

3.4 Mechanical, Electrical, Plumbing, Fire Protection Existing Conditions

Mechanical Systems Heat Generation

The building heating plant consists of (2) 3,000 MBH gas fired, stainless steel, condensing hot water boilers. Both boilers are of the same age and manufacturer – Patterson-Kelley “PK” model SC-3000, installed within the last few years. The boilers are in excellent operating condition and could be re-used for the next 20-30 years. These boilers can achieve combustion efficiencies of 95% or more, however this requires operating the hot water loop at lower temperatures than is typical for a building of this age. Typical hot water return temperatures are 150°F-160°F. Peak efficiency for condensing boilers is achieved at 90°F -120°F return water temperatures. The boiler flues remain separate for each boiler, and exit the building via double-wall stainless flue pipes that run up inside the former breaching from the old boilers out through the roof. Intake air is provided into the space and indirectly to the boilers through a wall louver. Boiler operation and staging is controlled through on-board packaged boiler controls.

A Primary/Secondary pump system circulates hot water throughout the school at 180°F. Dedicated primary pumps for each boiler appear to be in good condition. Secondary pumps appear older and in fair condition.



Recently installed Patterson-Kelley gas-fired condensing boilers in excellent operating condition.

3.4 Mechanical, Electrical, Plumbing, Fire Protection Existing Conditions



Stainless steel double wall independent boiler flues going up to the roof inside the existing boiler breaching.



Boiler primary pumps in good condition.

3.4 Mechanical, Electrical, Plumbing, Fire Protection Existing Conditions



Heating hot water secondary pumps in fair condition.

Space Heating

Heating throughout the building is provided by a combination of exposed, slope-top perimeter fin-tube radiation, cabinet unit heaters, and rooftop air handling units all served by the central gas-fired boiler plant.

Perimeter radiation throughout appears to be in fair to good condition.

Cabinet unit heaters vary in condition, but most are in fair condition showing wear associated with being in heavily trafficked entry areas.

3.4 Mechanical, Electrical, Plumbing, Fire Protection Existing Conditions



Example of perimeter fin-tube radiation in a corridor in fair to good condition.



Example of perimeter fin-tube radiation in a classroom in fair to good condition.

3.4 Mechanical, Electrical, Plumbing, Fire Protection Existing Conditions



Example of cabinet unit heater in fair condition, showing wear and tear.

Ventilation

Ventilation throughout the building is provided by fourteen rooftop air handling units. These units are original to the building and are at the end of their useful life. Eleven of these rooftop units have a single two-pipe changeover hot/chilled water glycol coil. Three of these rooftop units, serving the gyms and locker rooms, are heating only units with gas furnaces in lieu of hot water coils for heating. The rooftop units have the following total airflow rates:

- RTU-1: 11,960 CFM – Heating and cooling
- RTU-2: 7,610 CFM – Heating and cooling
- RTU-3: 11,990 CFM – Heating and cooling
- RTU-4: 10,160 CFM – Heating and cooling
- RTU-5: 7,105 CFM – Heating and cooling
- RTU-6: 6,885 CFM – Heating and cooling
- RTU-7: 9,245 CFM – Heating and cooling
- RTU-8: 10,160 CFM – Heating and cooling
- RTU-9: 11,200 CFM – Heating and cooling
- RTU-10: 4,550 CFM – Heating and cooling
- RTU-11: 14,600 CFM – Heating only

3.4 Mechanical, Electrical, Plumbing, Fire Protection Existing Conditions

- RTU-12: 6,400 CFM – Heating only
- RTU-13: 3,615 CFM – Heating only
- RTU-14: 6,270 CFM – Heating and cooling

Ductwork, diffusers and grilles throughout the building are original to the building and appear dated where they can be seen. Modern HVAC systems typically do not require as large of ductwork systems as exists currently in this building, so removing the existing ductwork is a likely outcome if the building is renovated to be re-used.



Example of dated-looking supply diffuser.

Cooling

Cooling is provided to the entire building, except the gyms and locker rooms, by a central water cooled chiller plant. The plant consists of a pair of indoor Trane Centravac Series R screw chillers coupled to an outdoor cooling tower mounted at grade. One chiller is 300-tons, the other is 150-tons. The chillers are original to the building and are at or past the end of their useful life. The cooling tower is also at or past the end of its useful life. The entire chiller plant, including the associated pumps and piping, should be replaced if the building is going to be renovated.

3.4 Mechanical, Electrical, Plumbing, Fire Protection Existing Conditions



Existing 300-ton and 150-ton Trane screw chillers, at or past their useful life.



Existing condenser water pumps, at or past their useful life.

3.4 Mechanical, Electrical, Plumbing, Fire Protection Existing Conditions



Existing Evapco cooling tower at or past its useful life.

Exhaust

General exhaust for the toilet rooms and other miscellaneous areas is ducted to a series of eighteen roof-mounted exhaust fans. These fans are generally in fair-to-good condition. It is likely that the vast majority of these fans will warrant replacement by a different type of ventilation/exhaust system if the building will be fully renovated.

Controls

The temperature control system is original to the building and is dated. The control system should be replaced in its entirety if the building will be renovated.

3.4 Mechanical, Electrical, Plumbing, Fire Protection Existing Conditions



Example of existing outdated thermostat.

3.4 Mechanical, Electrical, Plumbing, Fire Protection Existing Conditions

Electrical Systems

Electrical Service

The Main Service Switchgear is rated at 3000A, 480/277V, 3-phase, 4-wire and is manufactured by General Electric. It appears to be original to the building and is in fair condition. All of the main distribution equipment is now more than 30 years old. As such, it is nearing the end of its serviceable life and should be replaced.



Main switchgear, original to building and near the end of its useful life.

Electrical Distribution

The main switchgear feeds branch panels located throughout the building. Feeders are in conduit/EMT. Branch circuits are in EMT/armored cable, where these could be observed.

3.4 Mechanical, Electrical, Plumbing, Fire Protection Existing Conditions



Existing electrical distribution panelboards.

3.4 Mechanical, Electrical, Plumbing, Fire Protection Existing Conditions



Circuit breakers Inside an existing electrical distribution panelboard.

Most of the electrical equipment (branch panelboards, disconnect switches, motor starters, etc.) appears to be original to the building. Branch panelboards are manufactured by General Electric and are of the molded case circuit breaker type. Disconnect switches, motor starters, etc. are mainly by General Electric. All of the equipment that was observed is more than 30 years old and is nearing the end of its useful life.

3.4 Mechanical, Electrical, Plumbing, Fire Protection Existing Conditions

Receptacles in the building were mostly observed to be the 3-prong type. GFCI receptacles were observed near sinks and in other areas as required.



Example of existing power receptacle.

Emergency/optional standby power is provided by a Cummins diesel generator-set located at grade outside the back of the building, next to the cooling tower. This generator is fed by a diesel “belly tank” that the generator is mounted on top of. Emergency power is routed inside to the existing fire pump as well as to an emergency automatic transfer switch serving emergency lighting and fire alarm as well as optional standby loads. The generator appears to be original to the building, so is nearing the end of its useful life.

3.4 Mechanical, Electrical, Plumbing, Fire Protection Existing Conditions



Diesel generator with belly tank.

Lighting

Interior lighting throughout the building is fluorescent. Lighting controls are mostly manual wall switches. The majority of classrooms use pendant mounted fixtures, while corridors are typically 2 x 4 ceiling mounted fixtures. Lighting throughout appears original to the building, including controls.

3.4 Mechanical, Electrical, Plumbing, Fire Protection Existing Conditions



Example of corridor 2 x 4 fluorescent lighting.



Example of classroom pendent fluorescent lighting.

3.4 Mechanical, Electrical, Plumbing, Fire Protection Existing Conditions



Example of manual toggle switch for lighting control.

CES suggests replacing the existing light fixtures in classrooms with new LED fixtures and drivers. Provide new low voltage wall dimmer switches and ceiling mounted occupancy/vacancy sensors and using daylight sensing for fixtures that are closest to windows. This practice follows energy code guidelines and will increase energy savings over the long term while providing better light quality.

Lighting fixtures in the corridors are controlled by key operated toggle switches. Suggest replacing these with a combination of low voltage switches and lighting control relay panels. This practice follows energy code guidelines and will increase efficiency.

Lighting fixtures in the gymnasium are pendant mounted hi-bay HID type and appear to be in fair condition. These are controlled via a contactor. Suggest replacing the lights with hi-bay LED designed fixtures and updating the controls according to current energy code standards.

3.4 Mechanical, Electrical, Plumbing, Fire Protection Existing Conditions



High bay gym lighting.

Emergency lighting is achieved through select normal fixtures throughout and powered by the generator. Exterior building mounted light fixtures appear to be LED wall packs controlled via a combination of timeclock and photocell. All emergency and exterior lighting should be replaced if the building will be fully renovated along with the lighting throughout the inside of the building.

Exit Signage

The use of exit signage in all areas of the building appears to be in compliance with current codes. Exit signs are LED with battery back-up. All signage appears to be in fair condition, but should be replaced with any major renovation.

3.4 Mechanical, Electrical, Plumbing, Fire Protection Existing Conditions



Example of existing exit sign.

Fire Alarm Systems

The building is equipped with a Notifier addressable fire alarm system. Pull stations throughout appear new, while existing horn/strobes appear original to the building. Full replacement of this system is recommended as part of any major renovation.

3.4 Mechanical, Electrical, Plumbing, Fire Protection Existing Conditions



Newer fire alarm pull station.



Older fire alarm horn/strobe.

3.4 Mechanical, Electrical, Plumbing, Fire Protection Existing Conditions

The building is sprinklered. Smoke detectors are in storage areas and electrical rooms. Heat detectors are located in mechanical rooms. Fire alarm supervisory and flow switches were observed in stair risers. All system devices appear to be operational and locations appear to be in compliance.

Plumbing Systems

Domestic Water

An 8" combined fire protection/domestic cold water service enters the building below grade at the main mechanical room and rises up where it splits into domestic water and fire water services within the building. The domestic water services is metered inside the building.

Sanitary and Storm

The building is served by a central storm and sanitary sewer system. The central exit point could not be located as it is buried below the existing slab, however, it is likely existing the front of the building onto Washington Ave

Natural Gas

The gas main for this property enters the building just outside the main mechanical room. The gas piping appears to be in good condition.

Plumbing Fixtures

Plumbing fixtures within the building all appear to be original to the building.

3.4 Mechanical, Electrical, Plumbing, Fire Protection Existing Conditions



Existing urinals in one of the boys bathrooms.

Boys and girls bathroom lavatories are the Bradley large basin type with multiple faucets. They have deteriorated in functionality over time and regularly cause problems for facilities staff.

3.4 Mechanical, Electrical, Plumbing, Fire Protection Existing Conditions



Existing Bradley lavatory in one of the boys bathrooms.

All plumbing fixtures should be replaced as part of any major renovation to newer more efficient units with water saving features.

Domestic Hot Water Systems

Domestic hot water is provided by a Lochinvar “Efficiency Pac” semi-instantaneous hot water heater coupled with an indirect storage tank. The heater is near the end of its useful life and should be replaced as part of any major renovation.

3.4 Mechanical, Electrical, Plumbing, Fire Protection Existing Conditions



Lochinvar semi-instantaneous hot water heater.



Lochinvar indirect fired storage tank.

3.4 Mechanical, Electrical, Plumbing, Fire Protection Existing Conditions

Fire Protection

Fire Service

An 8" combined fire protection/domestic cold water service enters the building below grade at the main mechanical room and rises up where it splits into domestic water and fire water services within the building.



Fire service piping and horizontal electric fire pump.

3.4 Mechanical, Electrical, Plumbing, Fire Protection Existing Conditions



Obsolete fire pump controller.

The water pressure during original construction was low and so an electric fire pump is present to boost the pressure. Facilities staff commented that water pressure in the street has since improved, so a fire pump may no longer be necessary. The existing fire pump controller is original to the building and difficult to get parts for. Should a fire pump still be required, the pump and controller should be replaced.

The fire service appears to be in fair condition. The sprinkler piping within the building has a useful life of 30-50 years depending on water quality. The age of the piping is original to the building, and should be replaced as part of any major renovation since it is near the end of its useful life.

Sprinkler Distribution

Sprinklers throughout the facility are generally exposed upright heads or dropped pendent heads.

3.4 Mechanical, Electrical, Plumbing, Fire Protection Existing Conditions



Example of pendent sprinkler head.