Peter Noyes Elementary School
Sudbury, Massachusetts

EXISTING CONDITIONS

General

The Peter Noyes Elementary School is approximately 57,000 square feet of educational space. The building consists of the original building and the 1970 Addition.

Boiler Room

The existing boiler room is located in the lower level of the school. The boiler room houses the two gas fired firetube boilers, Cleaver Brooks model CB552-60, rated for 1,848 MBH gross output of hot water heating. Natural gas is provided to each boiler through a 4" gas service with 3" gas connections to the burner gas trains. The boilers are original construction installed in 1970 and have exceeded their operational life expectancy.

The boilers currently provide hot water heating water to the building heating terminal equipment by base mounted circulating pumps in the mechanical room. Lead/lag base mounted pumps, Taco model FI 2507E2CAJIL094 (2002), rated for 235 gpm, 48' head pressure and 5 Hp provides heating hot water to the original building terminal equipment. A second set of lead/lag base mounted pumps, Taco model FI 2507E2EIJIL04 (2002), rated for 192 gpm, 69' head pressure and 7.5 Hp provides heating hot water to the original building terminal equipment. Each of the zone pumping systems have been provided with variable frequency drives but no differential pressure controls due to the presence of three-way valves throughout the building.

The hot water system has been provided with a three-way mixing valve between the hot water supply and hot water return piping systems to reset the hot water supply water temperature based on outdoor air temperature.

The domestic hot water system was originally interconnected to the boiler system but has since been segregated to an independent system. Domestic hot water is provided by a gas fired storage type water heater, RUUD model G65-360A-1 (2004), with 62 gallons of storage capacity and 1,200 MBH gas input. The domestic hot water system is provided with (2) recirculation pumps/piping system, cold water supply and hot water piping system for the domestic hot water supply to the building.

The boiler room also houses an incinerator and emergency generator. The incinerator has been abandoned in place and it's blower has been disconnected from the breeching system. The emergency generator has not been provided with code required 2-hr enclosure.

Each boiler vents its products of combustion into 10" vent connectors into a common 12" horizontal breeching up through the adjacent low roof; the boiler breeching terminates vertically above the adjacent higher roof with an exit cone in accordance with applicable codes. The domestic hot water heater vents its products of combustion into the former incinerator 12" horizontal breeching up through the adjacent low roof; the domestic hot water breeching terminates vertically above the adjacent higher roof with an exit cone in accordance with applicable codes.

The boilers have been provided with an air separator and three 30" x 70" (180 gallons each) expansion tanks hung horizontally at the ceiling of the boiler room.

The boilers are provided with combustion air through an 78" wide by 96" high intake air louver to HV-1 which provides 6,360 cfm of tempered air to the boiler room and to a 48"x14" combustion air duct down to

18” above finished floor; and a 30”x24” screened opening duct located high on the opposite wall of the boiler room ducted to an exhaust air louver.

The boilers are provided with makeup water from the chemical feed system; there is no direct connection to the domestic water system to the chemical feed system. The chemical feed and makeup water system is manual but the boiler room hose bibs have not been provided with adequate backflow protection.

The boiler burners have not been provided with burner safety fuseomatic switch over the boiler burners or emergency shutoff switches at boiler room entrance in accordance with applicable code provisions.

Some of the insulating materials in the boiler room appear to be asbestos containing materials that would require abatement.

The existing automatic temperature controls are pneumatic.

PROPOSED RENOVATIONS

The existing boilers have exceeded their operational life and should be replaced with high efficiency type systems.

Replace the existing boilers which have exceeded their anticipated operational life with three (3) new condensing type boilers, Patterson Kelley model Mach C1500 rated for 1,440 MBH of hot water heating capacity at condensing water temperatures. Three condensing boilers will be required to provide non condensing water temperature (190 F water supply temperature) during the winter design days to accommodate the heating requirements of the existing terminal equipment to remain and for system redundancy.

Heating hot water supply piping, heating hot water return piping, protected water makeup piping through a new reduced pressure backflow preventer to cold water piping, and electrical power shall be extended to the existing systems to remain. The new boilers will also require condensate neutralization kits that will be individually piped to the existing floor drain.

Reuse existing original building and addition zone lead/standby circulating pumps and variable speed drives. Maintain existing expansion piping and tanks. Provide new air separator in heating hot water supply piping and expansion provisions.

Modify and extend gas piping to the boilers. Each gas train shall comply with Massachusetts State Plumbing Code and be provided with the appropriate gas vent piping to the outdoors in accordance with applicable code provisions.

Provide PVC combustion air and vent piping from each boiler to the outdoors in accordance with manufacturer’s written instructions. Existing combustion air provisions shall be eliminated and former boiler vent penetration through roof shall be patched water tight.

While a fuseomatic switch over the boiler burner and emergency boiler shutoff switch at the boiler room entry are not required by applicable codes for gas fired equipment, it is recommended that these controls be provided as part of this renovation. Similarly, while carbon monoxide detection is not required by applicable codes, it is recommended that this detection be provided as part of this renovation.

New boiler room electric/electronic controls shall be provided for boiler start/stop based on outside air temperature, hot water reset at the boilers based on outside air temperature, boiler lead/lag operation, boiler zone pump operation and variable speed control for each zone pumping system.

In addition, it is recommended that the pneumatic controls throughout the building be replaced with new electronic controls including changing three way valves at terminal units to two way valves to allow better use of the variable speed pumping systems.

The boiler room shall be provided with new lighting and proposed new equipment power shall be extended from a new electrical panel in boiler room.

The emergency generator should be provided with a 2-hr rated enclosure as required by applicable codes.

ESTIMATED CONSTRUCTION COST

The estimated construction cost the proposed renovations at the Peter Noyes Boiler Room Renovation is **$ 432,000.00**.