Cook - Wissahickon Elementary School

201 E. Salaignac St., Philadelphia, PA 19128

HVAC Replacement Project

Scope Determination Report

May 10, 2018

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1.0 Introduction

This report outlines a scope of work for removal and replacement of the Building's HVAC System at Cook – Wissahickon Elementary School. This School is located at 201 Salaignac St., Philadelphia, PA 19128

2.0 Background

The Scope of Work (SOW) is determined by the following primary considerations:

The existing 2 story building is approximately 73,100 sf that was constructed circa 1969.

2.1 Mechanical Building System(s).

2.1.1 PLUMBING-

A. Plumbing fixtures are standard china commercial quality with wall mounted lavatories, urinals and water closets. Lavatories have dual wheel handle faucets and urinals and water closets have recessed manual flush valves with push button operators. Water coolers are stainless steel single level type. There are some counter top stainless steel sinks and instructor lab sinks in science classrooms. Custodial areas have cast iron service sinks. Kitchen waste is piped to an above floor grease trap.
B. Hot water is provided by two Paloma instantaneous gas water heaters in the mechanical room with a small 2 HP circulating pump. Each heater has a small circulator and this equipment appears to be less than ten years old. A water softener is part of the system.
C. Sanitary, waste and vent piping is hub and spigot cast iron. Domestic hot and cold water is insulated rigid copper piping. Gas piping is galvanized with screwed fittings. There is a four inch water service with meter and backflow preventer and four inch gas service into the elevator/meter room on the first floor. These services are connected at Salaignac St.

2.1.2 Recommendation(s)

1. The plumbing piping systems are from the original 1969 installation. The supply piping has exceeded the service life and should be replaced. The cast iron piping should be inspected for damage and replaced or repaired as required.
2. The water heaters should remain serviceable up to fifteen years. They should be replaced due to the expiration of their useful life.
3. The fixtures appear to have been replaced during the past ten years and should have remaining life of twenty five years. The fixtures will remain.

2.1.3 Heating System

A. The building is heated by two Weil McLain steam cast iron sectional gas fired boilers in the mechanical room. The boilers are model 94 one hundred fifty hp installed in 1969, with modulating burners and code compliant gas train. A Shipco duplex cast iron condensate receiver serves the boilers. A heat exchanger in the mechanical room converts steam to hot water which is circulated to a dual temperature water system and to cabinet radiation units throughout the building. Boilers are connected to a field fabricated insulated vent system through the mechanical room to a chimney. Combustion air louvers have motorized dampers.
B. Cooling for the dual temperature system was originally provided by a steam absorption chiller which was replaced in 2005.The current chiller in the mechanical room is a Carrier dual scroll compressor water cooled machine, connected to a single cell Evapco induced draft cooling tower on grade. Water distribution includes three pumps- two dual temperature (7 1/2 hp) and one condenser water (20 hp). Pumps are all in the mechanical room and appear to be from original installation. The cooling tower was reportedly installed about 2000. The system includes a chemical treatment unit.
C. Exterior classrooms have Nesbitt unit ventilators with outside air damper, water coil, filter, control valve, blower and motor. There are seven air handling units connected to the dual temperature system and two heating and ventilating units in the gymnasium. Unit AH-1 which serves the office is in the elevator/ meter room. AH-2 serves the nurses area and is located in a mechanical closet. Storage rooms adjacent to the gymnasium contain AH-3 for the music area and AH-4 for the art space. These four units are all on the first floor. A second floor mechanical room contains AH-5 for the auditorium/cafeteria, AH-6 for the IMC and AH-7 serving room 213. Unit ventilators and air handling units are from the original 1969 installation. There is a ductless split system for the IT room.
D. The toilet rooms and other areas have mechanical exhaust with three centrifugal roof ventilators. These fans appear to be less than ten years old. There is a hood in the kitchen over warming equipment ducted to an upblast roof fan. There is no cooking and no fire suppression system for the hood.
E. There is no central control system. An older duplex air compressor in the mechanical room powers the pneumatic controls, most of which are inoperable.

2.1.4 Recommendation(s).

A. The Weil McLean boilers were installed in 1969 should be replaced based on their excessive useful life.
B. The unit ventilators and air handling units should be replaced based on age and condition and to provide code required outside air quantities.
C. The distribution piping, heat exchanger and pumps are in poor condition, have exceeded the service life and should be replaced.

D. The chiller has remaining service life of twenty years and the cooling tower ten years. A new air cooled chiller should properly sized to meet the current cooling capacity of this school.

2.2 ELECTRICAL-

A. The building is served by PECO Energy Company with 13.2 kV underground service routed to two line load break switches located in the transformer vault in the Basement. The line load break switches feed Unit Substations US1 in the 1929 Building and Unit Substation US2 in the 1967 Addition. All distribution equipment is manufactured by Eaton Cutler-Hammer and was installed in a major building renovation project completed in 2008 that replaced the existing distribution system equipment. Substation US1 is located in the Basement of the 1929 Building and rated 750 kVA, 13.2 kV-208/120V, 3 phase, 4 wire with a 3000A main switchboard. Substation US2 is located in the Basement of the 1967 addition and rated 500 kVA, 13.2 kV-208/120V, 3 phase, 4 wire with 2000A main circuit breaker switchboard. Both substations have provisions for fans to increase rated capacity by 33 percent. Substation US2 has a 225 kVA step-up transformer to supply the chiller at 480V.
B. Each of these substations feed a number of 208/120V panel boards located throughout the building. Except for a few panel boards, all of the electrical distribution system equipment was replaced in the 2008 building renovation project. Panel board PP-B is a 400A panel board that is fed by Automatic Transfer Switch ATS-5 in the Basement of the 1929 Building that was installed in 1990.

2.2.1 Recommendation(s) No refurbishment is required at this time.

3.0 Scope of Work

The following are lists of deficiencies and recommended actions that define the scope of work in detail. They are divided into the following categories: Environmental, Mechanical, Electrical and Plumbing.

3.1 Environmental

The School District of Philadelphia (SDP) Office of Environmental Management & Services (OEMS) developed the Scope of Work (SOW) for remediation services where applicable. Work will involve removal and proper disposal of asbestos materials prior to any removal, repair and/or construction of all boilers, breeching, piping, insulation, and/or any miscellaneous equipment and materials. Environmental scope of work will also include abatement required for other work described hereinafter.

3.2 Mechanical

A. Heating Plant

The two original Weil McLain steam boilers, located in the basement that are operational need to be demolished and removed. The SOW listed below encompasses the demolition and removal of the 2 original Weil McLain steam boilers and all associated ancillary equipment, located in the basement boiler room.

1. Demolition shall consist of, but not limited to the following SOW:

a. The two existing steam boilers located in the original basement boiler room area shall be removed along with all appurtenances such as, but not limited to: piping, breeching, vacuum pumps, heating tanks, steam tanks, converters, Hot water tanks, blow-off tanks, four heat exchangers and de-aerators.
b. Remove and replace seven (4000 CFM) Air Handling Units (AHU's)
c. Remove and replace four (4000 CFM) Heating & Ventilating Units.
d. Remove and replace thirty five (750-1000 CFM) Unit Ventilators
e. Remove and replace two (300 CFM) Unit Heaters
f. Remove and replace eight 7,500 (CFM) Relief Vents.
g. Remove and replace five (400 CFM) Cabinet Unit heaters.
h. Remove and replace Sixteen (2500 CFM) Exhaust Fans.
i. Remove three pumps. Two 7.5 HP Dual Water Pump and one 20 HP.
j. Remove, furnish and replace 7 Air Handling Units (AHU's).
k. Remove 4 heat exchangers.
l. Remove one Marley Cooling Tower.

2. The new basement boiler room upgrade shall consist of the following new mechanical work:

a. Furnish and install 2 new (skid mounted, if possible) 1,500 - 2,000 MBTUH condensing boilers with VFD pumps, hydraulic separator, PRV, control panel and all necessary piping appurtenances to properly heat the 3 story 73,100 sf school building.
b. Furnish and install two new 4'x8' concrete mounting pads with mounting brackets for each new boiler.
c. Furnish and install one new 12" diameter CPVC combustion air inlet/intake pipe, new breeching for both new condensing boilers and one 12" diameter CPVC exhaust outlet pipe for each new condensing unit.
d. Furnish and install 35 new unit ventilators with wireless control/thermostats for each UV throughout the school and the various classrooms that have malfunctioning. All classroom units shall be removed and replaced.
e. Furnish and install 1 air cooled chiller.
f. Furnish and install 7 new 4000 CFM AHU's (approximately 12-15 tons each) for heating and cooling.

g. Furnish and install 4 new 4000 CFM H&V units.
h. Furnish and install 2 new 300 CFM Unit Heaters.
i. Furnish and install 16 new 2500 CFM exhaust fans.

B. Piping

The facility has a history of heating/cooling pipe leaks, condensation and failing insulation through moisture saturation of the pipe insulation. Below is a schedule/list of all steel piping to be replaced with Uponor, Pex "A" (3") diameter pipe or smaller and steel pipe that is greater than 3" diameter, typically installed at the boiler basement location.

Location	***Length***	***Pipe Diameter***	***Mfg.***	***Comments***
Ground Floor	600 LF	2" dia.	Pex "A"	Mfg. Uponor w/ 2" Insul.
1st Floor	750 LF	2" dia.	Pex "A"	Mfg. Uponor w/ 2" Insul.
2nd Floor	600 LF	3/4" dia.	Pex "A"	Mfg. Uponor w/ 2" Insul.
Boiler Room	300 LF	6" dia.	Steel Sch. 80	USA Grade w/ 2" Insul.

C. Pumps

Replace the 3 inoperable pumps with 4 new pumps, 2 lead/lag pumps for each of the new condensing boilers. Each boiler dual pump package shall be equipped with one Variable Frequency Drive (VFD) controller. This pump package is included in the skid mounted condensing boiler package listed above.

D. Terminal Equipment

1. Furnish and install 35 UV's per the above SOW.
2. Furnish and install 4 heating/ventilating units per the above SOW.
3. Furnish and install 2 Unit heaters per the above SOW.

3.3 Electrical

A. Electrical Service

The new boilers will be connected to an existing 120/2018, 3 phase, 4 wire panel located in the boiler room. New wiring from each boiler will be run to the existing panel where each boiler will be separately circuited with a newly installed 3 phase circuit breaker. Assume a 100 Amp, 3 phase circuit breaker installation for estimating purposes only.

The 35 new unit ventilators shall be replaced with new circuit breakers and wiring and ground wires located inside the existing 120/208 Volt, 3 phase electrical

panels dedicated to each of the existing unit ventilators. The new unit ventilators will be connected to an electrical panel within close proximity to each newly replaced unit ventilator.

All new replaced mechanical equipment listed in the above SOW shall be properly re-wired and grounded per the local NEC requirements.

Each classroom shall have a thermostat mounted sensor on the wall to control each of the new unit ventilator to efficiently control the heating within the space.

3.4 Plumbing

A. Furnish and install ten (35) Condensate pumps and Piping for each newly installed and/or replaced Unit Ventilator. Install the 35 condensate pumps with new ¾" diameter Pex "A" piping through each of the new exterior louvers located behind each of the new perimeter unit ventilators.

4.0 Project Cost Estimate

A cost estimate for Major Renovations at Cook Wissahickon School is based on the scope of work described in the aforementioned sections and developed by the SDP estimating department. Construction Drawings from December 12, 1967 and the FCA Report dated 2015 were used for the development of this SDR and the mechanical and electrical quantity take-offs to estimate the cost to fund this Capital Project. See the attached Estimate of Probable Cost for a detailed line item breakdown.

Cost Estimate Breakdown for Major Renovation

Environmental	$ 325,000
General Contracting	$ xxx,xxx
Mechanical/Plumbing	$ x,xxx,xxx
Electrical	$ xxx,xxx
TOTAL	$ x,xxx,xxx