3	Variable air volume with VFD SF and EF	4,460 CFM 3 HP SF, 5 HP EF	Associated with AHU-C01

Boilers

Description	Type	Size	Notes
Boiler 1	Hot Water	3,414 kBtu/hr	For Technical Building
Boiler 2	Hot Water	3,414 kBtu/hr	For Technical Building
Boiler 3	Hot Water	3,414 kBtu/hr	For Technical Building
Boiler 4	Hot Water	3,414 kBtu/hr	For Technical Building
Boiler 5	Hot Water	3,414 kBtu/hr	For Technical Building
Boiler 6	Hot Water	3,414 kBtu/hr	For Technical Building
Boiler 7	Hot Water	3,414 kBtu/hr	For Technical Building
Boiler 1 Blue	Steam	7,300 kBtu/hr	For Transfer Building
Boiler 2 Orange	Steam	7,300 kBtu/hr	For Transfer Building

Hot Water Pumps Technical Building

Description	Type	Size	Notes
PC1	Variable volume	50 HP 550 gpm	Associated with Technical Main Building Boilers 1 through 7
PC2	Variable volume	50 HP 550 gpm	Associated with Technical Main Building Boilers 1 through 7
PC3	Variable volume	50 HP 550 gpm	Associated with Technical Main Building Boilers 1 through 7
PC4	Variable volume	50 HP 550 gpm	Associated with Technical Main Building Boilers 1 through 7
PC5	Variable volume	50 HP 550 gpm	Associated with Technical Main Building Boilers 1 through 7
Pump-B1		3 HP	B Building HW Loop
Pump-B2		3 HP	B Building HW Loop
Pump-A1	Variable volume	7.5 HP	A Building HW Loop
Pump-A2	Variable volume	7.5 HP	A Building HW Loop
Pump-2	Variable volume	5 HP	D Building HW Loop
Pump-3	Variable volume	5 HP	D Building HW Loop
Pump-4	Variable volume	1.5 HP	Cosmetology HW Loop
Pump-5	Variable volume	1.5 HP	Cosmetology HW Loop

HVAC Equipment Cont'd

Hot Water Pumps Transfer Building

Description	Type	Size	Notes
Pump-1	Constant volume	Unknown size	Science Library HW Loop
Pump-2	Constant volume	Unknown size	Science Library HW Loop
Pump-3	Constant volume	Unknown size	Fine Arts HW Loop
Pump-4	Constant volume	Unknown size	Fine Arts HW Loop
Pump-5	Constant volume	Unknown size	Chiller Room-PE HW Loop
Pump-6	Constant volume	Unknown size	Chiller Room-PE HW Loop
Pump-7	Constant volume	Unknown size	PE HW Loop
Pump-8	Constant volume	Unknown size	PE HW Loop
2 Heat Exchangers	Steam to hot water	Unknown size	

Chilled Water System

Description	Type	Size	Notes
Technical Building Chiller	Air cooled chiller	62 tons	Installed in 2009
CHWP-1	Variable volume	10 HP, 143 gpm	Associated with Technical chiller
Transfer Building Chiller	Air cooled	Approx 200 tons	
Primary pump North	Constant volume	5 HP	Transfer Building Chiller
Primary pump South	Constant volume	5 HP	Transfer Building Chiller
Secondary North CHWP	Variable volume	20 HP	Transfer Building Chiller
Secondary South CHWP	Variable volume	20 HP	Transfer Building Chiller

Science Hot Water Pumps

Description	Type	Size	Notes
Pump-1	Constant volume	Unknown size	Chemistry Labs
Pump-2	Constant volume	Unknown size	Chemistry Labs
Pump-3	Constant volume	Unknown size	East Science
Pump-4	Constant volume	Unknown size	Middle Science
Pump-5	Constant volume	Unknown size	Middle Science
Pump-9	Constant volume	Unknown size	New Science Addition
Pump-10	Constant volume	Unknown size	New Science Addition

VAV boxes (~ 30 boxes)

Description	Type	Size	Notes
VAV boxes	Reheat	300-1000 CFM	

HVAC Equipment Cont'd

Library Hot Water Pumps

Description	Type	Size	Notes
Library Heating Pump-1	Constant volume	Unknown size	
Library Heating Pump-2	Constant volume	Unknown size	
HW Circ Pump	Constant volume	Unknown size	

Chemistry Lab Hoods

Description	Type	Size	Notes
Hood 1 through Hood 6	Variable air volume	750 CFM	

Building H Heating System

Description	Type	Size	Notes
Admin Heating Pump	Constant volume	Unknown size	
Business Heating Pump	Constant volume	Unknown size	
Business Boiler	Constant volume	Unknown size	
Book Store Heating Pump	Constant volume	Unknown size	

Points on BAS

Air Handling Units

Description	Points
FO1	Occupied/Unoccupied mode, Cool/Heat mode, OAT, Econ Position, MAT, Fan Status, Fan command, VFD signal, HW Valve %, DAT, Zone temperature, Calc Econ setpoint, Calc heating setpoint, DAT Reset, RA CO ₂ setpoint, VFD speed setpoint, Damper minimum position, RA CO ₂ , RAT
FO2 HO1	Occupied/Unoccupied mode, Cool/Heat mode, OAT, Econ Position, MAT, Fan Status, Fan command, VFD signal, HW Valve %, DAT, Zone temperature, Calc Econ setpoint, Calc heating setpoint, DX cooling setpoint, RA CO ₂ setpoint, VFD speed setpoint, Damper minimum position, RA CO ₂ , RAT
FO3 LO1	Occupied/Unoccupied mode, Cool/Heat mode, OAT, Econ Position, MAT, Fan Status, Fan command, VFD signal, HW Valve %, DAT, Zone temperature, Calc Econ setpoint, Calc heating setpoint, Calculated cooling setpoint CHW Valve %, RA CO ₂ setpoint, Duct static pressure, Duct static pressure setpoint,, Damper minimum position, RA CO ₂ , RAT
FO4	RAT, Fan status, Fan command, HW valve %, CHW valve %, DAT, Zone temperature, Occupied cooling setpoint, Occupied heating setpoint, Occupied/unoccupied, Cool/Heat
FO5 FO6 FO7	OAT, Econ Position, RAT, RA damper %, MAT, Fan status, Fan command, HW valve %, DAT, Zone temperature, Calc Econ Setpoint, Calc heating setpoint, Damper minimum position, Occupied/unoccupied, Cool/Heat
FO8	OAT, Econ Position, RAT, MAT, Fan status, Fan speed, Fan command, HW valve %, CHW valve %, DAT, Duct static, Calc Econ setpoint, Calc heating setpoint, Duct static pressure setpoint, Damper minimum position, Zone temperature, Occupied/Unoccupied, Cool/Heat
FO9	OAT, Econ Position, RAT, MAT, Fan status, Fan command, HW valve %, CHW valve %, DAT, Zone temperature, Calc Econ setpoint, Calc heating setpoint, Damper minimum position, Occupied/Unoccupied, Cool/Heat
F10	Oat, RAT, Fan status, Fan command, HW valve %, CHW valve %, DAT, Zone temperature, Calc DAT heating setpoint, Cal DAT cooling setpoint, Occupied/Unoccupied, Cool/Heat, Day/Night
HO2	OAT, Econ position, RAT, RA CO ₂ , MAT, Fan status, Fan command, Fan VFD %, HW valve %, DX status, Hot Deck DAT, Cold Deck DAT, Zone temperature, Calc Econ setpoint, Calc Hot Deck DAT, RA cooling setpoint, RA CO ₂ setpoint, VFD speed setpoint, Damper minimum position, Occupied/Unoccupied, Cool/Heat
HO3	OAT, Econ position, RAT, RA CO ₂ MAT, Fan status, Fan command, Fan VFD %, DX status, DAT, Duct static pressure, Calc Econ setpoint, RA CO ₂ setpoint, Duct static pressure setpoint, Damper minimum position, Occupied/Unoccupied, Cool/Heat
HO4	OAT, Econ position, RAT, RA CO ₂ MAT, Fan status, Fan command, DX status, DAT, Duct static pressure, Calc Econ setpoint, RA CO ₂ setpoint, Duct static pressure setpoint, Damper minimum position, Occupied/Unoccupied, Cool/Heat

Points on BAS Cont'd

Air Handling Units (cont)

Description	Points
LO2	OAT, Econ position, MAT, Fan status, Fan speed, Fan command, HW valve %, CHW valve %, DAT, Duct static pressure, Zone temperature, Calc Econ setpoint, Calc DAT heating setpoint, Calc DAT cooling setpoint, RA CO ₂ setpoint, Duct static pressure setpoint, Damper minimum position, RF command, RF speed, RA CO ₂ , RAT, Occupied/Unoccupied, Cool/Heat, Day/Night
LO3	OAT, Econ position, MAT, HW valve %, DX command, Fan A command, Fan A speed, Fan A duct static pressure, Fan B command, Fan B speed, Fan B duct static pressure, Exhaust plenum static pressure, RF command, RF speed, RAT, Occupied/Unoccupied, Cool/Heat, Day/Night, Calc Econ setpoint, Calc DAT heating setpoint, Calc DAT cooling setpoint, Duct static pressure setpoint, Damper minimum position, Zone temperature
SO1	OAT, Occupied/Unoccupied, Cool/Heat, Wheel command, SF status, SF command, HW valve %, CHW valve %, DAT, Zone temperature, RARH, RF command. Space temperature setpoint, Night setback temperature setpoint, Heat/Cool SwitchOver Setpoint,
SO2	OAT, Occupied/Unoccupied, Cool/Heat, Wheel enable, Wheel status, SF command, SF speed, HW valve %, HW coil pump status, three way mixing valve %, CHW valve %, Supply duct static pressure, DAT, Return duct static pressure, RARH, RF command, RF speed, DAT setpoint, Night setback setpoint, Zone temperature
S10 S11 S18	OAT, Econ position, MAT, SF command, SF speed, Hw valve %, CHW valve %, DAT, Duct static pressure, Zone temperature, RAT, Occupied/Unoccupied, Cool/Heat, Summer/Winter, Calc Econ setpoint, Calc heating DAT setpoint, Calc Cooling DAT setpoint, Duct static pressure setpoint, Damper minimum position
A1A A1B	Econ position, MAT, Fan status, Fan command, HW valve %, CHW valve %, DAT, Econ setpoint, Heating DAT setpoint, Cooling DAT setpoint, Zone temperature, RARH, RAT
AO2	Econ position, MAT, Fan status, Fan command, HW valve %, DX Stage, DAT, Econ setpoint, Heating DAT setpoint, Cooling DAT setpoint, Zone temperature, RARH, RAT
AO3	Econ position, RAT, MAT, VFD status, VFD speed, SF command, DX stage, DAT, Duct static pressure, Econ setpoint, Night setback setpoint, Night setup setpoint, Cooling setpoint, Duct static pressure setpoint, Zone temperature
AO4 AO5	Econ position, MAT, SF status, SF command, HW valve %, DX stage, DAT, Duct static pressure, RAT, RF status, Exhaust damper %, Calc Econ setpoint, Calc heating setpoint, Cooling setpoint, Zone temperature
BO1 BO5	Econ position, RAT, RA CO ₂ , MAT, SF status, SF speed, SF command, HW valve %, DX stage command, DAT, Duct static pressure, Zone temperature, Calc Econ setpoint, Calc DAT setpoint, RAT cooling setpoint, RA CO ₂ setpoint, Duct static pressure setpoint, Damper minimum position, Occupied/Unoccupied, Heat/Cool
BO3 BO4	OAT, Econ position, MAT, SF status, SF command, HW valve %, DAT, Zone temperature, Econ setpoint, Heating setpoint
BO6	Econ position, RAT, MAT, SF status, SF command, HW valve %, DX stage command, DAT, Zone temperature, Calc Econ setpoint, Cooling setpoint
BO7 BO8	Econ position, MAT, SF status, SF command, HW valve %, DAT, Zone temperature, Econ setpoint, Heating setpoint

Points on BAS Cont'd

Air Handling Units (cont)

Description	Points
AHU CO1 AHU DO2 AHU DO3	OAT, OA damper %, OA fan status, Energy recovery wheel status, Min OA CFM, RAT, RARH, MAT, HW valve %, CHW valve %, SF status, SF command, SF speed, DAT, Duct static pressure, Zone temperature, DAT setpoint, Duct static pressure setpoint, EF status, Min Exhaust CFM, Relief damper %
NO1 NO4 NO5 NO6	Econ position, MAT, Fan status, Fan command, HW valve %, DX stage command, DAT, Zone temperature, Calc Econ setpoint, Calc Heating DAT setpoint, Space cooling setpoint, Occupied/Unoccupied, Cool/Heat
NO2 NO3	Econ position, MAT, SF status, SF command, HW valve %, DAT, Zone temperature, Calc Econ setpoint, Calc heating DAT, Occupied/Unoccupied, Cool/Heat
AHU NO7	OA damper, RA CO ₂ MAT, HW valve %, Fan status, Fan command, DX stage command, DAT, Reheat command, Zone temperature, Electric reheat setpoint, Calc Heating DAT setpoint, Cooling setpoint, Occupied/Unoccupied, Cool/Heat
AHU DO1	Econ position, MAT, HW valve %, CHW valve %, SF status, SF command, SF speed, DAT, Duct static pressure, Building static pressure, RAT, RF status, RF command, RF speed, Relief damper %, Zone temperature, DAT setpoint, Duct static pressure setpoint

VAV Boxes

Description	Points
VAV Boxes	AHU DAT, Damper %, CFM flow, HW valve %, VAV box DAT, Zone temperature, CFM setpoint, Heating setpoint, Cooling setpoint

Main Boilers

Description	Points
Boilers	B1 command, B2 command B3 command, B4 command, B5 command, B6 command, B7 command, B1%, B2%, B3%, B4%, B5%, B6%, B7%, B1 Alarm, B2 Alarm, B3 Alarm, B4 Alarm, B5 Alarm, B6 Alarm, B7 Alarm, B1 HWS, B2 HWS, B3 HWS, B4 HWS, B5 HWS, B6 HWS, B7 HWS, B1 Iso Valve, B2 Iso Valve, B3 Iso Valve, B4 Iso Valve, B5 Iso Valve, B6 Iso Valve, B7 Iso Valve, Main HWST, Main HWRT, PC1 command PC1 speed, PC2 command, PC2 speed, PC3 command, PC3 speed, PC4 command, PC4 speed, PC5 command, PC5 speed, HW DP Average setpoint, HW DP Average,
HW Loops	Pump A1 command, Pump A2 command, Pump B1 command, Pump B2 command, Pump 2 command, Pump 3 command, Pump 4 command, Pump 5 command, Pump A1 status, Pump A2 status, Pump B1 status, Pump B2 status, Pump 2 status, Pump 3 status, Pump 4 status, Pump 5 status, Pump A! speed, Pump A2 speed, Pump B1 speed, Pump B2 speed, Pump 2 speed, Pump 3 speed, Pump 4 speed, Pump 5 speed

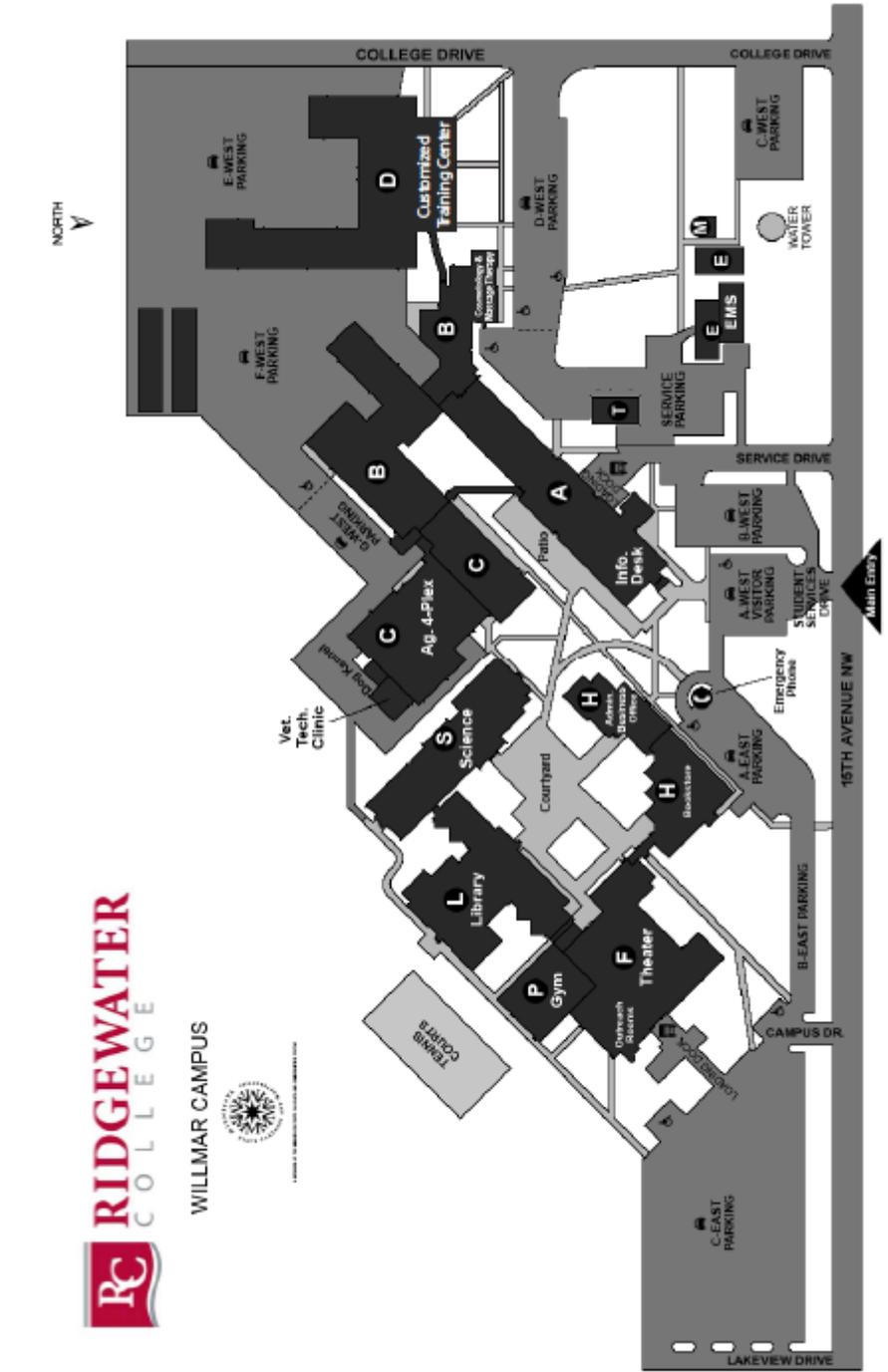
Main Boilers

Description	Points
Boilers	OAT boiler enable setpoint, Boiler 1 pressure, Boiler 2 pressure, bypass valve %, HWST, HWRT, Pump 1 status, Pump 2 status, Pump 3 status, Pump 4 status, Pump 5 status, Pump 6 status, Pump 1 command, Pump 2 command, Pump 3 command, Pump 4 command, Pump 5 command, Pump 6 command
Building H Heating System	Admin Pump enable, Admin Pump status, Business heating pump enable, Business heating pump command, Business boiler command, Business boiler status, Business Boiler HWST, Business Boiler HWRT, OAT high limit reset, OAT low limit reset, Business Boiler HWST high reset limit, Business Boiler HWRT low reset limit, Book Store heat pump command, Book store heat pump status, Book store domestic hot water system enable, Book store domestic hot water pump command, domestic hot water pump status
Library heating system	Library heating loop OAT high limit reset, Library heating loop OAT low limit reset , Library heating loop HWST high limit reset, Library heating loop HWST low limit reset, Library heating loop Circ Pump command, Library heating loop Circ Pump status, Library heating loop Circ Pump amps, Library heating pump 1 command, Library heating pump 1 status, Library heating pump 2 command, Library heating pump 2 status,
Science hot water pumps	Pump 1 command, Pump 1 status, Pump 2 command, Pump 2 status, Pump 3 command, Pump 3 status, Pump 4 command, Pump 4 status, Pump 5 command, Pump 5 status, Pump 9 command, Pump 9 status, Pump 10 command, Pump 10 status, Bypass valve %, HWST

Chilled water system

Description	Points
Fine Arts Chiller (Transfer building Chiller)	Chiller CMD, North Primary pump command, North Primary pump status, South Primary pump command, South Primary pump status, North secondary pump command, North secondary pump status, South secondary pump command, South secondary pump status, Secondary VFD speed, System differential pressure
Technical Building Chiller	Chiller command, CHWRT, CHWST, CHWP-1 command, CHWP-1 status, CHWP speed, System differential pressure,

Building Layout



PBEEEP Abbreviation Descriptions			
AHU	Air Handling Unit	HUH	Horizontal Unit Heater
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
CUH	Cabinet Unit Heater	MAT	Mixed Air Temperature
CV	Constant Volume	MAU	Make-up Air Unit
DA	Discharge Air	OA	Outside Air
DA Enth	Discharge Air Enthalpy	OA Enth	Outside Air Enthalpy
DARH	Discharge Air Relative Humidity	OARH	Outside Air Relative Humidity
DAT	Discharge Air Temperature	OAT	Outside Air Temperature
DDC	Direct Digital Control	Occ	Occupied
DP	Differential Pressure	PTAC	Packaged Terminal Air Conditioner
DSP	Duct Static Pressure	RA	Return Air
DX	Direct Expansion	RA Enth	Return Air Enthalpy
EA	Exhaust Air	RARH	Return Air Relative Humidity
EAT	Exhaust Air Temperature	RAT	Return Air Temperature
Econ	Economizer	RF	Return Fan
EF	Exhaust Fan	RH	Relative Humidity
Enth	Enthalpy	RTU	Rooftop Unit
ERU	Energy Recovery Unit	SF	Supply Fan
FCU	Fan Coil Unit	Unocc	Unoccupied
FPVAV	Fan Powered VAV	UH	Unit Heater
FTR	Fin Tube Radiation	VAV	Variable Air Volume
GPM	Gallons per Minute	VFD	Variable Frequency Drive
HD	Hot Deck	VIGV	Variable Inlet Guide Vanes
HP	Horsepower	VUH	Vertical Unit Heater

Conversions

1 kWh = 3.412 kBtu

1 Therm = 100 kBtu

1 kBtu/hr = 1 MBH
