



Vermont Superintendents Association
School Energy Management Program



Name of School

Facility Operating Plan

By

Date

Phone Number

Email Address

Facility Operating Plan - - Index

This document is also available on Google Docs at: <http://ow.ly/GxyWh>

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1. INTRODUCTORY PAGE

Facility Operating Plan Template

Updated November 2014

A. Introduction

This Facility Operating Plan (FOP) delineates key building systems and their management with the goal of maintaining a healthy, comfortable, energy efficient and economical building while always keeping in mind that the purpose of these systems is to support the educational and community use of the facility.

These goals are accomplished through well managed systems and preventive maintenance programs. Cost containment is achieved by avoiding the extra costs that are the inevitable result of a lack of preventive maintenance and by utilizing appropriate conservation and efficiency strategies. In addition to delineating current systems and their management this guide will point out opportunities for improvements in operations and physical equipment.

This FOP is not designed as a comprehensive manual on the facility and its operations. Instead, it is a basic guide to aid the facility director or anyone that has to involve themselves in the proper running of the building to help them understand the building's functioning and management.

This guide, through its appendices, attachments and references will also describe where more detailed information can be found.

B. Using the Template

The template is meant to be a guide for the creation of your operating plan. The facility details included in this template are for illustration purposes only. Because each school facility is unique, it is anticipated that extensive modification of the template will be necessary to make it specific for your building. Just delete the sections or information that doesn't apply and add in additional material as needed. See "How to Edit the Facility Operating Plan" on the following pages.

It is anticipated that the FOP itself will be put in a binder with section dividers relating to the main building components, appendices, etc. This will allow for frequent updates and for additional material to be added as available. Copies should be available to key administrative and maintenance staff. The FOP is a living document and should be reviewed and updated on a regular schedule to prevent it from becoming obsolete.

C. Help

This FOP template was created by the Vermont Superintendents Association's School Energy Management Program (SEMP). The SEMP program works for the schools to assist them as they deal with their energy use issues and consideration of renewables. Contact SEMP at 802-229-1017 or SEMP@VTVSA.org with your questions, comments, or to request a free energy assessment of your Vermont K-12 facility.

D. Acknowledgements

Funding for creation and update of this FOP template was provided by Efficiency Vermont. Participants in the original FOP template planning committee were: Dan French, Superintendent Bennington-Rutland SU, Tim Pedrotty, Physical Plant Consultant, Vermont School Board Insurance Trust, George Lawrence, Efficiency Vermont, and the following School Facility Managers: Lyall Smith, Milton SD, Chris Giard, Burlington Schools, Mike O'Malley, South Burlington SD, Leon Calabro, Chittenden East SU. Helping with the update were Facility Directors, Jonathan Brush, Lyall Smith, Jamie Evans, Marty Spaulding and Ray Daigle. These people brought a wealth of knowledge and experience to bear in creating this document. Principal author was Norman Etkind, VSA School Energy Management Program Director.

2. HOW TO MODIFY THE PLAN

The Facility Operating Plan (FOP) document is a template that must be modified extensively to best describe your systems and buildings. Sections of the operating plan template that are not relevant to your buildings should be deleted, new sections added as needed, and correct information inserted within the template sections. For example, if your school does not have steam boilers, you should delete those sections of the FOP in their entirety when modifying the plan for your school. Similarly, if your school uses a lighting or heating system that is not directly covered in the draft FOP, you will want to add in a section on the maintenance and upkeep of these systems.

Often the facility manager will mark up a hard copy of this template and have a secretary perform the edits to create the final document.

Quick tips:

1. Don't forget to save your changes after modifying the FOP! After every change, go to the "File" menu at the top of your screen and click "Save".
2. "Undo" is your friend! If you attempt to change something, and the computer doesn't do what you thought it would, undo! Go to the "Edit" menu and click on "Undo"; the last action you took (such as deleting some text) will be reversed and you can try again. You can "undo" several of your last actions.
3. Print the FOP one-sided to allow the reverse side to be used for added notes.
4. If you can't seem to modify the document the way you want to, enlist the help of someone at your school who is knowledgeable about computers. He or she should be able to help you edit the FOP, making it appropriate for your district's needs. Students are often very good for this type of help!

Deleting sections of the FOP that are irrelevant for your building

1. Click and drag the mouse over a complete section of the FOP that is not needed for your school. It should become highlighted.
2. Go to the "Edit" menu at the top of your screen and click on "cut" (or right click and select "cut"). The irrelevant section will be deleted from your FOP.

Sometimes, you don't want to get rid of a whole section, but just a few lines that are not necessary. Click and drag your mouse cursor over the parts you do not need. It should become highlighted. Click the "Delete" key on your keyboard- presto; the highlighted wording will disappear. To delete the rows altogether see the section on deleting a line or two (below).

Adding in new sections to the FOP

1. Locate an existing section that is the closest fit to the new section you need within the FOP. For example, if you are adding in a new lighting section, find the part of the existing lighting template that best matches your need.
2. Copy and paste the best match into the document.
 - a. To copy: Click and drag the mouse cursor over the section of text you want to copy. It should become highlighted with a dark background. Go to the "Edit" menu at the top of your screen and click on "Copy" (or right click and select "Copy)."
 - b. To paste: Click the mouse cursor into the space where you want the new section to go. Go back up to the "Edit" menu and click on "Paste" (or right click and select "Paste").
3. Your newly copied section should be highlighted. Select the parts of the new section that need to be renamed or changed, by clicking on the appropriate words. Use the "Delete" key on your keyboard to get rid of the old wording, and type in the new information.

Adding in or deleting just a line or two in an existing section

Sometimes you don't need to add or delete a whole section; but there are a few more lines of information in an existing section you need to add on or a line or two you want to delete. This is especially true because some default information has been included as a guide. These usually need modification or removal.

1. Click the mouse cursor on the last line of text in the section that you want to expand or highlight the rows you want to delete.
2. Go to the "Table" menu at the top of your screen, click on "Insert" and then, "New Row Below." A new blank line should appear below your mouse cursor. Similarly, go to the "Table" menu at the top of your screen, click on "Delete" to remove highlighted rows. Again, if you don't get the result you want, just use the undo function to restore the change and try again.
3. Click on the blank area in the table and type in the new information you want to see there.

Starting a new page

Sometimes you want to start a new page at the end of a section. This is typically because you want to use section dividers in the 3 ring binder that you will be putting the plan into, here's how to do it:

Just hold down the "control (ctrl)" key while you hit the "Enter" key and a hard page break will be inserted.

Table of Contents

Adding Section:

To add a first level category (Examples: Introductory Page, Body of the Plan)

1. Type heading
2. Highlight heading and select Heading 1 on the Styles section of the Word HOME drop down or ribbon.

To add a secondary level category (Examples: Basic Building Information or Building Shell)

1. Type heading
2. Highlight heading and select Heading 2 on the Styles section of the Word HOME drop down or ribbon.

To Update the Table of Contents

1. Click on the table
2. Right click
3. Select Update Field
4. Select Update Entire Table *(Note root numbers are not automatic and should be typed into the titles)*

Google Doc

This complete document is also available in Google Doc to download at: <http://ow.ly/GxyWh>

Notes

You can write as much as you want in any area of the table. The space will expand as you keep on writing.

You should check the various draft sections for a given issue to see which most closely reflects your situation.

When you remove some lines from the bottom of the table, the heavy border line may disappear. You can modify this by highlighting the line and going to "Format" "Borders and Shading" by using the menu on the top of the page. You can then click on the line in the "preview" box on the right to either add or delete a heavy line.

3. BODY OF THE PLAN

3.1. Basic Building Information

This section provides basic information on the building's original construction and additions. It delineates the sections of the building based on year and type of construction to be referred to in later sections (because they may have different systems). Also refer to the Appendices for the floor plan that shows the section designations. **The different sections should be named in the way you commonly refer to them.**

Original Construction – Section 1	
Year Built	
Gross size in square feet (outside measurement of heated space)	
Architect	
Engineer	
Contractor and subs	
Location of plans and specifications (describe where they may be found.)	In maintenance office - - plans in closet marked A and specifications on shelf marked S2. Digital photos of plans are in the folder labeled _____ on the maintenance computer.
Type of Construction	Slab on grade with frostwalls, wood 2x4 frame construction, pitched truss roof, attic fiberglass insulation,
Building use	Classrooms and offices
Notes	Take digital pics of plans and keep on computer.
	Use specific transmittal forms when plans are allowed to leave the building.
	Keep important computer backups off-site - location.
	Include Perimeter drain details

Original Construction – Section 2	
Year Built	
Size in square feet	
Architect	
Engineer	
Contractor and subs	
Plans and specifications are located	In maintenance office - - plans in closet marked A and specifications on shelf marked S2. Digital photos of plans are in area _____ on the maintenance computer.
Type of Construction	Slab on grade with frostwalls, cement block walls, pitched truss roof, attic fiberglass insulation,
Building use	Gymnasium/multi-purpose room
Notes	Include Perimeter drain details

Addition – Section 3

Year Built	
Size in square feet	
Architect	
Engineer	
Contractor and subs	
Plans and specifications are located	In maintenance office - - plans in closet marked A and specifications on shelf marked S2. Digital photos of plans are in area _____ on the maintenance computer.
Type of Construction	Slab on grade with frostwalls, cement block walls, pitched truss roof, attic fiberglass insulation,
Building use	Gymnasium/multi-purpose room
Notes	

Renovations and Upgrades – brief description

Renovations	
Year Renovated	
Building Sections involved	
Area renovated	
Scope of renovation	
Architect	
Engineer	
Contractor and subs	
Plans and specifications are located	In maintenance office - - plans in closet marked A and specifications on shelf marked S2. Photos of plans are in area _____ on the maintenance computer.
Notes	

Renovations	
Year Renovated	
Building Sections involved	
Area renovated	
Scope of renovation	
Architect	
Engineer	
Contractor and subs	
Plans and specifications are located	In maintenance office - - plans in closet marked A and specifications on shelf marked S2. Photos of plans are in area _____ on the maintenance computer.
Notes	
Energy Upgrade	

Major Repairs	
Year	
Building Sections involved	
Area involved	
Scope of repairs	
Problem that was corrected	
Contractor and subs	
Notes	

Year	
Building Sections involved	
Area involved	
Scope of repairs	
Problem that was corrected	
Contractor and subs	
Notes	

3.2. Building Shell

Roofs – general – provide roof map that shows different sections. Consider getting a roof study if there are issues.

Flat Insulated Roof	
Building Section(s)	
Type of roof surface	
Type of roof insulation	
Depth of Insulation and R Value	
When roofing installed	
Regular Maintenance	Twice a year, before and after winter, check roof for deterioration, fix potential leaks. Clean roof drains quarterly. Check for low spots.
Special Maintenance	Scan roof with infra-red scan if there are leak problems that are hard to diagnose.
Replacement:	Anticipated in 20____.
Notes:	Warranty information _____. May need to check for potential structural issues if insulation is increased or a white roof installed.
Energy Upgrade	At time of replacement add _____ insulation to bring roof to R-50. Consider roofing color when replacing. Is the goal to help heat or cool the space? In general, a white roof is preferable to reduce overheating.

Pitched Roof	
Building Section(s)	
Type of roof surface	
Type of insulation	
Depth of Insulation and R Value	
Where insulation is placed.	On roof deck or insulated rafters or at attic floor level with solid ceiling below or at bottom chord of trusses with dropped ceiling below and no solid ceiling surface.
When roofing installed	
Type of attic ventilation, if any	
Annual Maintenance	Check roof for deterioration, fix potential leaks.
Special Maint.	Scan roof with infra-red scan if leak issues.
Replacement:	Anticipated in 20____.
Notes:	Warranty information _____. May need to check for potential structural issues if insulation is increased or a white roof installed. Check that penetrations are sealed. Consider roofing color when replacing. Is the goal to help heat or cool the space? In general, a white roof is preferable to reduce overheating.
Energy Upgrade	At time of replacement add _____ insulation to bring roof to R-__.

Pitched Roof

Building Section(s)	
Type of roof surface	
Type of insulation	
Depth of Insulation and R Value	
Where insulation is placed.	On roof deck or insulated rafters or at attic floor level with solid ceiling below or at bottom chord of trusses with dropped ceiling below and no solid ceiling surface.
When roofing installed	
Type of attic ventilation, if any	
Annual Maintenance	Check roof for deterioration, fix potential leaks.
Special Maint.	Scan roof with infra-red scan if leak issues.
Replacement:	Anticipated in 20____.
Notes:	Check that all penetrations to exterior are sealed. Warranty information _____. May need to check for potential structural issues if insulation is increased or a white roof installed.
Energy Upgrade	At time of replacement add _____ insulation to bring roof to R-__.

Building Walls

Section(s)	
Wall construction	Inside surface is sheetrock. Framing is with (wood, metal) Sheathing is with _____ Outside surface is _____
Insulation	3-1/2 inches FG
R - value	Overall R-value of the wall assembly is ____.
Maintenance	Re-point mortar on brick walls when damaged or missing. Remove peeling paint and repaint as necessary.
Special Maint.	Add plywood backup in areas where sheetrock is easily damaged.
Notes:	On older buildings check for lead paint. Keep sheetrock off floors to prevent wicking.
Energy Upgrade	If uninsulated consider bringing up to R-19 at time of renovation. Careful planning is required to prevent moisture issues. An architect or engineer may be needed, especially when insulating older brick walls.

Building Walls

Section(s)	
Wall construction	<p>Inside surface is:</p> <p>Framing is with (wood, metal)</p> <p>Sheathing is with</p> <p>Outside surface is</p>
Insulation	3-1/2 inches FG
R - value	Overall R-value of the wall assembly is ____.
Maintenance	Re-point mortar on brick walls when damaged or missing. Remove peeling paint and repaint as necessary.
Special Maint.	Add plywood backup in areas where sheetrock is easily damaged.
Notes:	On older buildings check for lead paint. Keep sheetrock off floors to prevent wicking.
Energy Upgrade	If uninsulated consider bringing up to R-19 at time of renovation. Careful planning is required to prevent moisture problems. An architect or engineer may be needed, especially when insulating older brick walls.

Building Walls

Section(s)	
Wall construction	
Insulation	
R - value	
Beware of transite panels (asbestos)	
Maintenance	
Special Maint.	
Notes:	
Energy Upgrade	

Outside Doors

Section (s)	
Type of weatherstripping	
Age of doors	
Replacement date	Replace main entry doors in 20__. Replace remaining outside doors in 20__.
Maintenance	Check quarterly -- replace or repair as necessary.
Special Maint.	Check hinges quarterly. Check pressure on door closers. Check for proper functioning of panic bars and latching.
Notes:	Don't use aluminum doors. "Bristle" type sweeps seems to work best on heavily used doors. Consider galvanized doors to prevent corrosion. Undercoating is sometimes used to help prevent rust. Confirm ADA compliance.
Energy Upgrade	Replace door with Energy Star rated one.

Outside Doors

Section (s)	
Type of weatherstripping	
Age of doors	
Replacement date	
Maintenance	
Special Maint.	
Notes:	
Energy Upgrade	

Windows

Section(s)	
Type of window	
Windows installed in	19__.
Replacement date	Replace in 20__.
Maintenance	Check 2x/ year for proper operation, weatherstripping and caulking.
Special Maint.	Check storm windows closed weekly during winter. Check window locks for proper operation twice a year. Replace weather-stripping as needed. Use approved lubricant on tracks.
Notes:	Extra sash available in maintenance closet. Parts vendor listed with vendors. Testing may be required to determine if there are hazardous materials present (lead, asbestos, PCBs)
Energy Upgrade	Replace with Energy Star rated windows at time of replacement.

Windows

Section(s)	
Type of window	
Windows installed in	19__.
Replacement date	Replace in 20__.
Maintenance	Check 2x/ year for proper operation and weatherstripping
Special Maint.	Check storm windows closed weekly during winter.
Notes:	
Energy Upgrade	Replace with Energy Star rated windows at time of replacement.

3.3. Heating, Ventilation, Domestic Hot Water and Air Conditioning Systems

Heating System

Overview	
Type of heating plant	There is a central boiler that burns number 2 oil and creates hot water for distribution.
Heat distribution	Is by forced hot water in baseboard radiation, pre-heating ventilation air in air handlers, and in unit ventilators for classrooms.
Basic controls	There are controls on the boiler that maintain boiler temperature. Room control is via thermostats located in each space.
Control Points	Key zone valves and shutoffs are shown on the single line drawings
Emergency shutoff	Each boiler has a sensor mounted above it that will shut the boiler off if it detects a fire situation. There are emergency shutoff switches for each boiler located _____. See Quick Sheets for emergency response.

Fuel Storage	
Number size and location:	Buried 10,000 gallon steel double wall oil tank. Located _____. (see site plan).
When installed	
Monitoring	There are sensors to detect leaks. Alarm is in boiler room.
When last serviced	
Scheduled maintenance:	Stick tanks at beginning and end of heating season to determine usage. Check for moisture in tank by _____. (check maintenance and reporting requirements on UST website http://www.anr.state.vt.us/dec/wastediv/ust/home.htm). Current contact at ANR is June Reilly – 241-3871.
Scheduled replacement	Unit scheduled for replacement in _____. If you have a large underground tank, consider replacing the main oil boiler with a pellet system and not replacing the underground oil tank.
Notes:	Fuel pump at the boilers runs when boiler firing and delivers oil to the boilers.
Energy Upgrade	Install day tank to avoid having pumps running excessively.

Fuel Storage	
Number size and location:	250 Gallon above ground propane tank
When installed	
Monitoring	Gauge on tank
When last serviced	
Scheduled maintenance:	Check for corrosion
Scheduled replacement	Unit scheduled for replacement in _____
Notes:	Install propane detectors in kitchen and science labs. Have supplier check tanks for leaks and proper functioning annually. Replace brass connections with stainless steel to prevent corrosion.
Energy Upgrade	

Boilers

Building Section(s)	1 – (use common name for building sections)
Number and location:	2 boilers – see building plan for location
Make, Btu rating, type of fuel	Number 2 oil fired HB Smith cast iron 1.4 MMBtu hot water boiler.
When installed	
Boiler temperature	Boiler temperature is automatically adjusted via an automatic reset based on outside temperature. Range is 200 degrees at 10 degrees to 130 degrees at 50 degrees. A chart is posted in the boiler room that indicates proper boiler temperature for a given outside temp.
Type of fluid	Uses a mix with 30% glycol anti-freeze - - zero degree temperature rating.
Serviced by	
Scheduled maintenance:	Annual tune-up and cleaning. Test water for pH, rust inhibitor, dissolved oxygen and glycol level once a year. Open boiler for inspection every two years. Exercise valves quarterly. Test limit switches quarterly. Check boiler temperature against reset schedule weekly. Check for oil and water leaks regularly. Shut off all heating system components at end of heating season. Check ambient boiler room carbon monoxide levels once a month. Check combustion air dampers and interlock. Check relief valve and other equipment for corrosion and proper operation.
Scheduled replacement	Unit scheduled for replacement in _____. Replace refractory in _____.
Notes:	Service log is in boiler room. Add a low temp alarm and auto dialer when budget allows. Check pressure in bladder controlled pressure tanks. Considerable discussion ensued among the people working on this FOP on whether to test relief valves regularly. This is a recommended practice and the consensus was that if done regularly starting with a new relief valve there would not be problems. However, if the relief valve was not checked recently, it is likely that it would not seat correctly when tested and would leak. It would then need to be replaced.
Energy Upgrade	Replace burner with more efficient _____.

Boilers

Building Section(s)	
Number and location:	
Make, Btu rating, type of fuel	Number 2 oil fired steam boiler.
When installed	
Type of fluid	Distilled water and chemicals to stabilize pH and prevent scaling.
Serviced by	
Scheduled maintenance:	Annual tune-up and cleaning. Test water for pH, _____ once a year. Do upper and lower blow downs daily. Exercise valves quarterly. Test limit switches quarterly. Check boiler pressure against reset schedule weekly. Check for oil, water and steam leaks regularly. Shut off all heating system components at end of heating season. Determine that outside air (combustion) dampers operate when boiler fires weekly. Internal inspection every two years. Check skimmer.
Scheduled replacement	Unit scheduled for replacement in _____.
Notes:	Service log is in notebook binder in boiler room. Inspected by the state annually.
Energy Upgrade	Replace burner with more efficient _____.

Boilers

Building Section(s)	
Number and location:	
Make, Btu rating, type of fuel	
When installed	
Type of fluid	
Serviced by	
Scheduled maintenance:	
Scheduled replacement	
Notes:	
Energy Upgrade	

Boilers- Wood Chip

Make, Btu rating	Messersmith – 40 hp
When installed	
Type of fluid	Water/glycol solution 30 %
Serviced by	
Scheduled maintenance:	Check daily that all equipment is operating correctly. Remove ash daily. Clean tubes every two to three weeks. Test limit switches and water extinguishment system monthly.
Scheduled replacement	
Notes:	Service log is in notebook binder in boiler room. Inspected by the state annually.
Energy Upgrade	Consider adding automated blowing of tubes. Consider modifying the system with overfire air for more efficient operation.

Heating Circulators

Building Section(s)	
Number and location:	Six circulators for different zones and a circulator for the domestic hot water. All are located in the boiler room.
Make, HP rating, efficiency	There are 4 – 3 HP _____ circulators, two _____ 2 HP circulators and a 5 HP circulator.
When installed	
Operation	Pumps run continuously during heating season. Shut off automatically when outside temperature is above 55 degrees. There is an automated system that switches circulators (lead/lag) on a monthly (weekly?) basis.
When last serviced	Service record included with boiler log.
Scheduled maintenance:	Lubricate according to manufacturer's recommendations. Make sure the lead/lag function is working correctly to even usage on circulators.
Scheduled replacement	Unit scheduled for replacement in _____
Notes:	When you do not have a redundant circulator for key areas, keep a spare available for emergency repairs. Also keep a seal kit and extra coupler available.
Energy Upgrade	Consider replacing with more efficient motors and variable frequency drives or integrated units. Many schools are replacing their circulators with Grundfos or similar self-contained variable speed drive efficient units. These automatically adjust the speed of the circulator based on heating demand and/or how many zones are open.

Heating Circulators

Building Section(s)	
Number and location:	Four circulators for different zones located in the boiler room.
Make, HP rating, efficiency	There are 4 – 7 HP _____ circulators
When installed	
Operation	Two pumps run to supply hot water to the building. The two extra pumps are redundant. They are switched automatically by the computer on a daily basis. Pumps are controlled by a variable speed drive. Speed is controlled by the return water temperature and varies from 100% at a temperature of ____ to 30% at a temperature of _____. They shut off automatically when outside temperature is above 60 degrees.
When last serviced	Service record included with boiler log.
Scheduled maintenance:	Lubricate according to manufacturer's recommendations.
Scheduled replacement	Unit scheduled for replacement in _____
Notes:	
Energy Upgrade	Replace with high efficiency motors upon failure.

Heating Circulators

Building Section(s)	
Number and location:	
Make, HP rating, efficiency	
When installed	
Operation	
When last serviced	
Scheduled maintenance:	
Scheduled replacement	
Notes:	
Energy Upgrade	

Steam Traps

Section(s)	
Number and location:	
Make	
When installed	
Operation	Steam traps retain steam in radiation and allow condensed water to return to boiler.
When last serviced	Service record included with boiler log.
Scheduled maintenance:	Check steam traps for proper closing twice a year.
Scheduled replacement	
Notes:	
Energy Upgrade	

Domestic Hot Water

Building Section(s)	
How Produced	Hot water for the kitchen, showers and bathrooms is provided by an indirect fired hot water tank that is heated with water from the main boiler via a heating loop and a coil in the tank. During the off-season when the main boiler shuts down, hot water is provided by an electric hot water heater in the boiler room.
Make, Btu rating	Storage tank is a ____ gallon _____ indirect fired tank. The electric heater is a 4.5 kW _____ gallon tank.
When installed	
Annual changeover	When the main boilers are shut down for the season, close valves number ____ and ____ and shut off circuit breakers ____ and ____ that go to the hot water heater and the recirc. pump.
Hot water temperature	Tank temperature is maintained at 140 degrees to reduce production of Legionella bacteria. There is a direct line to the dishwasher in the kitchen. Other domestic hot water is tempered to _____ degrees.
Hot water circ.	There is a circulator that (1) runs from ____ to ____ and is controlled by a timer located _____ or (2) is controlled by an aquastat located on the return pipe.
Scheduled maintenance:	Inspect TPR valve annually. Considerable discussion ensued among the people working on this FOP on whether to test relief valves regularly. This is a recommended practice and the consensus was that if done regularly starting with a new relief valve there would not be problems. However, if the relief valve was not checked recently, it is likely that it would not seat correctly when tested and would leak. It would then need to be replaced. Replace if corrosion is evident. Clean electric tank annually. Exercise valves and tempering valves quarterly. Repair and replace insulation on all heating and hot water piping as needed.
Scheduled replacement	Units scheduled for replacement in _____
Notes:	
Energy Upgrade	Consider conversion to point of use. Consider using cleaning materials that avoid the need for hot water.

Domestic Hot Water

Building Section(s)	
How Produced	
Make, Btu rating	
When installed	
Annual changeover	
Hot water temperature	
Hot water circ.	
Scheduled maintenance:	
Scheduled replacement	
Notes:	
Energy Upgrade	

Ventilation

Ventilation is generally designed to provide code compliant fresh air rates to student and other areas. It is essential to maintain proper ventilation rates to ensure a safe, healthy school environment and is also important to the longtime viability of the building.

Unit Ventilators

These units are generally found against outside walls in classrooms although they can also be ceiling mounted and used in halls. They are self-contained units that are designed to bring in fresh air through outside grilles and keep the room at proper temperature. They are coupled with some kind of active or passive relief vent to exhaust the inside air being displaced by the fresh air intake.

Unit Ventilators	
Building Section(s)	
Where used	In classrooms only, a total of ____ units
Manufacturer	
When installed	
How controlled	Wall thermostat, fan switch on unit and central controller (see control section).
Filters	Use properly sized pleated filters per manufacturers recommendation rated Hi E40. Consider metal frame and fabric rolls.
Maintenance	Check outside air damper operation 2x/year. Change filter 2-4x/year and more often if in a dirty location. Replace belts, clean coils with compressed air and lubricate motors and moving parts annually using proper lubricant (SAE 20). See maintenance contract.
Energy Policy	Keep items off of unit ventilator grilles.
Additional Info	See Book ____ for complete manual found on shelf in maintenance room.
Notes	Some units have two filters. Be sure the gasket material for the fresh air damper is in place/ replace with better gasket as needed
Scheduled for replacement	In 20__.
Energy Upgrade	At end of useful life consider upgrading to central ventilation system also consider upgrading controls to DDC.

Relief Vents – coupled with unit ventilators

Where found	There is a roof mounted exhaust fan and ducts run to each classroom. The grilles are on the wall opposite the unit ventilators at the ceiling level.
When installed	
Location of duct smoke detectors	
Size of motor	
Notes	Check relief vents for proper operation.
Belts and motors:	Check twice a year, replace annually, check motor operation
Belt size/type	Pleated, high efficiency filters – streamers
Belt schedule:	See appendices
Energy Upgrade	Replace with high efficiency motor.

Unit Ventilators

Building Section(s)	
Where used	
Manufacturer	
When installed	
How controlled	
Filters	
Maintenance	
Energy Policy	
Additional Info	
Notes	Be sure the gasket material for the fresh air damper is in place/ replace with better gasket as needed
Scheduled for replacement	
Energy Upgrade	

Relief Vents – coupled with unit ventilators

Where found	
When installed	
Location of duct smoke detectors	
Size of motor	
Belts and motors:	
Belt size/type	
Belt schedule:	

Central Ventilation System

Building Section (s)	
Where found	The air handler is located in a penthouse that is accessed by the ladder in the room behind the coach's room off the gym. It serves the gym and locker rooms.
When installed	
Type, manufacturer and model number.	
Mode of operation	Outside air dampers provide fresh air to the system. Minimum setpoint for outside air is _____%. The system re-circulates inside air and adds outside air as needed for temperature control. The heat recovery wheel tempers outside air as needed.
Location of duct smoke detectors	See single line drawings
Maintenance	Annual inspection, cleaning of reheat coils as needed, check for proper operation of dampers and control valves. Supply air temperature at the classroom to be ___ degrees. Systems should be re-balanced every ten years or as needed (if partitioning has occurred or other changes were made to the system)
Diffusers	Maintain streamers on the diffusers as an easy way of ensuring that the system is operating as it should.
Notes:	Once balanced, mark the position of dampers with markers so they can be easily restored when moved.
Dampers	Check for proper operation monthly during the heating season.
Filters	Replace with H40 pleated filters 4x per year. There are filters on both sides of the heat exchanger (see filter schedule)
Heat recovery wheels	Clean every 5 years
Belts and motors:	Check twice a year, replace belt annually or as needed, keep spare belts available, check motor operation, grease twice a year.
Motor size, model, manufacturer	Motor is a _____ x hp motor See motor schedule in appendices.
Belt schedule:	See appendices
Energy Upgrade	Install variable frequency drives. Use high efficiency motors.

Central Ventilation System

Building Section (s)	
Where found	
When installed	
Type, manufacturer and model number.	
Mode of operation	
Location of duct smoke detectors	
Maintenance	
Diffusers	
Dampers	
Filters	
Heat recovery wheels	
Belts and motors:	
Motor size, model, manufacturer	
Belt schedule:	
Energy Upgrade	

Gym/Multi-Purpose Room Ventilation System

Building Section (s)	
Where found	The air handler is located in a penthouse that is accessed by the ladder in the room behind the coach's room off the gym. It serves the gym and locker rooms.
When installed	
Type, manufacturer and model number.	
Mode of operation	Outside air dampers provide fresh air to the system. Minimum setpoint for outside air is _____%. The system re-circulates inside air and adds outside air as needed for temperature control. The heat recovery wheel tempers outside air as needed.
Location of duct smoke detectors	See single line drawings
Maintenance	Annual inspection, cleaning of reheat coils as needed, check for proper operation of dampers and control valves. Supply air temperature at the classroom to be ___ degrees. Systems should be re-balanced every _____ years?
Diffusers	Maintain streamers on the diffusers as an easy way of ensuring that the system is operating as it should.
Dampers	Check for proper operation monthly during the heating season.
Filters	Replace with H40 pleated filters 4x per year. (see filter schedule)
Heat recovery wheels	Clean every 5 years
Belts and motors:	Check twice a year, replace belt annually, check motor operation, grease twice a year.
Motor size, model, manufacturer	Motor is a _____ x hp motor See motor schedule in appendices.
Belt schedule:	See appendices
Energy Upgrade	Go to CO2 based demand control ventilation. Use high efficiency motors.

Ventilation System

Building Section (s)	
Where found	
When installed	
Type, manufacturer and model number.	
Mode of operation	
Location of duct smoke detectors	
Maintenance	
Diffusers	
Dampers	
Filters	
Heat recovery wheels	
Belts and motors:	
Motor size, model, Manufacturer	
Belt schedule:	
Energy Upgrade	

Auditorium Ventilation System

Building Section (s)	
Where found	The air handler is located in a penthouse that is accessed by the ladder in the room behind the coach's room off the gym. It serves the gym and locker rooms.
When installed	
Type, manufacturer and model number.	
Mode of operation	Outside air dampers provide fresh air to the system. Minimum setpoint for outside air is _____ %. The system re-circulates inside air and adds outside air as needed for temperature control. The heat recovery wheel tempers outside air as needed.
Location of duct smoke detectors	See single line drawings
Maintenance	Annual inspection, cleaning of reheat coils as needed, check for proper operation of dampers and control valves. Supply air temperature at the classroom to be ___ degrees. Systems should be re-balanced every _____ years?
Diffusers	Maintain streamers on the diffusers as an easy way of ensuring that the system is operating as it should.
Dampers	Check for proper operation monthly during the heating season.
Filters	Replace with H40 pleated filters 4x per year. (see filter schedule)
Heat recovery wheels	Clean every 5 years
Belts and motors:	Check twice a year, replace belt annually, check motor operation, grease twice a year.
Motor size, model, manufacturer	Motor is a _____ x hp motor See motor schedule in appendices.
Belt schedule:	See appendices
Energy Upgrade	Go to CO2 based demand control ventilation. Use high efficiency motors.

Bathroom Exhaust Fans

Motor size, model, manufacturer	
Maintenance	Clean grille 2 times per year
How controlled	Runs continuously. Or - - is cycled with the occupied/unoccupied cycle.
Notes:	
Energy Upgrade	Control with occupied cycle if possible.

Ceiling Ventilation Fans

Motor size, model, manufacturer	
Maintenance	Clean annually
How controlled	Switch controlled
Notes:	Ck http://www.bigassfans.com/ for some fan options
Energy Upgrade	Control with temperature sensors if possible.

Kitchen Ventilation Fan

Motor size, model, manufacturer	
Filters:	Monthly cleaning
Maintenance	Have ductwork from roof to hood professionally cleaned annually and clean filters as needed.
How controlled	Wall switch – staff turns on as necessary
Notes:	
Energy Upgrade	Use CFL bulbs, consider using hourly countdown timer for control. Consider Melink system for larger units.

Shop Dust Collection

Motor size, model, manufacturer	
Filters:	Monthly cleaning
Maintenance	Clean ductwork __ times per year
How controlled	Wall switch – staff turns on as necessary
Notes:	Check relief vent for proper functioning to avoid creating a negative pressure in the space.
Energy Upgrade	Consider using countdown timer for control.

Air Conditioning

Building Section (s)	
Where found	Window units in admin areas.
When installed	
Type, manufacturer and model number.	
Mode of operation	Manual controls on each unit.
Maintenance	Remove for winter or install covers for winter. Comb grilles as needed.
Filters	Clean filter monthly during use periods or more frequently as needed.
Energy Upgrade	Purchase only Energy Star ® rated units.

3.4. HVAC Controls

The control system needs to accomplish several tasks: maintaining building temperature, having ventilation fans run when needed and reducing both temperature and ventilation based on the occupancy schedule in the building. Controls can also schedule lead/lag boilers and circulators, control boiler temperature setback and shutdown, and many other functions.

A complete understanding of how to optimize the use of controls is critical for both proper operations of the systems and to maximize efficiency. Training on the use of your system is highly recommended. Having your controls contractor explain the operations of the system and how to adjust it is recommended. Having someone record this on DVD for future reference can be extremely helpful.

Note: each site has specific requirements and wording below will need to be modified.

Central Control System	
Section(s)	
Location, Manufacturer and model number	Central Controller is a Network 8000 system Model _____ that is self addressable via a keypad on the unit in the boiler room.
Mode of operation	This electronic system interfaces with the pneumatic control system throughout the building section to provide for timing of ventilation fans and night temperature setback control. Minimum outside air damper setting is 10% during occupied times.
When installed	
Occupied cycle	Ventilation runs from 7:30 AM until 3 PM on days when students are present. The rest of the year the ventilation is off except when needed for humidity control. Day cycle for heating starts at 6 AM during shoulder seasons, 5 AM during winter and there is no setback during extremely cold periods. The system sets back ten degrees from the day setting.
When last serviced	Service record is in notebook at the unit and a copy is on shelf B in the maintenance office.
Scheduled maintenance:	Annual inspection of system by contractor for air leaks, calibration and proper operation. Additional inspection for air leaks if compressor runs too frequently. See maintenance contract. Calibrate outside temperature sensor annually.
Emergency Measures	See Quick Sheets for instructions on how to override the controls if necessary.
Scheduled replacement	Unit scheduled for replacement in _____
Notes:	Detailed manual on adjusting the system is in manual titled _____ that can be found in _____. System no longer supported.
Energy Upgrade	Upgrade of entire system to DDC to be undertaken at the next major renovation.

Pneumatic Control System

Section(s)	
Location, Manufacturer and model number	The central controller is located in the boiler room on the wall opposite the boilers. It is a _____ pneumatic control system model _____. There is a secondary controller located in the penthouse near the air handlers. It is a _____ pneumatic control system model _____.
Mode of operation	This pneumatic adjusts the air pressure to switch items on and off to provide for timing of ventilation fans and night setback control and to get temperatures to a night setback mode.
When installed	
Occupied cycle	Ventilation runs from 7:30 AM until 3 PM on days when students are present. The rest of the year the ventilation is off except when needed for humidity control. Day cycle for heating starts at 6 AM during shoulder seasons, 5 AM during winter and there is no setback during extremely cold periods. The system sets back ten degrees from the day setting.
Setpoint pressures	During occupied cycles, the pneumatic pressure should read ____ psi. For night setback is should read ____ psi.
When last serviced	Service record is in notebook at the unit and a copy is on shelf B in the maintenance office.
Scheduled maintenance:	Annual inspection of system for air leaks, calibration and proper operation. Additional inspection for air leaks if compressor runs too frequently. Calibrate outside air temperature sensor annually. See maintenance contract.
Scheduled replacement	Unit scheduled for replacement in _____
Notes:	Detailed manual on adjusting the system is in manual titled _____ that can be found in _____.
Energy Upgrade	Consider adding a digital front-end to the system. An upgrade of entire system to DDC to be undertaken at the next major renovation. Be careful on the selection of a DDC contractor. You rarely want to go solely with low bid. Add demand control to ventilation and variable speed drives.

Central Control System -- Compressor

Location, Manufacturer and model number	The compressor is a _____ model _____. It is located in the main boiler room in Section _____.
Mode of operation	The compressor is set to maintain a pressure of ____ psi. There is also an automatic blowdown every _____ to eliminate any moisture from the system.
When installed	
Occupied cycle	The compressor runs night and day during the heating/ventilating season and is shut off during the summer months except when the system is activated to provide moisture control.
When last serviced	Service record is in notebook at the unit and a copy is on shelf B in the maintenance office.
Scheduled maintenance:	Belts should be changed annually at the beginning of the heating season. Oil should be checked _____ and the dryer condenser should be cleaned as needed. Actuators should be checked for proper operation.
Scheduled replacement	Unit scheduled for replacement in _____
Notes:	Detailed manual on proper operation of the compressor can be found in _____. Training DVD can be found _____.
Energy Upgrade	Consider no-loss drains. Use outside air feed (it uses less energy to compress colder air).

Central Control System - - Pneumatic -- Thermostats

Location, Manufacturer and model number	Pneumatic thermostats are located in each classroom and in all other areas of the building. They are _____
Mode of operation	The thermostats vary between day and night settings based on the air pressure in the system. Day pressure _____ Night pressure _____
When installed	
Scheduled maintenance:	Thermostats are to be calibrated annually.
Scheduled replacement	Units scheduled for replacement in _____
Notes:	Detailed manual on proper operation of the thermostats can be found in _____. Include training on thermostats for teachers.
Energy Upgrade	Upgrade of entire system to DDC to be undertaken at the next major renovation.

Central Control System - DDC

Section(s)	
Location, Manufacturer and model number	There is a Direct Digital Control (DDC) system for all the building's HVAC functions. Program used is _____ version _____. The program is accessed by _____.
Mode of operation	The DDC system controls on/off schedule on all air handlers and unit ventilators. It also controls and monitors room temperature. More detailed information can be found in the "Sequence of Operations" section of the building specifications located on bookshelf _____ in the maintenance office.
When installed	
Occupied cycle	Ventilation runs from 7:30 AM until 3 PM on days when students are present. The rest of the year the ventilation is off except when needed for humidity control. Day cycle for heating starts at 6 AM during shoulder seasons, 5 AM during winter and there is no setback during extremely cold periods. The system sets back ten degrees from the day setting.
When last serviced	DDC programming history is in folder _____ in the main filing cabinet in the maintenance office.
Scheduled maintenance:	Annual inspection of system for calibration and proper operation. See maintenance contract. Calibrate outdoor temp. sensor also.
Scheduled replacement	Unit scheduled for software upgrade in _____
Notes:	Install a UPS (uninterruptible power supply) for the control computer. Deviations from setpoints can be found by checking the temperature history in the various rooms. This can indicate improperly functioning valves etc. Trending information on all the systems functions should be checked on a _____ basis.

Demand Control Ventilation

Building Section(s)	
Location, Manufacturer and model number	There are carbon dioxide sensors in the auditorium and the gym. They are _____ sensors.
Mode of operation	The CO2 sensors control the supply and return fan speed through a variable speed drive and also control the outside air damper. When CO2 is satisfied (below 800 ppm) the speed drive reduces speed to ___ and the outside air damper to _____.
When installed	
Scheduled maintenance:	Annual calibration of the CO2 sensors and monitoring to make sure that the system is operating correctly.
Scheduled replacement	Unit scheduled for software upgrade in _____
Notes:	
Energy Upgrade	

_____ Control System

Section(s)	
Location, Manufacturer and model number	
Mode of operation	
When installed	
Occupied cycle	
When last serviced	
Scheduled maintenance:	
Scheduled replacement	
Notes:	

3.5. Electrical and Lighting

Electrical take pictures of circuit identification information in panel boxes and create a file on a computer to store it.

Electric Rates	
Utility	Green Mountain Power
Rate	
Demand (kW) charge	We are charged ____ per peak kW and ____ for off peak kW Peak hours are _____. (This school is charged a demand charge on the electrical bill for its highest 15 minute draw at any period of the month.)
Usage (kWh) charge	
Customer charge	
Power factor penalty	If PF fall below ____ %. Our PF is above/below the cutoff.
Notes:	The school reaches its peak demand weekdays between __ AM and __ PM. Obtain peak times from the power company. Install PF correction capacitors if in penalty. Check requirements of the different rate structures. Considerable savings may occur if you can get on a more favorable rate. Meet with utility representative annually to review power costs and rates. There are firms that will buy capacity from schools to reduce their summer peak. If this is a potential for this school, talk to your utility.
Energy Management	Move shed able loads outside of peak hours. Consider sub-metering to determine usage of master metered buildings or specific loads.

Energy Monitoring	
Description	Obtain copies of all fuel and electric bills. Monitor usage and track over time to discern trends. This school is charged a demand charge on the electrical bill for its highest 15 minute draw at any period of the month. This needs to be monitored carefully. See energy use history with attachments. Check billing information directly on the utility's website.
Energy Policy	
Notes:	Keep track of demand charges and power factor percentages to avoid penalties or over-charges. Power factor correction is relatively easy to do by installation of capacitors.
Energy Upgrade	Consider ways to reduce maximum demand by scheduling use of equipment. Evaluate potential of demand limiting equipment.

Power Transformer – use if district owned	
Ownership	The transformer is owned by the school district.
Capacity	
When installed	
Schedule for replacement	
Notes:	Was tested for PCBs - - not present.

Energy Upgrade	Transformer is oversized because building used to be electrically heated. Check sizing for new replacement.
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Lighting

Lighting - Classrooms	
Building Section(s)	
Type/number of fixtures	Each classroom has 2- lamp recessed parabolic reflector 32 watt t-8s in three rows. See lighting schedule.
Mode of operation	There are two switches. One for the row near the windows and one for the other two rows. This allows the row near the window to be shut off when there is enough ambient light.
When installed	
When last serviced	
Scheduled maintenance:	Annual cleaning of fixtures and replacement of broken parts.
Scheduled replacement	Group re-lamp scheduled for _____.
Notes:	Annual teacher training to include advice on switching and shutting off lights. Student lighting monitor assigned to check for lights left on.
Energy Upgrade	Check with VSA-SEMP for the latest lighting programs from Efficiency Vermont. Consider the ReLight program that pays for lighting designers to help upgrade lighting. Upgrade switch to occupancy sensor – manual on and auto off. Automatically switch row by windows with light sensor. Replace lamps and ballasts with high performance T-8 system. Check on latest status of LED lighting options.

Lighting - Hallways	
Building Section(s)	
Type/number of fixtures	Each hall uses _____ fixtures spaced eight feet apart. They are _____.
Mode of operation	There is a keyed switch used only by building staff. Lights are turned on when staff arrives in the morning and shut off when janitors are finished at night.
When installed	
When last serviced	
Scheduled maintenance:	Annual cleaning of fixtures and replacement of broken parts.
Scheduled replacement	Group re-lamp scheduled for _____.
Energy Upgrade	Put hall lights on dual sensor occupancy sensors.
Notes:	Have custodians shut lights off in areas not currently in use. Replace any older fixtures with high performance T-8 fluorescents.

Lighting - Classrooms

Building Section(s)	
Type/number of fixtures	Each classroom has 2-lamp recessed parabolic reflector 32 watt t-8s in three rows. See lighting schedule.
Mode of operation	There are two switches. One for the row near the windows and one for the other two rows. This allows the row near the window to be shut off when there is enough ambient light.
When installed	
When last serviced	
Scheduled maintenance:	Annual cleaning of fixtures and replacement of broken parts.
Scheduled replacement	Group re-lamp scheduled for _____. Use roller ladders to improve ease of project.
Notes:	Annual teacher training to include advice on switching and shutting off lights. Student lighting monitor assigned to check for lights left on.
Energy Upgrade	Upgrade switch to occupancy sensor – manual on and auto off. Automatically switch row by windows with light sensor. Replace lamps and ballasts with high performance T-8 system. Check with VSA-SEMP for the latest lighting programs from Efficiency Vermont. Consider the ReLight program that pays for lighting designers to help upgrade lighting. Check on latest LED lighting options.

Lighting - Hallways

Building Section(s)	
Type/number of fixtures	Each hall uses _____ fixtures spaced eight feet apart. They are _____.
Mode of operation	There is a keyed switch used only by building staff. Lights are turned on when staff arrives in the morning and shut off when janitors are finished at night.
When installed	
When last serviced	
Scheduled maintenance:	Annual cleaning of fixtures and replacement of broken parts.
Scheduled replacement	Group re-lamp scheduled for _____. Use roller ladders to improve ease of project.
Energy Upgrade	Put hall lights on dual sensor occupancy sensors. Use of occupancy sensors also helps security.
Notes:	Have custodians shut lights off in areas not currently in use. Replace any older fixtures with high performance T-8 fluorescents.

Lighting - Auditorium

Type/number of fixtures	40 - 300 watt incandescent overhead fixtures. 20 wall sconces with 100 watt incandescent bulbs.
Mode of operation	There is a bank of switches by the entry door and dimmer switches for the overhead lights.
When installed	
When last serviced	
Scheduled maintenance:	Annual cleaning of fixtures and replacement of broken parts.
Scheduled replacement	
Energy Upgrade	Replace incandescents with dimmable LEDs. Add fluorescent lighting to be used when dimmable lights are not needed. Replace incandescent bulbs in sconces with CFLs or LEDs.
Notes:	

Lighting – Gym/multipurpose Room

Type/number of fixtures	20 - - 400 watt metal halides
Mode of operation	There is a bank of switches by the entry door.
When installed	
When last serviced	
Scheduled maintenance:	Annual cleaning of fixtures and replacement of broken parts.
Scheduled replacement	
Energy Upgrade	Convert to T-5 high bay fluorescent fixtures and control with occupancy sensors.
Notes:	Some fixtures come with pre-installed occupancy sensors. They work well.

Exit Lights

Type/number of fixtures	____ fixtures. Some LED some fluorescent. Some contain emergency lighting.
Mode of operation	Emergency lighting comes on in the event of a power failure.
When installed	
When last serviced	
Scheduled maintenance:	Annual cleaning of fixtures and replacement of broken parts. Test emergency lighting once a year.
Scheduled replacement	Change battery backups and notification panels every 5 years.
Energy Upgrade	Upgrade to all LED exit lights and LED emergency lights Use combo units to improve emergency lighting as needed
Notes:	

Lighting – Outside

Type/number of fixtures	
Mode of operation	There is a timer located in the electrical panel room. Settings are from dusk till dawn and changed periodically with the seasons.
When installed	
When last serviced	
Scheduled maintenance:	Annual cleaning of fixtures and replacement of broken parts.
Scheduled replacement	Group re-lamp scheduled for _____. Replace battery in timer annually.
Energy Upgrade	Control outside lights with a timer with battery backup and a photocell. The timer enables the lights to come on and the photocell helps to ensure that they aren't left on unnecessarily. Schedule lights to come on at dark and shut off at 11 PM, come on again at 6 AM and off at 8 AM (during winter).
Notes:	If outside lights are from the electric utility, consider if you would be better off using your own building or pole mounted lighting.

Lighting - _____

Building Section(s)	
Type/number of fixtures	
Mode of operation	
When installed	
When last serviced	
Scheduled maintenance:	
Scheduled replacement	
Notes:	
Energy Upgrade	

Lighting - _____

Building Section(s)	
Type/number of fixtures	
Mode of operation	
When installed	
When last serviced	
Scheduled maintenance:	
Scheduled replacement	
Notes:	
Energy Upgrade	

Lighting – Misc.

Type/number of fixtures	30 incandescent and 35 fluorescent fixtures in misc. areas of the building.
Mode of operation	Controlled by wall switches.
When installed	
When last serviced	
Scheduled maintenance:	Annual cleaning of fixtures and replacement of broken parts.
Scheduled replacement	
Notes:	
Energy Upgrade	Replace incandescent bulbs with CFLs or LEDs. Use dual sensor occupancy sensors to control lighting in areas with intermittent use. Replace older lighting with high performance T-8 units.

3.6. Electrical – Plug Loads

Computers

Type/number of computers	There are three computer servers located in the room off the library. A total of 15 computers with CRT monitors and 30 with LCD screens.
Mode of operation	Servers are kept on 24/7 because of dial-in capability. Monitors are left off at the switch on the monitor except when needed. Other computers are turned on as needed by staff and have sleep software activated.
When last serviced	
Scheduled maintenance:	Check plugs and wires annually for frayed or broken insulation.
Scheduled replacement	
Energy Policy	All computers except servers to be on power strips and shut off at the end of the day.
Notes:	Annual teacher training to include advice on activating sleep software and shutting off computers and monitors when not in use.
Energy Upgrade	Consider getting a low cost Kill-a-Watt meter that can be used to see how much energy computers and other plug loads use on a regular basis. Consider Smart power strips.

Dishwashers

Make and model Energy Usage	There is a commercial Hobart dishwasher model _____. The booster is electric and draws 45 kW.
Scheduled maintenance:	
Scheduled replacement	
Notes:	Change nozzles periodically. They use more water when worn.
Energy Upgrade	Convert to propane at time of booster replacement or consider low-temperature chemical wash to reduce demand charges. Also consider the option of using an instant hot water heater coupled with a small storage tank. Savings come primarily from the reduction in electrical demand charges.

Dishwashers

Make and model Energy Usage	There is a commercial Hobart dishwasher model _____. The booster is propane fired.
Scheduled maintenance:	Check monthly for carbon monoxide and propane leaks.
Scheduled replacement	
Notes:	
Energy Upgrade	

School Bus Block Heaters

Number and Watts	There are ____ block heaters. They each draw ____ watts.
Scheduled maintenance:	
Scheduled replacement	
Notes:	They are on timers and come on at 5 AM during cold winter periods.
Energy Upgrade	Consider lower wattage boosters.

Kilns

Type/energy draw	There are two kilns in the art room that each draw 11 kW.
Mode of operation	Kilns are used approximately once a week during the school year.
When last serviced	
Scheduled maintenance:	Check interlock with exhaust fan for proper operation.
Scheduled replacement	
Energy Policy	Use kilns after 3 PM so that their use doesn't coincide with peak electrical demand hours.
Notes:	Explain the demand impact to the person who uses the kiln so they understand that a single use during peak times can have an impact.
Energy Upgrade	

Kitchen Equipment

Motor size, model, manufacturer	See kitchen equipment schedule with attachments.
Steamers	Check pressure relief valves for proper operation once a year. Clean and de-scale steamers once a year.
Freezers and coolers	Clean evaporator coils once a year. Oil motors once a year.
Ice Makers	Chemically clean once a year. Clean coils and oil motors annually.
Notes:	Check kitchen carbon monoxide levels. Consider adding propane detection.
Energy Upgrade	Check Consortium For Energy Efficiency website (www.cee1.org) for kitchen equipment upgrade options.

Refrigeration

Type/number of refrigerators	There are five refrigerators in the kitchen area. A walk-in freezer. An older refrigerator in the teacher's lounge. There are 21 small refrigerators in classrooms.
Scheduled maintenance:	Clean condensers twice a year on all refrigeration units. Check gaskets annually on all units.
Scheduled replacement	Teachers' lounge refrigerator to be replaced with an energy star rated unit in ____.
Energy Policy	Choices: - ban small refrigerators - - allow them but require they be taken home over holidays and summers - - require that they be energy star rated - - allow them but charge a monthly fee for those that want them.
Notes:	All energy using equipment brought into the school by staff should be approved and inspected by maintenance to ensure that they don't create a hazard.
Energy Upgrade	Consider replacing refrigerators in the kitchen with a walk-in cooler. Move condenser outside. Consider the "Freeaire" system that uses outside air to service the walk-ins when cold enough air is available.

Phantom Loads

Description	These are the many miscellaneous uses of power that add up in a large facility. Of special interest is all the units that appear to be off but still draw power. These include the little plug-in transformers (power cubes) and instant-on televisions etc.
Energy Policy	Place all miscellaneous loads on power strips that are shut off when not needed.
Notes:	All energy using equipment brought into the school by staff should be approved and inspected by maintenance to ensure that they don't create a hazard.
Energy Upgrade	Use only Energy-Star rated equipment. Consider working with students to identify and help manage plug loads by shutting them off when not needed and working to create a "hibernation vacation" plan for the building.

Make and model	
Energy Usage	
Scheduled maintenance:	
Scheduled replacement	
Notes:	
Energy Upgrade	

Misc.

Misc – describe	
Building Section(s)	
	Some possible other loads: well pumps, sewer pumps,
Scheduled maintenance	
Scheduled replacement	
Notes:	
Energy Upgrade	

Misc – describe	
Building Section(s)	
Scheduled maintenance	
Scheduled replacement	
Notes:	
Energy Upgrade	

Misc – describe	
Building Section(s)	
Scheduled maintenance	
Scheduled replacement	
Notes:	
Energy Upgrade	

4. NON ENERGY SECTION

These are additional areas submitted by users and included here for your benefit.

4.1. Electrical / Maintenance

Type/number of panels	
Mode of operation	
When installed	
When last serviced	
Scheduled maintenance:	Annually exercise switches and contacts. Tighten loose connections in panels. Use only licensed electricians for work in the panels. Check insulation on wiring.
Scheduled replacement	Replace pitted or corroded contacts.
Notes:	Take thermal pictures of panels to check for hot spots. Follow all required safety requirements when doing this work.
Energy Upgrade	

4.2. Fire Safety Equipment

Type/number of fixtures	
Mode of operation	To provide notification to the fire and police departments in the event of a fire.
When installed	
When last serviced	
Scheduled maintenance:	Perform professional inspection on fire systems, sprinkler systems, and fire extinguishers annually. Perform monthly fire drills, using different pull stations every drill to verify each one functions properly. Perform monthly fire extinguisher inspections for proper charges.
Scheduled replacement	Clean smoke detectors annually or as needed. Replace when necessary.
Energy Upgrade	
Notes:	

4.3. Elevators and Lifts

Type/number	
Mode of operation	To convey students and teachers to upper and lower levels of the building.
When installed	
When last serviced	
Scheduled maintenance:	Professionally inspected annually by a state inspector – including handicapped lifts
Scheduled replacement	Upgrade as needed to maintain code compliance.
Energy Upgrade	
Notes:	

Placeholders – These areas are included as placeholders to allow for easy access for the already set up interactive index. Just delete the areas that are not used.

4.4. Hazardous Materials

4.5 Cleaning Procedures and Supplies

4.6. Pest Control – integrated pest management

4.7. Annual Reporting Requirements

4.8. Grounds Maintenance

4.9. Facilities Policies and Procedures

4.10. Cameras and Access Systems

4.11. Equipment Maintenance List

4.12. Design Best Practices

Insert best practices as a guide for planning renovations and new construction - - ie – type of locksets and door closers to specify, delineate snow push areas on site plans, water drainage etc.

4.13. Other

5. APPENDICES

5.1. Critical Phone Numbers

5.2. Preferred vendor list with contact information

5.3. Required Inspections and Trainings

From Tim Pedrotty - VSBIT

Here is the Annual Inspection and Training Requirements. This info can be found on VSBIT's web site.

Inspection required annually:

- Sprinkler systems
- Fire extinguishers
- Fire alarm systems
- Kitchen hood fire suppression systems
- Boilers and pressure vessels - - including compressor tanks.
- Gym and stadium bleachers
- Elevators
- Septic Systems
- Water Systems
- AHERA - Asbestos Hazard Emergency Response Act
- TIER TWO, Hazmat - Vermont's Community Right -To-Know Program
- Backflow Preventer inspections

Required annual training:

- Respiratory, (PPE only) 1910.134(k)(4) (Carpenters, painters, HVAC mechanics, lead or asbestos abatement workers)
- Hazardous Materials 1910.120(e)(8) (Custodians, biology of chemistry teachers, office staff, receiving employees, maintenance personnel)
- Blood borne Pathogens 1910.1030(g)(2)(iv) (Nurses, staff trained and assigned to perform first aid, coaches, athletic trainers, plumbers, custodians)
- Fire Extinguisher and Hose 1910.157(g)(4) (Employees designated to use fire extinguishers or fire hoses to fight fires)Noise 1910.95(k)(l) (Grounds equipment operators, shop teachers) *
Electrical 1910.269(a)(2)(iii) (Electricians)
- Health: Lead 1910.1025(l)(1)(iv) & Asbestos 1910.1001(j)(7)(ii)
(Painters, carpenters, electricians, teachers, custodians, ground workers)
- Medical First Aid 1910.151(b) (In absence of an infirmary, clinic, or hospital in near proximity employees assigned to perform first aid)
- Confined Space 1910.146(g)(2)(i)-(iv) (HVAC mechanics, plumbers, electricians, grounds worker)

5.4. School freeze protection check list

In an effort to assist school building operators we have compiled the following check list based in part from prior insurance claims and lessons learned.

1. If you had projects that required access to pipes in the past year check to see if the insulation was replaced after the repairs were completed.
2. Check and confirm that all combustion air dampers are closing when the boiler are not running.
3. Test all low water cut off and manual reset high limit controls for proper operation monthly.
4. If the school's heating system has glycol test the level of freeze protection and the PH level. Your boiler service company can perform this test for you.
5. Check the intake air dampers in your unit vents to confirm that they close during unoccupied cycles.
6. Make sure all garden hoses have been removed and that the outside water faucets have been drained.
7. Confirm that all of your sprinkler system inspections are complete and all recommendations are complete. You should also familiarize your staff with where and how to turn off water supplies in a flood condition.
8. You should consider adding a low temperature alarm system. There are many different ways to do this. It can be as simple as a thermostat that triggers a flashing light to having an alarm monitoring company call a list of contacts.
9. Consider having an arrangement with a local company that rents temporary heating units commonly referred to as Heat Wagons. GW Savage is one company that has these units preloaded into trailers and can set them up for you if your school does not have a maintenance staff.
10. For ice on walk ways consider having some bags of sand that are kept in a heated area that can be used when it is too cold for ice melting products to work.
11. Provide and require staff members that are spreading the ice melting products to wear crampon cleats that attach to your boots.

If you have any questions or require assistance implementing any of these strategies please contact me at (802) cell 316-1275.

Lyall Smith

5.5. Key Websites

Underground Storage Tank Requirements - - Agency of Natural Resources

<http://www.anr.state.vt.us/dec/wastediv/ust/home.htm>

Vermont Envision Program - - Indoor Air Quality Issues

<http://healthvermont.gov/enviro/envision.aspx>

Consortium for Energy Efficiency - - lists commercial energy efficient kitchen and other equipment. Information on a variety of energy products and strategies.

<http://www.cee1.org/>

Vermont School Board Insurance Trust - - Lot's of resources to help manage school buildings.

<http://vsbit.org/smrc/>

Efficiency Vermont - - Information on incentives with downloadable prescriptive forms. Information on contractors and many energy issues.

<http://www.encyvermont.com/pages/>

Department of Energy - - Energy Smart Schools

<http://www1.eere.energy.gov/buildings/energysmartschools/>

EPA – Tools for Schools

<http://www.epa.gov/iaq/schools/actionkit.html>

Usage Calculator - - shows cost of running equipment.

<http://michaelbluejay.com/electricity/howmuch.html>

5.6. Links to Manuals

The Collaborative for High Performing Schools - - includes guides for best maintenance practices and many other documents. All downloadable, some printable, some not.

<http://www.chps.net/manual/index.htm>

Planning Guide for Maintaining School Facilities – by U.S. Department of Education

<http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2003347>

School Operations and Maint. - - Best Practices for Controlling Energy Costs - - A guidebook for K-12 School System Business Officers and Facilities Managers by US Department of Energy.

www.azdeq.gov/function/about/download/greenguide2.pdf

New York State Education Department (and Energy Dept.) Capital & Maintenance Planning Reports Toolbox (Excel Spreadsheet)

http://www.emsc.nysed.gov/facplan/forms/Comprehensive_Maintenance_Plan_052005.xls

5.7. Floor plan

Evacuation plan drawing may be used) – designates building sections, location of boiler room(s) and fuel storage. Name the building sections as you commonly refer to them at your school.

5.8. Single line drawings of plumbing, electrical and HVAC systems

These show in a simplified manner how the systems are set up and where to find key components, shutoffs etc.

5.9. Controls

Sequence of operations – typically extracted from specifications – this outlines how the controls were meant to be operated in the original design.

5.10. List of active warranties and maintenance contracts

5.11. Preventive Maintenance Plan

5.12. Environmental Health Plan

5.13. Model Energy Policy

Distributed on the Vermont School Boards Association website <http://www.vtvsba.org/policy/e10.html>

5.14. Long Term Capital Plan

5.15. Copy of School Energy Management Program - Site Assessment Report

6. SCHEDULES

Lists of types of equipment and information about them.

6.1. Lighting

6.2. Motors

6.3. Filters and Belts

6.4. Valve Tag Key

6.5. Key Schedule

6.6. Doors and Windows

7. EFFICIENCY VERMONT INCENTIVE PROGRAM INFORMATION AND FORMS

8. SAMPLE QUICK SHEET

8.1. Sample – Emergency Boiler Problems

Problem: Black smoke coming from chimney.

Immediate Action: Turn off the emergency switch to boilers. The switch has a red cover plate and is located just inside the door to the boiler room from the hallway. If the room is locked, the principal, custodians, and Mr. Jones has the key.

Next: Page facilities director, _____, at _____ or call at _____ and contact _____ Plumbing and Heating on their 24 hour hotline, _____.

Discussion: Black smoke from the chimney is an indication that the boiler is not firing correctly. This can result in fouling of the boiler and an increase in generation of carbon monoxide, a poisonous gas. The boiler shutdown eliminates the risk but the boiler must be fixed expeditiously, especially in cold weather. It is possible that the fix will not be too complicated and if the response will happen quickly, you may not need to cancel classes.