

State College Area School District
High School South Building
EXISTING CONDITIONS ASSESSMENT



Prepared by CenterPoint Engineering
08 February 2013

FACILITY ASSESSMENT SUMMARY

PHYSICAL PLANT

General

- This report is a “snapshot” of the MEP systems in the condition they were in on Wednesday January 30, 2013, when Eric Huth, Russ Oft, and Tom Bliss walked the building and met with maintenance personnel. The recommendations included herein are representative of a condition in which no architectural modifications will be performed to the building. If a renovation or addition project were to occur, equipment capacities will need to be evaluated reviewed based on building modifications and the new space programming.

HVAC

System

- The majority of the building is heating only.
- Heat is distributed throughout the building with hot water. The hot water is generated by three HB Smith 450 Mills cast iron sectional boilers. The boilers are gas-fired. They are approximately 8 or 9 years old and were reported to have no major issues.



Two of the Three Heating Water Cast Iron Sectional Boilers

- Hot water is distributed by two base-mounted pumps which operate in a lead/standby arrangement. They were replaced at the same time as the boilers and are in good condition.

State College High School South Building
EXISTING CONDITIONS ASSESSMENT



Heating Hot Water Circulation Pumps

- Hot water is distributed throughout the building in copper and galvanized steel piping. Piping was reported to be in fair condition with sporadic leaks. The piping is insulated and is located in both the crawlspace and above ceilings. The lobby area has piping in the floor for a radiant slab heating system.



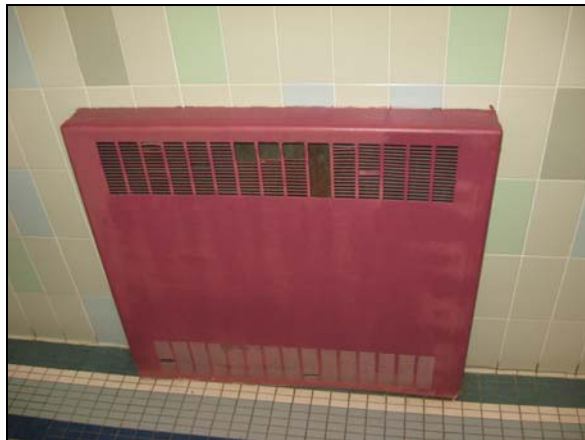
Piping Entrance into Crawlspace

- Expansion tanks are less than 5 years old and in good condition.
- Classrooms in the building are heated by unit ventilators. Other large spaces are heated by indoor air handling units or rooftop air handling units. Smaller spaces are heated by fin-tube radiation and convector type units. The units serving the older areas of the building are in poor condition. Maintenance staff indicated many issues with the units including leaks and breakdowns.

State College High School South Building
EXISTING CONDITIONS ASSESSMENT



Typical Classroom Unit Ventilator



Typical Convector Type Unit



Indoor Air Handling Unit Horizontal Configuration Suspended by Structure Above

State College High School South Building
EXISTING CONDITIONS ASSESSMENT



Kitchen Makeup Air Unit and Kitchen Hood Exhaust Fan

- Although the systems and equipment appear to be well maintained, the overall condition of the system is fair to poor. The majority of the system is original to the time of construction of the various areas of the building.
- Recommendation:
 - ASHRAE Handbook HVAC Applications (2007) table 4 on page 36.3 lists service life estimates for unit heaters as approximately 20 years, boilers are 35 years, pumps as 20 years, ductwork as 30 years, rooftop units as 15 years, coils as 20 years, and electronic controls as 15 years, and pneumatic controls as 20 years.
 - With the exception of the central plant equipment, equipment is original and is beyond its average service life. The older areas of the building are in the poorest condition. Newer areas of the building are fair, but they are reaching the end of their average service life.
 - Central heating plant equipment still has part of its average service life remaining.
 - Parts for existing equipment will become more difficult to purchase making maintenance more difficult.
 - With the exception of the central plant equipment, the system should be replaced in its entirety with a more efficient system that provides adequate outdoor ventilation air.
 - A life cycle cost analysis will be performed to evaluate the best system for the building.

Ventilation

- Outdoor air is introduced into the building through the building HVAC system. Each piece of equipment brings in outdoor air for the specific area it serves. It is anticipated due to the age of the building that the majority of the systems do not meet current Code requirements for outdoor air quantities.
- There is no smoke evacuation system for the stage. This is a requirement of the current Code.
- No combustion air for the boilers or domestic water heating systems was observed. What appeared to be the original combustion air intake was blocked by a subsequent building addition. There also appeared to be no combustion air for the emergency

State College High School South Building EXISTING CONDITIONS ASSESSMENT

generators. We observed air being pulled from the crawlspaces during our visit and assume this is due to the operation of the boilers, water heaters, etc.

- The unit ventilators appeared to relieve air into the corridors. This is a violation of the current Code.
- The woodshop is served by a Dantherm dust collection system. The system is approximately 5 years old and appeared to be in good condition.



Dust Collection Unit for Woodshop

- No refrigerant ventilation system was observed in the chiller room. Calculations should be performed to determine the necessity of an exhaust system.
- Corridors are served by convector and fin-tube units which do not introduce outdoor air into these spaces.
- Recommendations:
 - New HVAC systems noted above should be designed to introduce Code required outside air into the building.
 - Combustion air must be provided for gas-fired equipment.
 - The woodshop dust collection system should remain.
 - An exhaust system should be installed in the chiller room.
 - A smoke evacuation system should be installed for the stage.

Air Conditioning

- The cafeteria, administration area, and nurse's area are air conditioned with packaged rooftop units that are original to the time of construction.

State College High School South Building
EXISTING CONDITIONS ASSESSMENT



Packaged Rooftop Unit

- The interior classrooms on the upper level are air conditioned with unit ventilators. These units are two-pipe, which means they use the same two pipes for both heating and cooling. There are 4 valves to isolate the chiller during heating season. The chiller is a split tube with an air-cooled condenser section and an indoor coil bundle section. The chiller appeared to be original. However, the compressor on the indoor section appeared to be relatively new.



Indoor Section of Chiller

State College High School South Building
EXISTING CONDITIONS ASSESSMENT



Chilled Water Pump

- Guidance, special needs areas, and classrooms are served with window air conditioning units.
- The library is served by a packaged rooftop unit that was added approximately 5 years ago. The unit was reported to be in good condition.
- The Cat kitchen is also served by a packaged rooftop unit that is approximately 15 years old. No major issues were reported with this system.
- There are two shops served by rooftop units. One was reported as approximately 5 years old, the other is approximately 12 years old. No major issues were reported with these systems.
- Data rooms are conditioned with ductless split systems. Age was unknown. However, they appeared to be in fair to good condition.



Outdoor Section of Ductless Split System



Window Air Conditioning Unit

- Recommendation:
 - With the exception of the shop rooftop unit and the library, the air conditioning equipment is at or near the end of its average service life and should be replaced.
 - Consideration should be given to providing air conditioning for the entire building.
 - Window units should be replaced with more efficient systems if these areas will continue to be air conditioned.

Automatic Temperature Control

- Maintenance staff reported that all temperature control is local and either mounted within the units or on the wall.
- There is a computer used to control the heating hot water system including the boilers and pumps. It is believed that the system was installed with the most recent boilers.
- A second computer runs the controls for the eight classrooms in the 1999 addition.
- Recommendation:
 - A direct digital control (DDC) automatic temperature control system should be installed when a new system is installed. This will allow for the most efficient control of the new equipment.

Plumbing

Plumbing Fixtures

- Water closets are floor-mounted flush valve type.

State College High School South Building
EXISTING CONDITIONS ASSESSMENT



Water Closet

- Urinals are wall-mounted flush valve type.



Urinal

- Lavatories are wall-mounted type with a variety of faucet/handle styles.



Lavatories

State College High School South Building
EXISTING CONDITIONS ASSESSMENT

- Plumbing fixtures are original to their time of construction. Maintenance indicated that the faucets are falling apart.
- It is assumed from the time of construction, that the fixtures do not meet current water flow requirements.
- Recommendation:
 - Plumbing fixtures should be replaced.

Domestic Water System

- Water service is provided by the State College Borough Water Authority.
- The water service enters the building in the boiler room. There is a Zurn Wilkins 3" backflow preventer to protect the service. A three meter assembly is also located within the boiler room as well as a pressure reducing valve.



Backflow Preventer at Water Service Entrance



Domestic Water Meter Assembly at Water Service Entrance

State College High School South Building
EXISTING CONDITIONS ASSESSMENT

- An Ecowater water softener is located in an adjacent space. It was installed 4 to 5 years ago. Maintenance staff reported that this serves the entire building. It is in good condition.



Water Softening System

- Domestic water is distributed throughout the building in copper piping. The piping is original to the time of construction for each area. Maintenance staff indicated that the piping is in poor condition. Some leaks were reported. Shutoff valves no longer operate. Piping is located in the crawlspace and above ceilings.
- Recommendation:
 - With the exception of the water softener, all plumbing items including but not limited to the piping, valves, and backflow preventer should be replaced. Although no major issues were reported by maintenance staff, the system is of the age where leaks will begin to occur more frequently. At a minimum, the piping should be scoped to determine the condition of the interior of the piping.

Hot Water Generating System

- Domestic hot water is generated by two boilers each with a separate storage tank. One system serves the upper level, and the other serves the lower level. These units are original to their time of construction. Maintenance staff indicated no major issues.

State College High School South Building
EXISTING CONDITIONS ASSESSMENT



Domestic Hot Water Storage Tank



Boiler Used for Domestic Hot Water Generation



Boiler Used for Domestic Hot Water Generation



Domestic Hot Water Storage Tank

- Recommendation:
 - The domestic hot water generating systems should be replaced because the equipment is beyond its average service life. A more efficient system type should be reviewed including strategic placement of domestic hot water generating systems if possible.

Sanitary Sewer System

- The building is served by the University Area Joint Authority.
- The original waste piping throughout the building is cast iron and is in poor condition. Maintenance staff indicated that approximately 1/2 of the piping has been replaced with PVC. The piping has sagged over the years causing low spots. They also reported issues with foreign debris being introduced into the system and causing blockages and backups.

State College High School South Building EXISTING CONDITIONS ASSESSMENT

- Maintenance staff indicated that the system must be snaked approximately once a month.
- There are two grease interceptors that serve the building. The unit serving the upper level is located outside. It was believed to be approximately 10 years old. The lower level is located in the boiler room. It is original. Both units were reported to leak and clog. Maintenance staff indicated that they are pumped out once a year.



- The building is served by the University Area Joint Authority.
- There is no acid waste system serving the science areas.
- Kitchen food prep sinks were directly connected to the waste system which is a violation of the current Code.
- Recommendation:
 - Piping should be scoped to determine condition of pipe interior. This will also determine areas of uneven slope and potential leaks.
 - Cast Iron has an average service life of approximately 50 years. Therefore, all cast iron piping from the areas of the building other than the 1999 addition should be replaced.
 - All piping should be replaced. Newer PVC piping was installed. However, maintenance staff indicated that there were large rocks under the piping that were not removed during piping installation causing "bells" in the system which will lead to backups.
 - A review of any acids used in the science labs should be performed to determine if an acid neutralization system should be used.

Rainwater System

- The building is served by internal roof drains. The water is drained through cast iron piping. It is original to the time of construction. No major issues were reported.
- Recommendation:
 - Piping and roof drains from the older parts of the building should be replaced due to the piping and drains reaching and exceeding their average service life. Roof drains and piping from the 1999 addition could consider reuse.

State College High School South Building
EXISTING CONDITIONS ASSESSMENT

Fuel Oil

- The building originally had a fuel oil system, but most of the components have been removed.
- The underground fuel oil tank is still installed. Maintenance staff indicated it was pumped out and disconnected.
- Recommendation:
 - Remove the fuel oil tank to limit future liabilities associated with prior leaks.

Natural Gas

- Natural gas is supplied by Columbia Gas.
- There are two natural gas services to the building. One serves the upper level, the other serves the lower level.



Natural Gas Service Entrance



Natural Gas Service Entrance

- Natural gas serves the boilers, water heaters, generators, Cat kitchen, and science labs.

State College High School South Building
EXISTING CONDITIONS ASSESSMENT



- Natural gas is distributed through welded black steel piping.
- No issues were reported with this system.
- Recommendation:
 - The system is in good condition. However, modifications to the system will be required based on changes to the HVAC, plumbing, and emergency generator systems.

Compressed Air

- An air compressor is located in the boiler room to serve the wood shop. The time of installation is unknown. The unit was reported to be in fair condition.



Air Compressor for Wood Shop

- Recommendation:
 - Replace the air compressor with more efficient unit.

State College High School South Building
EXISTING CONDITIONS ASSESSMENT

Sprinkler System

- The cafeteria area is served by an automatic sprinkler system. There is one riser located in the boiler room.
- Design data was listed on the valve as 413 GPM at 61.6 psi.



Sprinkler Water Service Entrance

- The pressures listed on the testing tag were 130 psi static pressure and 68 psi residual pressure. No flow data was logged.
- The building does not have a fire pump.
- Recommendation:
 - Extend the system to cover the entire building. This may require a new water service. Hydraulic flow data acquired at the site is a good indication that a fire pump will not be required.

Electrical

Electric Distribution System

- The facility currently has two electrical services provided by West Penn Power.
- Service entrance equipment one is located in the boiler room of the lower level and is original to the facility. The equipment is rated 1600 amps, 208/120 volt, three phase, four wire (see Figure E-1). This service is fed underground from utility pole-mounted transformers. It is unknown if the utility service and/or utility service equipment was ever upgraded.

State College High School South Building
EXISTING CONDITIONS ASSESSMENT



Figure E-1. Service Entrance Equipment One

- Service entrance equipment two is located in the mechanical room of the upper level. The equipment is combination of units installed in 1965 and 1999. The equipment installed in 1965 is rated 1600 amps, 208/120 volt, three phase, four wire. The equipment installed in 1999 is rated 1600 amps, 480/277 volt, three phase, four wire. The 1999 equipment feeds the 1965 equipment via a 500 kVA indoor-pad mount dry-type transformer (see Figure E-2). This service is fed underground from utility pad-mounted transformer.



Figure E-2. Service Entrance Equipment Two

- All of the panelboards, motor starters, and disconnect switches are in fair to poor condition and are located in corridors, closets, and mechanical rooms.
- Maintenance staff indicated capacity issues.
- Recommendation:
 - Review service size with future building renovation and power capacity needs. Consolidation of services is recommended capable of handling building load plus 25% spare capacity.

State College High School South Building
EXISTING CONDITIONS ASSESSMENT

- Replace switchboards and distribution equipment.

Emergency Distribution System

- The building is served by three emergency generators. Two are located in the boiler room and serve the lower level. The third is located in the mechanical room and serves the upper level.
- All three generators are natural gas-fired.
- The generators serving the lower level are rated 15 kVA, 120/240 volts and 18.75 kVA, 120/208 volts (see Figure E-3). The manufacturer is Onan. The 15 kVA generator feeds through an 100 amp rated automatic transfer switch which feeds an 100 amp fusible, split-bus emergency panelboard. The emergency system associated with the 18.75 kVA generator was not apparent during the survey.



Figure E-3. Lower Level Generators

- The generator serving the upper level is rated 18.75 kVA, 120/208 volts (see Figure E-4). The manufacturer is Onan. The generator feeds through a 60 amp rated automatic transfer switch which feeds an 100 amp fusible, split-bus emergency panelboard. An area protection panel, which monitors area lighting in the building, is also part of the emergency system.



Figure E-4. Upper Level Generator

State College High School South Building

EXISTING CONDITIONS ASSESSMENT

- The majority of the connected load is life safety systems (i.e. emergency lighting, fire alarm, paging system, etc.). Selected HVAC and plumbing equipment is also connected to the emergency distribution system.
- The generators are tested once per week per NFPA standards.
- The generators are serviced twice per year by an outside service company.
- Recommendation:
 - The generators, transfer switches, and emergency distribution equipment should be replaced. Consolidation of generators into one generator will be evaluated. A comprehensive review of what systems are desired to be placed on emergency distribution system should be conducted with the Owner.

Paging and Intercommunication

- The paging and intercom is obsolete and original to the building.
- Recommendation:
 - A separate meeting will be required to discuss these systems and associated needs.

Emergency Generator and Lighting

- 95% of the building exit signs are battery backup.
- The cafeteria and newer areas of the building are original to construction.
- The remaining areas were replaced within the last five years.
- Recommendation:
 - Areas not replaced within the last five years should be replaced and put on the emergency generator system.

Data Network, Voice, and Classroom A/V

- These systems have not yet been evaluated. A meeting with administration and IT will be scheduled to discuss.

Lighting

- Approximately 75% of interior lighting has T12 ballasts.
- The lower level interior lights are relay based control.
- The upper level interior lights are switch control.
- There are no occupancy sensors in the building.

State College High School South Building
EXISTING CONDITIONS ASSESSMENT



Stage Lighting Controls

- Exterior lights are switches including building and canopy lighting.
- Pole-mounted lights located in the bus loop and parking lot are controlled by photocell for on/off.
- Pole-mounted lights at the entrance to the parking lot are controlled on by photocell and off by time clock.
- Recommendation:
 - Lighting should be upgraded to more efficient fixture types.
 - Occupancy sensors and lighting control should be installed to meet the requirements of the current Code.
 - Consider replacing outdoor lighting with LED type.

Fire Alarm

- One fire alarm system covers the entire building. The main panel is located in the boiler room. It is approximately 15 years old. The system is serviced once per year.
- There is no outside monitoring of the system.
- The 1999 wing has smoke detectors.



Fire Alarm Panel

- The lower level has bells, while the upper level and cafeteria have horns and strobes.
- Recommendation:
 - The system should be replaced and brought up to current Code requirements.

Security Systems

- There is no access control system for the building. Entry is controlled by lock and key.
- Interior cameras cover cafeteria, main office, fitness center, entry points and approximately 50% of corridors. The head end is located in the girl's locker room. The system is approximately 10 years old. There is no outside monitoring of the system.
- Exterior cameras cover the main entrance, the back of the building including the parking lot and track.
- Recommendation:
 - A thorough review of camera coverage should be conducted with district personnel to address needs. Building usage should be reviewed to determine access control system needs.

Clock Systems

- There are several offices and kitchen which are not on the system.
- The control for the system is located in the main office.

State College High School South Building
EXISTING CONDITIONS ASSESSMENT

- The clocks are original, but the head end was replaced.
- It is a wired system for power and to synchronize.
- Maintenance staff indicated several clocks were replaced due to issues with synchronizing.

- Recommendation:
 - The clock system should be replaced with new wireless correction.