l. Quantity of 24-4 ft. 4 lamp T5HO High Bay fixtures and 8-4 ft. 3 lamp T5HO High Bay fixtures in Gym to be retrofit with high lumen 4 ft. Linear DLC Premium listed LED High Bay retrofit kits with LED drivers. Existing occupancy sensors will remain to control Gym lighting.

2. Exterior Lighting Upgrades:
   a. Quantity of 14 - 50 watt High Pressure Sodium Canopy fixtures to be replaced with 23 watt LED Energy Star Listed Canopy fixtures.
   b. Quantity of 1 - 250 watt High Pressure Sodium Flood fixture in rear parking lot fixture to be replaced with new 100 watt DLC Listed LED Flood fixture.
   c. Quantity of 1 - Existing exterior lighting timers will be replaced with new Astronomic/Programmable time clock.

ECM #2 – Building Envelope Upgrades

A detailed building envelope audit was performed to identify opportunities for reducing building infiltration and improving building envelope insulation.

Proposed Upgrades

Provide the following building envelope upgrades:

A. **Boothbay Region High School:**

1. Base Measures:
   a. 9 - Single commercial doors to be weather-stripped (3 dark bronze anodized).
   b. 1 - Single commercial interior boiler room door to be weather-stripped.
   c. 1 - Single commercial mechanical room access door to be weather-stripped (roof).
   d. 1 - Single commercial electrical closet interior door to be weather-stripped (electrical vault door in Wood Shop).
   e. 2 - Double commercial doors to be weather-stripped (1 dark bronze anodized).
   f. 2 - Overhead garage doors to be weather-stripped, 64 linear feet.
   g. 53 - Window casings to have trim removed, perimeters sealed and trim re-installed, 1,605 linear feet.
   h. 2 - Windows to be sealed at exterior with waterproof construction sealant, all existing sealants to be removed and surfaces treated for installation of new sealant, 48 linear feet.
   i. 5 - Roof top ventilators to be opened, dampers lubricated and perimeters sealed, 40 linear feet.
   j. 24 Ft - Mechanical room floor joint to conditioned space to be sealed.
   k. 300 Ft - Roof/wall joint to be sealed (20" H Dow Thermax Sheathing).
   l. 3 - Windows to be removed, properly disposed of and openings filled-in with 2" insulated FRP panels (gray), 2 @ 45.5"x24.5", 1 @ 92.5"x24.5", 30.5 linear feet, 22.5 square feet.
   m. 1 - Wall louver and duct sleeve to be sealed and insulated with 3" rigid board foam insulation (R21) at interior side of wall, 16 linear feet, 13.75 square feet.
   n. 14 - Unit ventilator louvers to be removed from exterior duct work cleaned, and perimeter interior wall/cabinet interface to be sealed with 2-component foam, 77"x12" at interface, 210 linear feet. All louvers to be re-installed at existing locations and caulked at perimeters with color matching construction sealant.
   o. 4 – Skylights on roof of original section of building to be removed when customer replaces roofing in summer 2018. Savings captured in Honeywell energy project, and cost captured by customer through separate roof replacement project.

2. Window Pane Replacements:
   a. A detailed survey was performed to identify existing windows which have failed or defective thermal breaks/seals between the thermal panes. Failed or defective thermal breaks cause unsightly windows, due to infiltration of water vapor, and more importantly they compromise the thermal integrity of the windows, resulting in additional heat loss. Windows with failed thermal breaks can be repaired by replacing the window panes with new window panes with thermal breaks. This will result in reduced heat loss and improved window appearance. The following windows were identified as being in need of pane replacement due to broken thermal breaks/seals.
   b. Replace 25 existing window pane units (240 Sq Ft) which have failed or defective seals, with new units. New units shall have maximum U value of 0.57 (R 1.75).

B. Boothbay Region Elementary School:

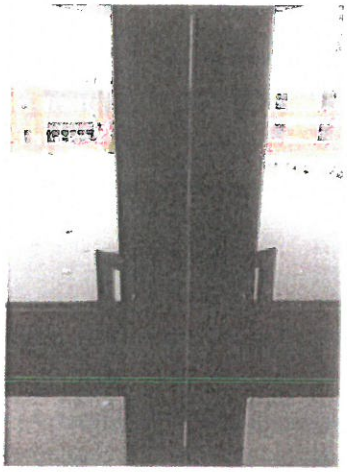
1. Base Measures:
   a. 35 - Single commercial doors to be weather-stripped (32 dark bronze anodized).
   b. 7 - Double commercial doors to be weather-stripped (3 dark bronze anodized).
   c. 2 - Roll-up garage door to be weather-stripped, 72 linear feet.
   d. 60 Ft - Exterior window sill to be sealed with waterproof construction sealant, all existing sealants to be removed and surfaces treated for installation of new sealant. Measure to prevent water leakage into rooms 110 and 109.
   e. 3 - Bulkheads to be sealed and insulated to R21, 128 square feet, 81 linear feet.
   f. 23 - Window panels (FRP panels below windows) to be re-caulked at exterior perimeter, 265 linear feet.
   g. 2 - Pipe penetrations, located in boiler room, to be sealed with fire block sealant at perimeter.
   h. 37 - Unit ventilator's to be sealed to interior wall/cabinet interface, 73"x28" at interface, 612 linear feet. Measure requires coordination with installation of new unit ventilator cabinets. (Note: One unit ventilator will not be included in savings estimates as it is in DDC graphics, but was not found in occupied room counts.)
2. Air-Sealing Existing Air-Barrier:
   a. 19,856 - Square feet of existing polyiso board insulation to be sealed at perimeters with 2-component fire rated foam, all foam to be coated with DC315 intumescent paint (approx. 14,891 linear feet).
   b. Option to Increase R Value To ASHRAE Standard of R38: 19,856 - Square feet of cellulose insulation to be added atop existing insulation to achieve an overall R38.
3. Adding Air-Barrier:
   a. 14,165 - Square feet of 1" Dow Thermax Sheathing to be installed to underside of truss joists and vertical knee-walls (hallways), seams to be sealed with FSK tape and 2-component fire rated foam, all foam to be coated with DC315 intumescent paint (approx. 10,961 linear feet).
   b. Option to Increase R Value to ASHRAE Standard of R38: 14,165 - Square feet of cellulose insulation to be added atop existing insulation to achieve an overall R38.
4. Window Pane Replacements:
   a. A detailed survey was performed to identify existing windows which have failed or defective thermal breaks/seals between the thermal panes. Failed or defective thermal breaks cause unsightly windows, due to infiltration of water vapor, and more importantly they compromise the thermal integrity of the windows, resulting in additional heat loss. Windows with failed thermal breaks can be repaired by replacing the window panes with new window panes with thermal breaks. This will result in reduced

heat loss and improved window appearance. The following windows were identified as being in need of pane replacement due to broken thermal breaks/seals.

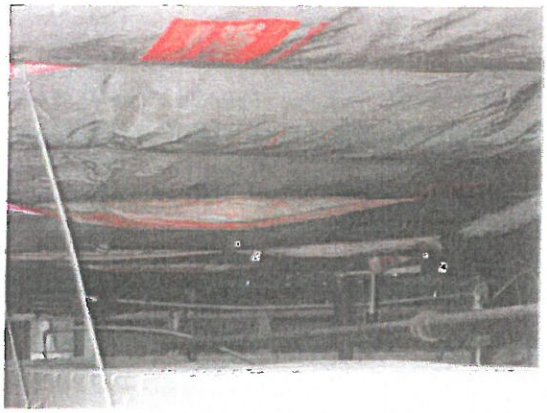
b. Replace 35 existing window pane units (427 Sq Ft) which have failed or defective seals, with new units. New units shall have maximum U value of 0.57 (R 1.75).

5. Overhead Door Replacement:

a. The Elementary School has 2 overhead metal roll-up doors which are original (1975 vintage) and which have little to no insulation value. Replace these two overhead doors with new insulated roll-up overhead doors. New overhead doors shall have minimum R value of R 4.23.

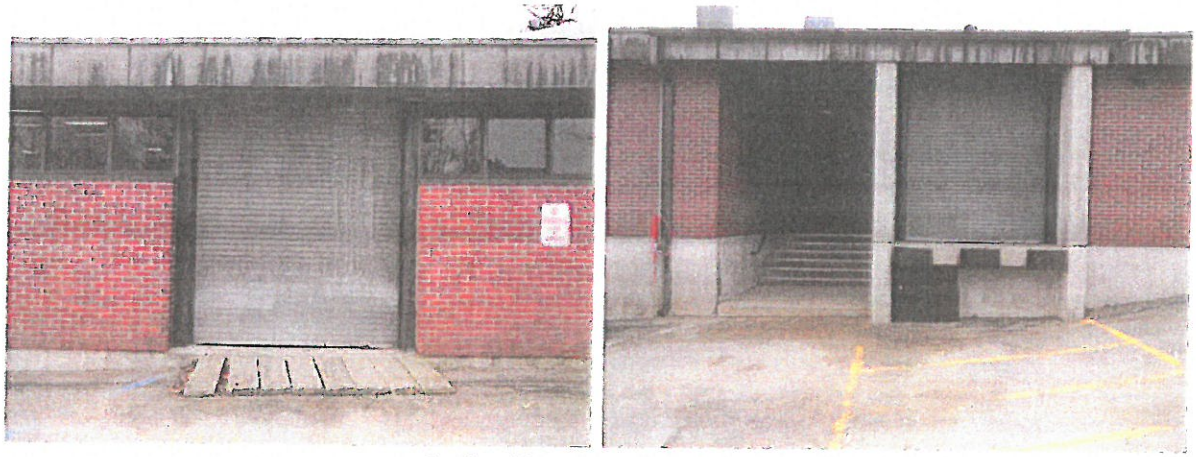



Examples of Door Weatherstripping Missing/Inadequate




Attic Insulation Inadequate/Missing in Areas

Typical Window with Failed Thermal Breaks/Seals



Overhead Doors to be Replaced

ECM #3 – Controls & HVAC System Upgrades

Provide the following Controls and HVAC system upgrades:

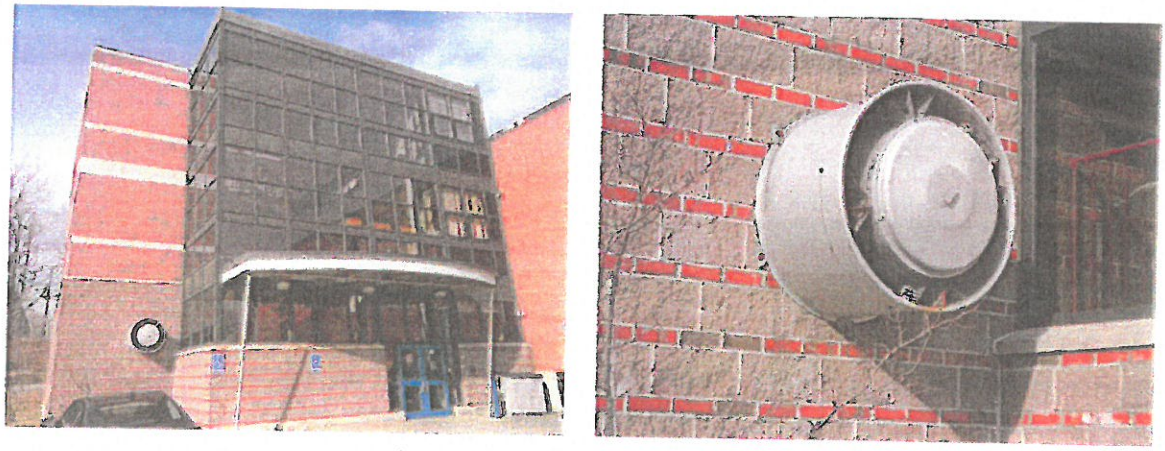
A. **Boothbay Region High School:**

1. Add ACV's & Associated Controls to Unit Ventilators:
   a. 14 unit ventilators have face & bypass dampers, and no control valves on the hot water coils. This allows potential overheating in spring and fall when the boiler/pumps are ON and the units are in full bypass mode. Add automatic control valves and associated controls to these 14 unit ventilators. When OAT is < 40 deg F, full flow through coils and used F & BP dampers for control. When OAT > 40 deg F, all airflow through coil and use ACV's for control.

Existing Unit Ventilator

2. Add Gravity Backdraft Damper to Fume Hood Exhaust System:
   a. The existing fume hood exhaust fan has no gravity backdraft damper. This allows air to gravity flow out of the fan whenever the exhaust fan is OFF. Provide a gravity backdraft damper, to prevent gravity airflow when the fan is OFF.

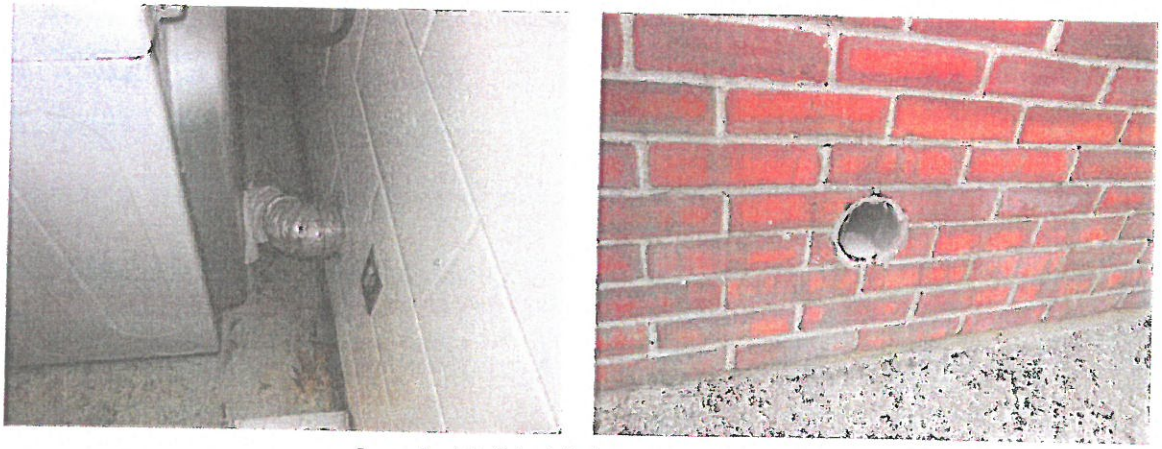
20. Add Rain Hood Over Art Room's Wall Mounted Exhaust Fan:
    a. The owner reports that the wall mounted exhaust fan, which serves the kiln hood, leaks water into the building during wind driven rain storms.
    b. Provide a rain hood over the wall mounted exhaust fan.



Art Room's Wall Mounted Exhaust Fan

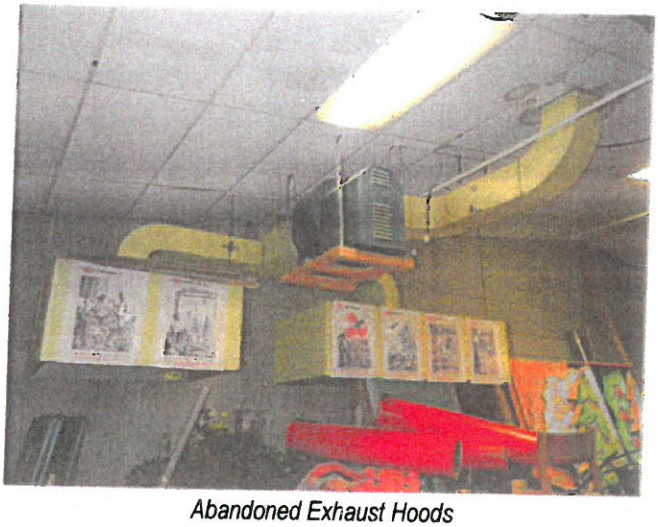
B. Boothbay Region Elementary School:

1. Add Backdraft Damper to Dryer Vent Outlet:
    a. In the Industrial Arts/Maintenance Shop, the dryer vent outlet at the outside wall is missing. This allows cold air to dump into the building through the dryer when it is OFF.
    b. Provide a new backdraft damper on the dryer vent outlet.



Dryer Vent Outlet – Missing Backdraft Damper

2. Disconnect and Cap Ductwork at 2 Abandoned Exhaust Hoods:
    a. In the Industrial Arts/Maintenance Shop, there are two abandoned yellow exhaust hoods. The ductwork for these hoods is still connected and it terminates outdoors. There is no active backdraft damper in this exhaust system, so warm building air gravity flows out through this ductwork when the exhaust fan is OFF.
    b. Disconnect the ductwork from the two abandoned hoods, and cap the ductwork to eliminate gravity airflow.



Abandoned Exhaust Hoods

3. Remove Abandoned Sawdust Collector & Cap Duct:
   a. In the Industrial Arts/Maintenance Shop, there is an abandoned sawdust collection system, with the sawdust collection cyclone located outdoors. The ductwork for this sawdust collection system is still connected and it terminates outdoors. There is no active backdraft damper in this exhaust system, so warm building air gravity flows out through this ductwork when the exhaust fan is OFF.
   b. Remove the outdoor sawdust collection cyclone, and cap the duct at the exterior wall, to eliminate gravity airflow.
   c. NOTE: The cyclone and its steel framework will be removed, but the concrete base will remain abandoned in place.

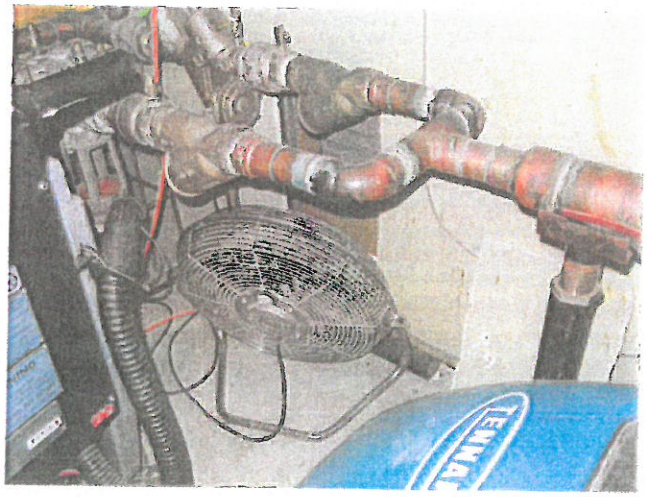
Abandoned Sawdust Collector

4. Add Backdraft Dampers to Rooftop Exhaust Fans:
   a. There are 3 rooftop exhaust fans (Fan # 5 – Fume Hood System, Fan # 9 – Dishwasher Exhaust Hood, Fan # 3 – Classroom Exhaust) that have no gravity backdraft dampers, so warm building air gravity flows out through these fans when they are OFF.
   b. Add gravity backdraft dampers to these 3 fans.



Fan #5, Fan #3, Fan #9 (On Left)

5. Add Transfer Fan System to Transfer Heat From Server Room to Main Entrance:
   a. The Server Room on the lower level overheats. Small portable fans have been installed to move the heat out of the room. That heat could be beneficially used in the winter, if it could be transferred to the entrance area.
   b. Provide a new transfer fan system, to transfer warm air from the Server Room to the entrance/lobby area down the hall.

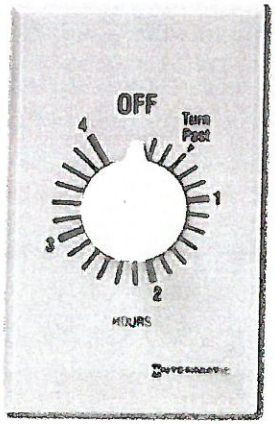


Fan Transferring Heat Out of Server Room

6. Provide Summer LP Gas Water Heater:
   a. Domestic hot water for the building is provided through heat exchangers that are connected to the heating system boilers. This requires the large boilers to be active in order for domestic hot water to be available. Currently the school shuts the boilers in the summer and does not use domestic hot water in the summer. There is a desire to have the ability to provide a small amount of domestic hot water for summer use.
   b. As there is an existing 500 gallon LP Gas tank outside the boiler room which serves the emergency generator, provide a new LP Gas water heater to supply domestic hot water for the summer. Serve the new gas water heater from the existing 500 gallon LP Gas tank.
   c. NOTE: The 500 gallon LP Gas tank may not be of sufficient size to serve the new gas water heater and the emergency generator simultaneously. This should not create a problem, as the boilers are capable of supplying domestic hot water if the emergency generator should be needed for an outage.

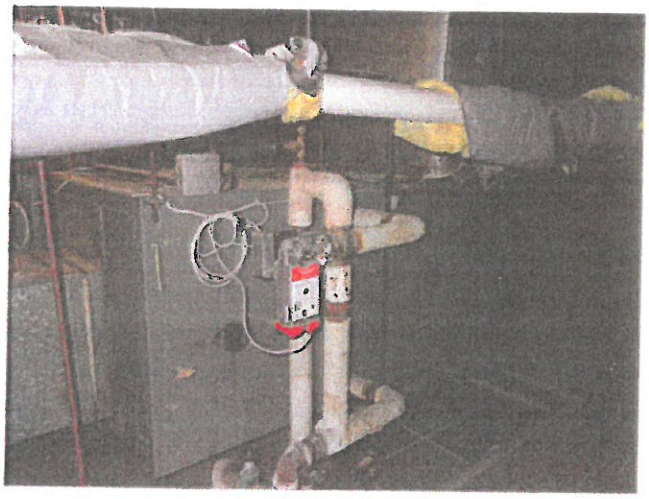
Existing 500 Gallon LP Gas Tank

7. Add 4 Hour No-Hold Timer Switch for Dishwasher Hood Exhaust Fan:
   a. The dishwasher exhaust hood's fan is currently controlled by an ON/OFF wall switch. At times, the switch can inadvertently be left ON overnight or on weekends by kitchen staff.
   b. Remove the existing wall switch and provide a 4 hour no-hold timer switch. This will require kitchen staff to wind the switch as much as 2 times per day (assuming an 8 hour shift and continuous operation), and will limit excessive run time of the fan to 4 hours if staff forget to turn the fan OFF.



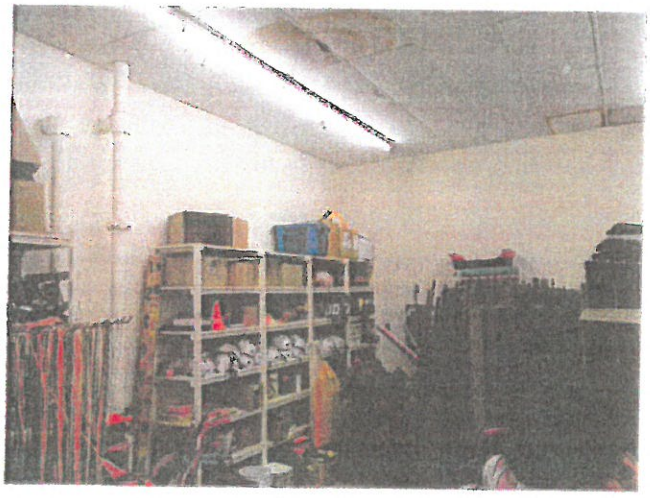
4 Hour No Hold Timer Switch

8. Add CO2 Controls To IA/Maintenance Shop Air Handling Unit (HV-7):
   a. The IA/Maintenance Shop's air handling unit (HV-7) was found during our surveys with its outside air damper at 45% open on a cold day (i.e. no need for free cooling) and with no occupancy in the IA/Maintenance Shop.
   b. Provide CO2 controls for HV-7, to reduce outdoor air as occupancy levels change.



HV-7

9. Provide Ventilation System for Band Room/Stage:
   a. The Stage is used as the Band classroom, and this room has no means of mechanical fresh air ventilation.
   b. Provide a new mechanical ventilation system, to supply code compliant ventilation air to the Band Room/Stage.
      1) Locate the new unit in the storage room behind the Stage.
      2) Provide new DDC controls for new unit, and interface with the operator workstation and user interface graphics.



Stage Storage Room

10. Replace 36 - 1977 Vintage Unit Ventilators:
    a. The 36 - 1977 vintage unit ventilators have exceeded their useful service lives. Although the outer cabinets of the units appear to be in generally fair to good condition, the service technician reports that these units have been problematic. Damper blades have been breaking loose from their shafts.

Temporary repairs have been made, but more permanent repairs require the units to be nearly disassembled, which would be very time consuming and costly, so replacement of these units is justified.

b. Replace the 36 existing unit ventilators with new units.
   1) New units will have face & bypass dampers and automatic control valves.
   2) Existing units are assumed to have code compliant power feeds. Upgrading of power feeds is excluded.
   3) Valves and accessories in the unit ventilator cabinets will be replaced with new.
   4) Casework will be modified as required, to accommodate differences in width from existing units to new units.
   5) Air and water balancing are included.

Typical Existing Unit Ventilator

11. <u>Replace HV-2, HV-3, HV-4 and Safety Upgrades to Mechanical Mezzanine:</u>
    a. HV-2 (Gymnasium):
       1) The Gymnasium air handling unit (HV-2) is original 1977 vintage. The unit has exceeded its useful service life and it is in poor condition. There are no blade or jamb seals on the dampers, the return air damper is bent, the return air duct connection to the bottom of the unit is separated. The unit has exposed fiberboard insulation on the inner surfaces of the unit housing, and that fiberboard liner has become friable and has deteriorated over time, sending fiberglass particles out through the ductwork and into the occupied spaces. The deteriorated fiberboard liner accumulates dirt, dust and is a potential for mold growth.
       2) The 2 duct mounted heating coils associated with HV-2 are also original 1977 vintage. They have exceeded their useful service lives and they are in poor condition. They are clogged with dust and debris from many years of use.
       3) Replace HV-2 with a new unit:
          a) New unit will be double wall construction, with solid interior walls so that exposed fiberboard insulation is eliminated.
          b) New unit will have a variable frequency drive (VFD) and associated controls, to allow the fan speed to be reduced when CO2 and temperature are satisfied.
          c) Similar to the existing unit, the new unit will <u>not</u> have a heating coil. Heating will be performed through the 2 duct mounted heating coils.
          d) Valves and accessories will be replaced with new.
          e) Air and water balancing of the new unit are included. Air balancing is limited to the unit only; air balancing is not included for the entire ductwork system.

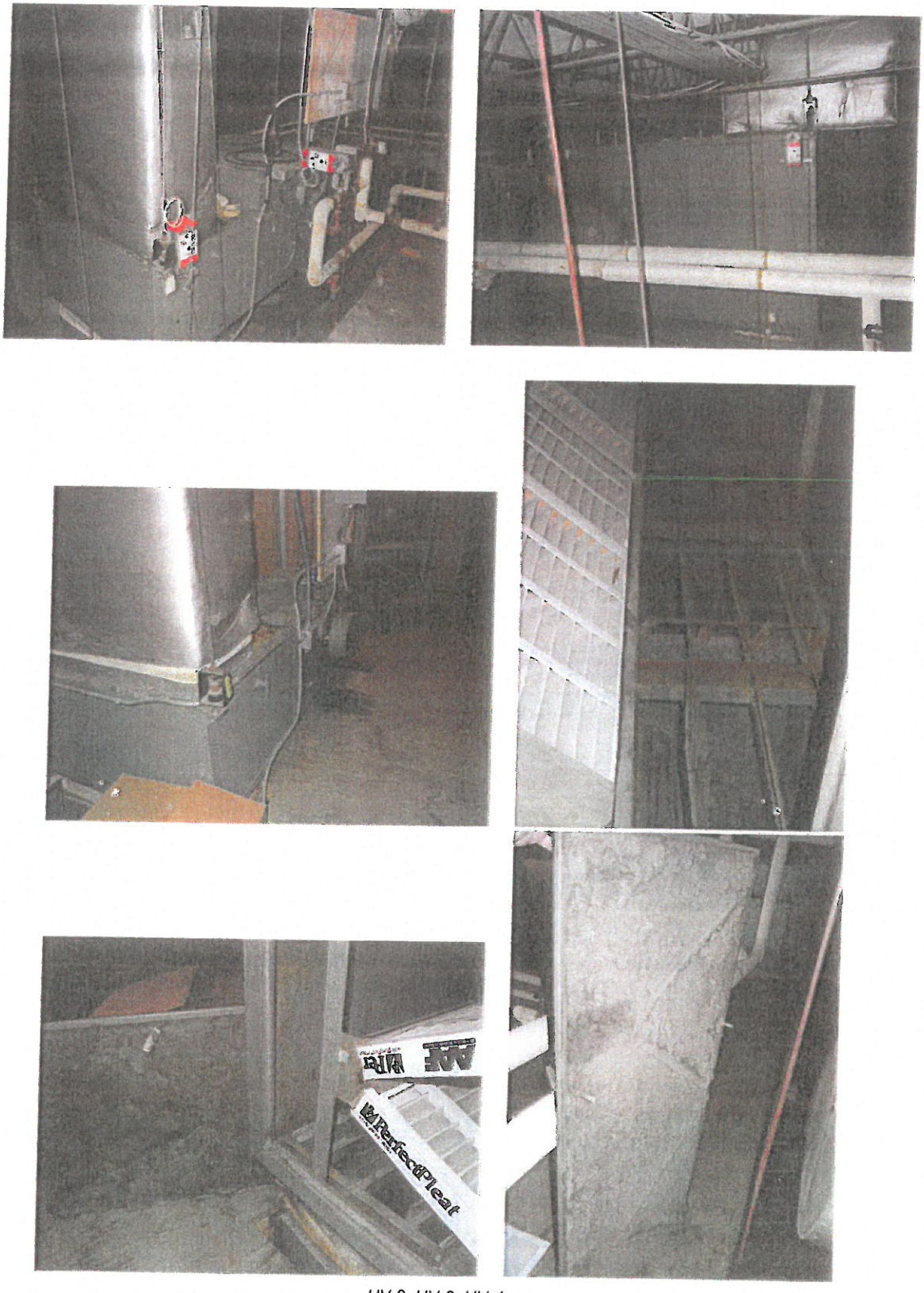
4) Replace 2 Duct Mounted Heating Coils:
   a) Replace 2 – 66" x 33" duct mounted heating coils.
   b) Valves and accessories to be replaced with new.
   c) Provide water balancing.

b. HV-3 (Locker Rooms):
   1) The Locker Room air handling unit (HV-3) is original 1977 vintage. The unit has exceeded its useful service life and it is in poor condition. There are no blade or jamb seals on the dampers. The unit has exposed fiberboard insulation on the inner surfaces of the unit housing, and that fiberboard liner has become friable and has deteriorated over time, sending fiberglass particles out through the ductwork and into the occupied spaces. The deteriorated fiberboard liner accumulates dirt, dust and is a potential for mold growth.
   2) The 4 duct mounted heating coils associated with HV-3 are also original 1977 vintage. They have exceeded their useful service lives and they are in poor condition. They are clogged with dust and debris from many years of use.
   3) Replace HV-3 with a new unit:
      a) New unit will be double wall construction, with solid interior walls so that exposed fiberboard insulation is eliminated.
      b) New unit will have a variable frequency drive (VFD) and associated controls, to allow the fan speed to be reduced when the existing Locker Room occupancy sensors indicate no occupancy.
      c) The new unit will have a heating coil. Additional heat will be provided by the 4 duct mounted heating coils (to be replaced).
      d) Valves and accessories will be replaced with new.
      e) Air and water balancing of the new unit are included. Air balancing is limited to the unit only; air balancing is not included for the entire ductwork system.
   4) Replace 4 Duct Mounted Heating Coils:
      a) Replace 4 duct mounted heating coils (1 – 14" x 12", 1 – 18" x 12", 2 – 6" x 6").
      b) Provide duct access doors for the new coils.
      c) Valves and accessories to be replaced with new.
      d) Provide water balancing.

c. HV-4 (Teacher's Lounge):
   1) The Teacher's Lounge air handling unit (HV-4) is original 1977 vintage. The unit has exceeded its useful service life and it is in poor condition. There are no blade or jamb seals on the dampers. The unit has exposed fiberboard insulation on the inner surfaces of the unit housing, and that fiberboard liner has become friable and has deteriorated over time, sending fiberglass particles out through the ductwork and into the occupied spaces. The deteriorated fiberboard liner accumulates dirt, dust and is a potential for mold growth.
   2) Replace HV-4 with a new unit:
      a) New unit will be a 1,200 CFM unit ventilator.
      b) Valves and accessories will be replaced with new.
      c) Air and water balancing of the new unit are included. Air balancing is limited to the unit only; air balancing is not included for the entire ductwork system.

d. Safety Upgrades to Mechanical Mezzanine:
   1) Provide safe access to the mechanical mezzanine where HV-2, HV-3 and HV-4 are located.
   2) Add a permanent access ladder in the nearby Janitor's Closet, with an extension of the mechanical mezzanine platform to connect to the new access ladder.

3) Expand the mechanical mezzanine platform as required to allow for safe maintenance and service access to the new air handling units and duct heating coils.
4) Add safety railing around the perimeter of the platform.

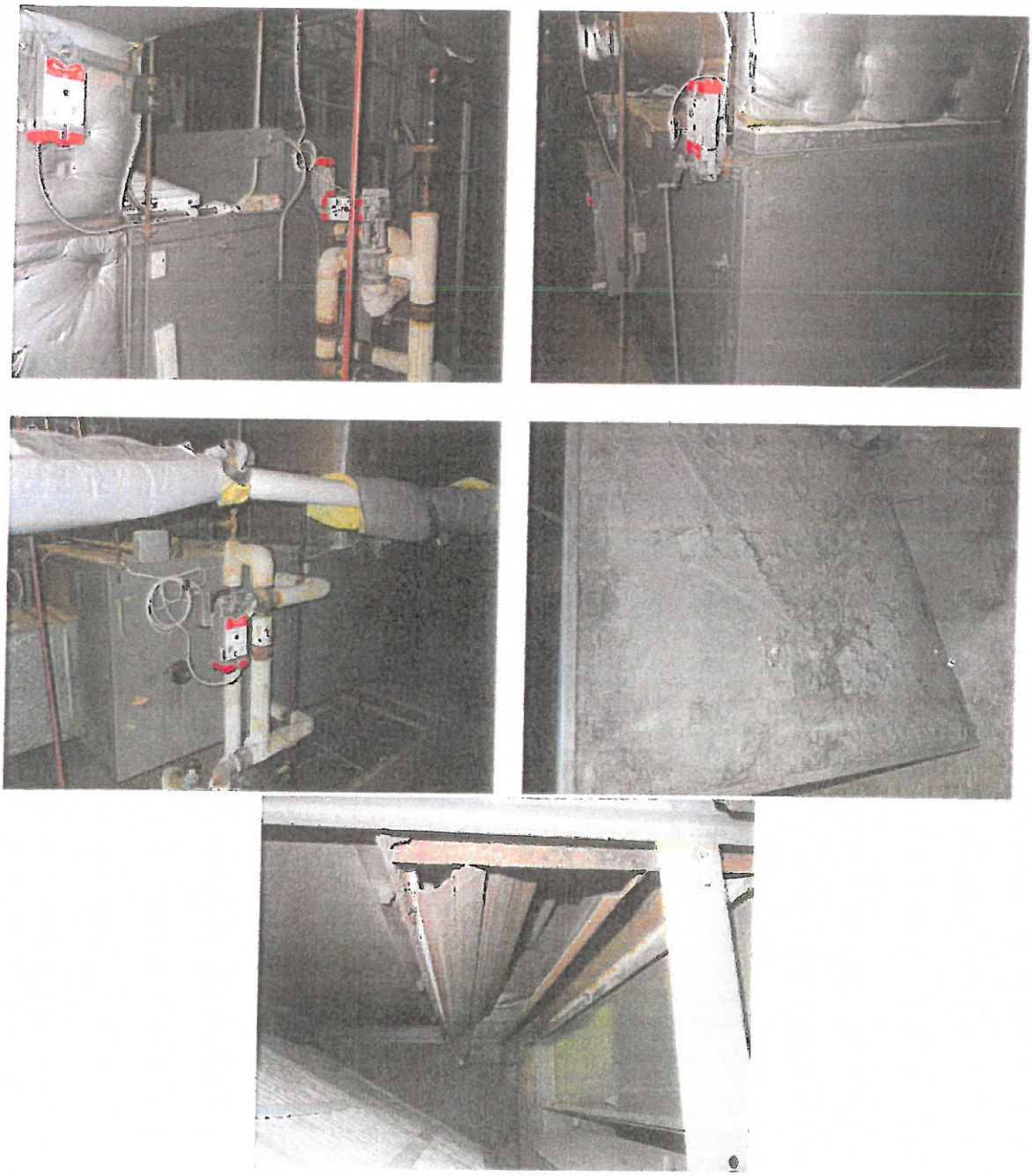


HV-2, HV-3, HV-4

12. Replace HV-5, HV-6, HV-7 And Safety Upgrades to Mechanical Mezzanine:
    a. HV-5 (Kitchen):
        1) The Kitchen air handling unit (HV-5) is original 1977 vintage. The unit has exceeded its useful service life and it is in poor condition. The unit has exposed fiberboard insulation on the inner surfaces of the unit housing, and that fiberboard liner has become friable and has deteriorated over time, sending fiberglass particles out through the ductwork and into the occupied spaces. The deteriorated fiberboard liner accumulates dirt, dust and is a potential for mold growth.
        2) Replace HV-5 with a new unit:
            a) New unit will be double wall construction, with solid interior walls so that exposed fiberboard insulation is eliminated.
            b) The new unit will have a heating coil. Valves and accessories will be replaced with new.
            c) Air and water balancing of the new unit are included. Air balancing is limited to the unit only; air balancing is not included for the entire ductwork system.
    b. HV-6 (Music):
        1) The Music air handling unit (HV-6) is original 1977 vintage. The unit has exceeded its useful service life and it is in poor condition. There are no blade or jamb seals on the dampers. The unit has exposed fiberboard insulation on the inner surfaces of the unit housing, and that fiberboard liner has become friable and has deteriorated over time, sending fiberglass particles out through the ductwork and into the occupied spaces. The deteriorated fiberboard liner accumulates dirt, dust and is a potential for mold growth.
        2) The 3 duct mounted heating coils associated with HV-6 are also original 1977 vintage. They have exceeded their useful service lives and they are in poor condition. They are clogged with dust and debris from many years of use.
        3) Replace HV-6 with a new unit:
            a) New unit will be double wall construction, with solid interior walls so that exposed fiberboard insulation is eliminated.
            b) Similar to the existing unit, the new unit will not have a heating coil. Heating will be performed through the 3 duct mounted heating coils.
            c) Valves and accessories will be replaced with new.
            d) Air and water balancing of the new unit are included. Air balancing is limited to the unit only; air balancing is not included for the entire ductwork system.
        4) Replace 3 Duct Mounted Heating Coils:
            a) Replace 3 duct mounted heating coils (1 – 28" x 18", 1 – 12" x 6", 1 – 30" x 18").
            b) Provide duct access doors for the new coils.
            c) Valves and accessories to be replaced with new.
            d) Provide water balancing.
    c. HV-7 (IA/Maintenance Shop):
        1) The IA/Maintenance Shop air handling unit (HV-7) is original 1977 vintage. The unit has exceeded its useful service life and it is in poor condition. There are no blade or jamb seals on the dampers. The unit has exposed fiberboard insulation on the inner surfaces of the unit housing, and that fiberboard liner has become friable and has deteriorated over time, sending fiberglass particles out through the ductwork and into the occupied spaces. The deteriorated fiberboard liner accumulates dirt, dust and is a potential for mold growth.
        2) Replace HV-7 with a new unit:
            a) New unit will be double wall construction, with solid interior walls so that exposed fiberboard insulation is eliminated.

b) The new unit will have a heating coil. Valves and accessories will be replaced with new.
c) Air and water balancing of the new unit are included. Air balancing is limited to the unit only; air balancing is not included for the entire ductwork system.

d. Safety Upgrades to Mechanical Mezzanine:
1) Provide safe access to the mechanical mezzanine where HV-5, HV-6 and HV-7 are located.
2) Add a permanent access ladder in the nearby Kitchen Storage room, with an extension of the mechanical mezzanine platform to connect to the new access ladder.
3) Expand the mechanical mezzanine platform as required to allow for safe maintenance and service access to the new air handling units and duct heating coils.
4) Add safety railing around the perimeter of the platform.



HV-5, HV-6, HV-7

13. Replace HV-1:

a. HV-1 (Administration):

1) The Administration air handling unit (HV-1) is original 1977 vintage. The unit has exceeded its useful service life and it is in poor condition. There are no blade or jamb seals on the dampers. The unit has exposed fiberboard insulation on the inner surfaces of the unit housing, and that fiberboard liner has become friable and has deteriorated over time, sending fiberglass particles out through the ductwork and into the occupied spaces. The deteriorated fiberboard liner accumulates dirt, dust and is a potential for mold growth.

2) The 4 duct mounted heating coils associated with HV-1 are also original 1977 vintage. They have exceeded their useful service lives and they are in poor condition. They are clogged with dust and debris from many years of use.

3) Replace HV-1 with a new unit:

a) New unit will be double wall construction, with solid interior walls so that exposed fiberboard insulation is eliminated.

b) Similar to the existing unit, the new unit will not have a heating coil. Heating will be performed through the 4 duct mounted heating coils.

c) Valves and accessories will be replaced with new.

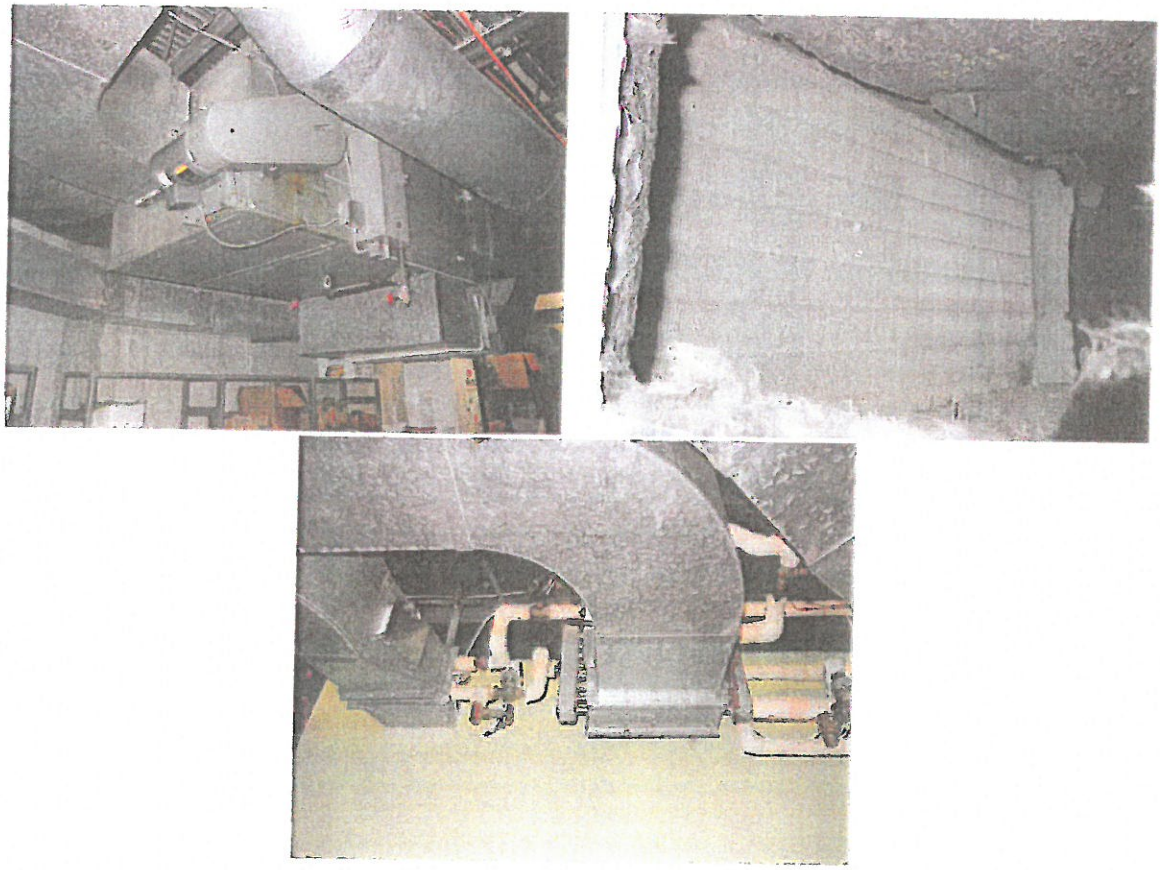
d) Air and water balancing of the new unit are included. Air balancing is limited to the unit only; air balancing is not included for the entire ductwork system.

4) Replace 4 Duct Mounted Heating Coils:

a) Replace 4 duct mounted heating coils (1 – 12" x 6", 1 – 12" x 12", 1 – 14" x 6", 1 – 24" x 12").

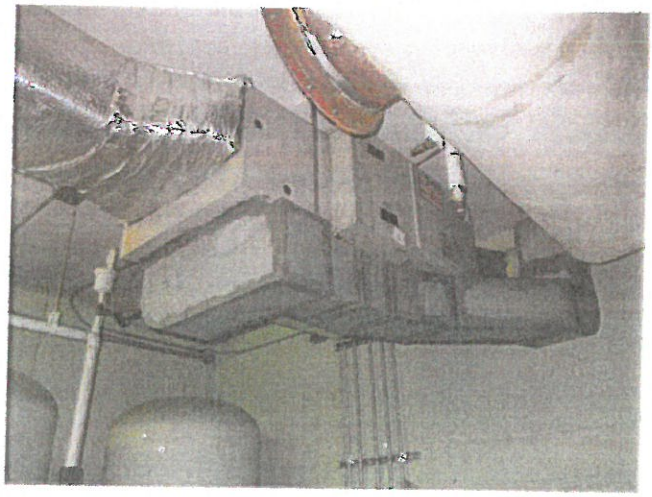
b) Valves and accessories to be replaced with new.

c) Provide water balancing.



HV-1

14. Replace FCU-1 And Extend Generator Vent Up Higher:
    a. FCU-1 (Computer Lab/Guidance):
        1) The Computer Lab/Guidance air handling unit (FC-1) is of unknown age, and it is in fair to poor condition. It appears as though the heating coil in this unit was disconnected, so the unit provides no heat.
        2) Replace FCU-1 with a new unit:
            a) New unit will be a unit ventilator with hot water coil and face & bypass dampers.
            b) Valves and accessories will be replaced with new.
            c) Air and water balancing of the new unit are included. Air balancing is limited to the unit only; air balancing is not included for the entire ductwork system.
    b. Extend Emergency Generator Vent Up Higher:
        1) The fresh air intake louver for FCU-1 terminates close to and at approximately the same elevation as the exhaust vent outlet of the emergency generator. This creates a serious danger of potentially drawing in carbon monoxide when the generator runs.
        2) Extend the emergency generator exhaust vent up, to an elevation that is a minimum of 10 feet above FCU-1 fresh air intake louver. Brace the emergency generator exhaust vent to the building wall with steel angle support braces.

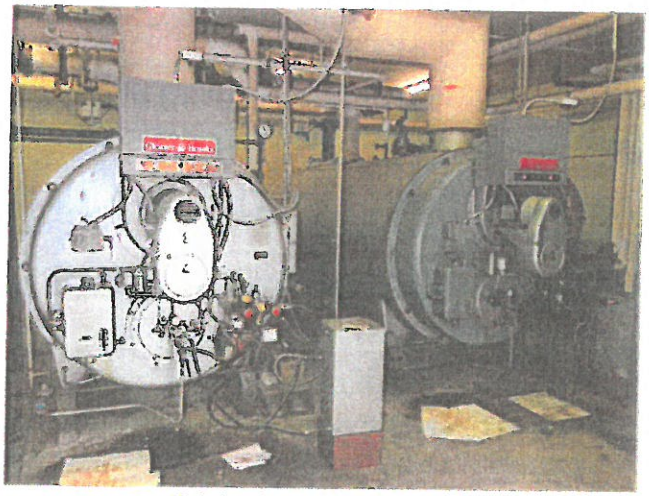


FCU-1

15. Replace Fuel Oil Transfer Pumps with New Day Tank:
    a. The existing fuel oil transfer pumps in the boiler room are original 1977 vintage. They have exceeded their useful service lives and they are in fair to poor condition. The existing Cleaver Brooks boilers require these pumps to run continuously during the heating season.
    b. Replace the existing fuel oil transfer pumps with a new fuel oil day tank with duplex pump set. This new system will result in a fuel oil transfer system that cycles on and off to maintain oil level in the day tank, versus the more energy intensive existing pumps which must run 24/7. The Cleaver Brooks boilers will be replaced with new boilers that do not require constant oil flow (scope shown elsewhere in this report).

Existing Fuel Oil Transfer Pumps

16. Replace Boilers:
    a. The existing Cleaver Brooks boilers are original 1977 vintage. They have exceeded their useful service lives and they are in fair to poor condition.
    b. Replace the existing Cleaver Brooks boilers with new Buderus 3 pass cast iron sectional boilers.
        1) Provide new metal chimney liner.
        2) Provide new powered combustion air system.
        3) Provide new concrete housekeeping pads.
        4) Modify boiler room piping so that new boilers inject into the primary heating main.



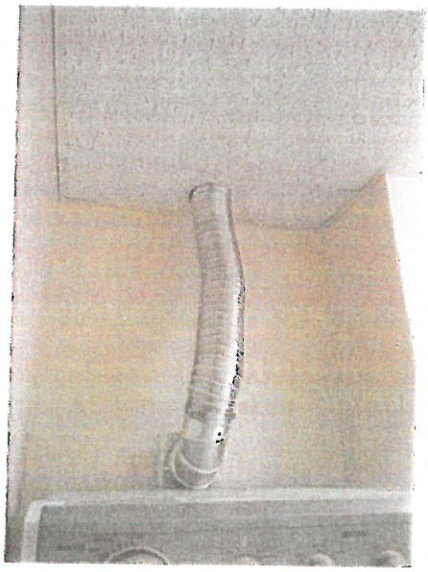
Existing Cleaver Brooks Boilers

17. Replace Heating Water Pumps:
    a. The existing base mounted heating water pumps are original 1977 vintage. They have exceeded their useful service lives and they are in fair to poor condition.
    b. Replace the existing heating pumps with new base mounted pumps.
        1) Extend the concrete housekeeping to accommodate the new pumps.
        2) Re-use existing VFD's.
        3) Provide water balancing of new pumps.

Existing Heating Water Pumps

18. Provide AC for the Administration Area:
    a. Provide mini split AC and heat pump systems for 6 Administration offices.
        1) Per the owner's request, one system will be an AC only system. It will serve 3 of the offices and it will include 1 outdoor unit and 3 indoor units.
        2) Per the owner's request, one system will be a heat pump system, providing both heat and AC. It will serve the Main Reception area and 2 offices and it will include 1 outdoor unit and 3 indoor units.
        3) Indoor units mounted on exterior walls will drain their condensate through the exterior walls.
        4) Indoor units mounted on interior walls will pump their condensate to a safe disposal area (floor drain, sanitary drain line).

19. Extend Dryer Vent to Outdoors:
    a. In Room 228, the dryer vent terminates in the cold attic. This is a code violation, and it is not good practice as moist air from the dryer condenses in the cold attic, and that can cause ceiling staining and mold growth.
    b. Extend the dryer vent up through the roof, with a backdraft damper.



Dryer Vent Terminates in Cold Attic

20. Add Water Meter to DHW System:
    a. The domestic hot water system has no means to monitor usage. Having the ability to monitor domestic hot water usage will benefit the owner by knowing how domestic hot water usage changes from month to month and year to year.
    b. Add an analog water meter to the domestic hot water system's cold water make-up line, to monitor domestic hot water usage. NOTE: This will be a simple analog meter; it will not be tied into the DDC system for automatic monitoring, so manual readings will need to be taken.

ECM #4 – Plug Load Power Management

Provide a plug-load power management system, to implement shut-down of devices during unoccupied times. The plug load power management system would communicate wirelessly through the existing school department LAN. Devices which would be controlled include projectors, smart boards, printers, copiers, vending machines, TV monitors, large coffee makers, water dispensers, plug-in water fountains. This energy conservation measure will be implemented in the following buildings:

A. Boothbay Region High School:

B. Boothbay Region Elementary School: