State College Area School District
High School North 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 steam. The steam is generated by two HB Smith 450 Mills cast iron sectional boilers. The boilers are gas-fired. It is believed they are approximately 10 years old and were reported to have no major issues. However, maintenance staff also reported having to replace sections as they go bad.

One of Two Steam Generating Cast Iron Sectional Boilers

- 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 terminal equipment, such as unit heaters and convectors. The units serving the older areas of the building are in poor condition. Maintenance staff indicated many issues with the system including leaks and breakdowns.

Typical Classroom Unit Ventilator

Indoor Air Handling Unit Horizontal Configuration Suspended by Structure Above

Heating Convector in Typical Toilet Room

- Steam is distributed throughout the building in steel piping. Maintenance staff indicated that the system has a large number of leaks and is in poor condition. The piping is not insulated and is located in the crawlspace. This makes access to the piping very difficult. On the day of our site visit, maintenance staff indicated there were 15 outstanding work orders to replace leaking steam traps.

- The HVAC system serving the pool area was replaced last year and is in good condition.
- Although systems and equipment appear to be well maintained, the overall condition of the system is fair to poor due to age. 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 30 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 and the natatorium unit, equipment is original and 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. The system should be converted to hot water to minimize energy costs and ease of maintenance compared to steam. An analysis will be completed to compare conversion of the existing boilers to hot water versus new boilers.
    - 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 HVAC system. Each piece of equipment brings in outdoor air for the specific area it serves. Due to the age of the building and HVAC equipment, it is anticipated 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.
- Combustion air is introduced into the boiler room through a makeup air unit. Age of the unit was unknown.

Combustion Air Ductwork at Boiler Room Ceiling

- 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

- Corridors are served by convector and fin-tube units that do not introduce outdoor air into these spaces, which is a violation of the Current Code.

- Recommendations:
  - New HVAC systems noted above should be designed to introduce Code required outside air into the building.
  - The woodshop dust collection system should remain.
  - A smoke evacuation system should be designed and installed for the stage.

Air Conditioning

- Most air conditioning equipment was added in 1999. Areas that are air conditioned include computer labs, a few classrooms, and IT rooms.

Indoor Section of Ductless Split System in IT Room

- The two band rooms are served by packaged rooftop units which were replaced approximately two to three years ago.
- Several areas were noted as being served by window air conditioning units.

- Recommendation:
  - With the exception of the band room, 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

- We observed a pneumatic control system throughout the building, except in the 1999 addition, which has a direct digital control (DDC) system for its building automation system (BAS).

Air Compressor for Operation of Pneumatic Control System


Pneumatic Control Station

- The systems appeared to be in poor condition due to age. Systems of this age begin to show increasing amounts of leaks which make control difficult.

- 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.

Water Closet

- Urinals are wall-mounted flush valve type.

Urinal

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

Lavatories

- Plumbing fixtures are original to their time of construction.
- It is assumed from the time of construction, that the fixtures do not meet the current water flow requirements of the International Energy Conservation Code.

- Recommendation:
    - Plumbing fixtures should be replaced.

Domestic Water System

- Water service is provided by the State College Borough Water Authority.
- Water pressure was read at the backflow preventer between 75 and 80 psi.
- The water service enters the building in its own room. There is a Zurn Wilkins 3" backflow preventer to protect the service as well as a pressure reducing valve.

Water Service Entrance

- A Marlo water softener is located in the boiler room. Time of installation is unknown. It appeared to be 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 fair condition, with no major issues. 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 hot water boilers and then stored in an insulated 15,000 gallon storage tank. Maintenance staff indicated no major issues with this system.

Boilers Used for Domestic Hot Water Generation

Domestic Hot Water Storage Tank

- The boilers are approximately 10 years old and were re-tubed last year. It seemed unusual that the boilers would need to be re-tubed at nine years. Typically, a boiler will last approximately seven years after being re-tubed.

- Recommendation:
  - The domestic hot water generating systems should be replaced. 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.
- Waste piping throughout the building was originally cast iron, except in the 1999 addition. It is believed that this is PVC. Maintenance staff reported a lot of clogs in the system. No piping has been replaced.
- The system was snaked approximately 3 times in the past year.
- There are grease interceptors located in the floor in the kitchen. They are not original, but the date of installation is not known. They are cleaned every year.

Grease Interceptors in Kitchen Floor

Grease Interceptor in Kitchen Floor

- 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.
    - 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.

Fuel Oil

- The building originally had a fuel oil system, but the tank was previously removed. The pumps and some piping remain.

- Recommendation:
    - All remaining parts of the fuel oil system should be removed to avoid confusion of abandoned piping and equipment.

Natural Gas

- Natural gas is supplied by Columbia Gas.
- There is one natural gas service to the building.

Main Natural Gas Service Entrance

- Natural gas serves the boilers, water heaters, natatorium pool heaters, science area, generators, and combustion air unit.

Science Lab Work Tables with Natural Gas Turrets

- 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

- There are two air compressors in the building. One serves the shop area. The other serves the temperature control system. The units are not believed to be original, but the time of installation is unknown. They are old in appearance and in fair condition.

Air Compressor for Shop Area

- Recommendation:
    - Replace the air compressor serving the shops. The temperature control compressor should be removed per the recommendation to install a new DDC type BAS.

Sprinkler System

- The athletic areas in the north end of the building is protected by an automatic sprinkler system. There is one riser serving the building.
- The pressures listed on the testing tag were 72 psi static pressure and 65 psi residual pressure. No flow data was logged. No design data was listed on the valve.

Sprinkler Water Service Entrance

- 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. However, calculations will be performed to confirm.

Electrical

Electric Distribution System

- The facility currently has two electrical services provided by West Penn Power.
- Service entrance equipment one is located in a dedicated room adjacent to the boiler room. The equipment is rated 2500 amps, 208/120 volt, three phase, four wire (see Figure E-1). This service is fed underground from utility pad-mounted transformers. This equipment backfeeds the original service entrance equipment located in an adjacent room (see Figure E-2). It is unknown as to when this service was upgraded.

Figure E-1. Service Entrance Equipment One

Figure E-2. Original Service Entrance Equipment

- Service entrance equipment two is located in the same room service entrance equipment one. The equipment is rated 1600 amps, 480/277 volt, three phase, four wire (see Figure E-3). This service is fed underground from utility pad-mounted transformer.

Figure E-3. 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.

- 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.
  - Replace switchboards and distribution equipment.

Emergency Distribution System

- The building is served by two emergency generators. One is located in a room adjacent to the boiler room and the other one is located outdoors.
- Both generators are natural gas-fired.
- The generator located in the room adjacent to the boiler room is rated 45 kW, 208/120 volts, three phase, four wire and was installed in 1989 (see Figure E-4). The manufacturer is Onan. The 45 kW generator feeds through a 200 amp rated automatic transfer switch which feeds an 225 amp emergency panelboard.

Figure E-4. Indoor Emergency Generator

- The outdoor generator is rated 100 kW, 208/120 volts, three phase, four wire and was installed approximately 3-5 years ago. The manufacturer is Cummins (see Figure E-5). The 100 kW generator feeds through an automatic transfer switch which feeds emergency panelboards dedicated to the School Districts data center.

Figure E-5. Outdoor Emergency Generator

- The majority of the connected load associated with the indoor generator 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 by an outside service company.

- Recommendation:
    - The indoor generator, transfer switch, and emergency distribution equipment should be replaced. A comprehensive review of what systems are desired to

be placed on emergency distribution system should be conducted with the Owner.
- o The outdoor generator shall be remain.

Paging and Intercommunication

- The paging and intercom is obsolete and original to the building.

- Recommendation:
  - o A separate meeting will be required to discuss these systems and associated needs.

Emergency Generator and Lighting

- Corridors, gymnasium, and natatorium have emergency lighting tied to the emergency generator.

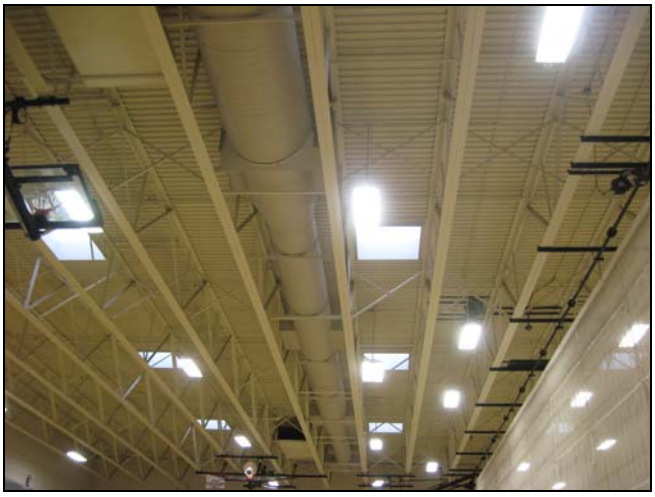
- Recommendation:
  - o See recommendations for lighting below.

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

- The majority of the lighting in the building is T12. There are some T8 fixtures in the building, with T5 fixtures in the gymnasium and natatorium.
- Lighting control is switched.
- Gymnasium lighting is controlled by occupancy sensors.
- Exterior lighting is controlled by both switch and timeclock.



Lighting in Gymnasium

Lighting in Natatorium

- Recommendation:
  - Keep lighting and controls in the gymnasium and natatorium. Replace all T12 and T8 fixtures with more energy efficient lighting.
  - 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

- There are two annunciators in the building each located in the boiler room.
- The new system is a Simplex system and covers the gymnasium, athletic areas, 130's wing, 60's wing, and miscellaneous areas of the building.
- The remainder of the building is served by the original system.

- 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.
- Cameras cover corridors, exterior, main office, cafeteria, and security room (room 18). The system is approximately seven years old.

- 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

- The system is manufactured by Simplex.
- The control for the system is located in the main office.
- It is a wired system for power and to sync.
- Maintenance staff indicated no issues with the system. However, both buildings should sync with each other, but do not.

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