Vare Washington Elementary School

1198 S. 5th St., Philadelphia, PA 19147

Major Mechanical Replacement Project

Scope Determination Report

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1.0 Introduction

This report outlines a Scope of Work (SOW) for removal and replacement of the Building's Automatic Temperature Controls, classroom and hallway unit ventilators, four roof top units and piping throughout Vare Washington Elementary School. This School is located at 1198 S. 5th St., Philadelphia, PA 19147

2.0 Background

The Vare Washington (previously named George Washington) Elementary School building is located at 1198 S. 5th St., Philadelphia, PA. The 4 story, 95,500 square foot main building was originally constructed circa 1937.

1. The existing reinforced concrete and brick walled structure is supported by concrete foundations and bearing walls. The main structure consists typically of cast-in-place concrete columns, beams, and one way ribbed slab. The roof structure consists of concrete one-way slab supported by a main structural frame.

2. The building envelope is masonry with face brick. Elevations are enhanced minimally with decorative concrete and stonework around the exterior entrances.

3. The existing building has no elevators.

The Existing Building HVAC System

1. The building has a hydronic, low pressure steam heating system that serves the classroom steam unit vents, hallway/corridor radiators and one air handler that serves the auditorium.

2. Two Weil-McLain, cast iron sectional, model H-1288 W5, 2329 MBH (70 HP) net capacity, boilers provide steam for heating the entire building. They are equipped with Power Flame oil and natural gas burners manufactured in 1989. Gas service enters the building from S. 5th St. (in the same room as the water service) through a 4 inch line with gas meter and booster. There are two fuel oil pumps in the coal room behind the boiler room and an 8,000 gallon tank buried in the yard north of the building. Feedwater comes from duplex pump tank with separate feed lines. There is a vacuum condensate system on top of the feedwater tank that is located adjacent to the chemical injection system. The boilers and all ancillary pumps and piping equipment have reached their useful life. A new high efficiency condensing boiler system should replace the existing low pressure steam boiler system. Heating load calculations are needed to properly size the new condensing boiler system with VFD pumps.

3. The building has no central air conditioning equipment. There are approximately19 window air conditioner units and 1 mini split system that provides approximately 40 tons of cooling capacity throughout the interior school space. An air cooled chilled water system should be installed to provide cooling to the entire building. Cooling load calculations are needed to properly size the proposed new air cooled VFD chiller system.

4. The original air handler for the auditorium is located in a basement mechanical room under the auditorium stage. It has two steam heating sections with cast iron coils, an air washer, and a 3 HP fan. The air volume capacity is approximately 15,000 cfm. It is completely obsolete, and should be replaced with a modern unit including a cooling section. Classrooms and gyms still have the original unit ventilators which have greatly exceeded their useful life, so they should be replaced. Classrooms air exhausted through vents in the coat closets up to the attic

plenum and then out through gravity vents on the roof. The kitchen has no exhaust, (not even windows which have been bricked over,) but it has no fuel burning appliances, only an electric convection oven. Steam distribution on pipe is threaded steel. There were no complaints about pipe leaks or steam trap failures. However, given the unknown age of the steam and condensate pipes, they should be inspected and repaired, as needed.

5. Finned tube convection on units with sheet metal cabinets supplement unit vents in classrooms are the only heat for other areas, i.e. hallways, toilet rooms, and offices. They are likely the original equipment and have exceeded their expected service life. Some convectors are damaged and corroded. They should all be replaced with new equipment.

6. Building HVAC controls are pneumatic and inoperable. Classrooms and gyms have wall mounted thermostats to control unit ventilators. The controls are obsolete and should be replaced with a DDC to control new HVAC equipment. There are two air compressors in the building. A single pump with tank and cooler is installed and operational in the boiler room. There is also a duplex pump with tank stored in the coal room not installed.

3.0. Scope of Work – HVAC Replacement

Environmental, Mechanical/Plumbing & Electrical.

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 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. Mechanical System Replacement

The SOW listed below encompasses the demolition, removal and replacement of the original classroom unit ventilators (UV's), hallway radiators, boilers, and Air Handling Units (AHU's) and all associated ancillary valves, piping and controls, located throughout the school.

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

    a. Removal of approximately 34 classroom radiators/UV's from the classrooms.
    b. Removal of a compressor unit and all pneumatic controls.
    c. Removal of one Air Handling Unit (AHU), located on the roof, servicing the Auditorium.
    d. Removal of one AHU located on the roof, servicing the Gymnasium.
    e. Removal of two AHU's located on the roof that service the Main office and common area(s).
    f. Removal of approximately 12 hallway finned tubed radiators throughout the school.

g. Removal of (all) approximately 2100 L.F. of 4" diameter steel piping, valves and insulation located throughout the school.
h. Removal of (all) approximately 1100 L.F. of 6" diameter steel piping, valves and insulation throughout the school.
i. Removal of all steam piping, traps and valves from the horizontal and vertical main risers to each existing UV/radiator.
j. Removal of all control wiring and conduit associated with each Unit Ventilator and Unit Heater located in the classrooms, hallways and stairwells.
k. Removal of all miscellaneous piping and control valves for each UV and UH located throughout the school.
l. Removal of all convector heaters in the boys and girls bathrooms.
m. Removal of two low pressure steam boilers and feedwater system located in the boiler room in the basement.
n. Removal of the Vacuum Feeder Pump and all appurtenant piping and controls.
o. Removal of the expansion tank in the basement boiler room.
p. Removal of all steam piping in the boiler room and throughout the school.
q. Removal of all Fuel oil tank located in the school yard and the associated supply, return and vent lines.

2. Installation shall consist of, but not limited to, the following SOW

a. Furnish and install approximately 50 new (UV's) and new control valves with electric thermostats connected to a BMS in school building classrooms and common areas. The EOR shall confirm the existing UV quantities and capacities in each classroom, hallway, gymnasium and stairwell. Calculations shall be performed on all units to confirm flow rates and heating capacity of each unit.
b. Furnish and install approximately 2 new Air Handling Units for the Auditorium, Gymnasium, Main Office and Common Area. The EOR shall provide calculations for each unit in accordance with the new 2018 IBC, IECC and IMC codes and the ASHRAE 62.1 -2013 IAQ Standard.
c. Design approximately 2100 LF of 4" diameter (maximum diameter) steel/copper water lines throughout the school classrooms, hallways and plenum area(s).
d. Design approximately 1100 LF of 6" diameter (maximum diameter) steel/copper water lines throughout the boiler room and crawl space areas.
e. Design approximately 1400 L.F. of Pex "A" of 3" diameter for the branch piping from the main lines to each unit ventilator.
f. Design one air cooled chiller with a VFD for the school dual temp - 2 pipe system.
g. Design a dual pump with a VFD for the new hydronic condenser water/chilled water system.
h. Furnish and install a new DDC system to control all new equipment. A BacNet communications protocol network shall be specified as the Building Management System (BMS) communications software for design purposes.

3.3 Electrical

A. Electrical Service

1. Furnish and install all new disconnect switches and miscellaneous wiring to each branch panel for the new unit ventilators. The EOR shall confirm wiring replacement to each hot water UV.

2. All new replaced mechanical equipment listed in the above SOW shall be properly re-wired to coincide with the correct voltage, amperage and frequency and grounded per the local NEC requirements.

3. Each classroom shall have a thermostat sensor built within the Unit Ventilator for DDC control to the heating and cooling within each classroom and common area.

3.4 Project Schedule

Consultant notice to proceed	Friday, Sept. 27, 2019	8
25% Submission	Tuesday, Oct. 8, 2019	11
25% Review comments	Friday, Oct. 25, 2019	17
60% submission	Friday, Jan.3, 2020	70
60% review comments	Friday, Jan. 17, 2020	14
90% submission	Friday, March 6, 2020	47
90% review comments	Friday, March 20, 2020	14
Constructability walkthrough	Friday, March 27, 2020	7
Constructability comments	Friday, April 3, 2020	7
100% final submission	Friday, April 17, 2020	14
Advertise	Thursday, April 30, 2020	13
Bidder walkthrough	Friday, May 8, 2020	8
Addendum	Friday, May 15, 2020	7
Bid	Tuesday, June 2, 2020	18

4.0 Project Cost Estimate

A cost estimate for Major Renovations at Vare Washington Elementary School is based on the Scope of Work (SOW) described in the aforementioned sections and developed by the Philadelphia BOE estimating department. As-built drawings circa 1937 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 SDP Construction Estimate of Probable Cost for a detailed line item breakdown.

<u>Cost Estimate Breakdown for Major Renovation</u>

TOTAL $ 4,000,000
(Construction Budget)

Photographs

Photo #1 – Vare Washington Front Entrance

Photo No. 2 – Vare Washington Side Front Entrance

Photo No. 3 – Existing Boiler No. 1

Photo No. 4 – Existing Boiler No. 2

Photo No. 5 – Supply Pump and Emergency Generator

Photo No. 6 – Condensate Pump Return Tank/Pit

Photo No. 7 - Boiler Room Combustion Air Louvers

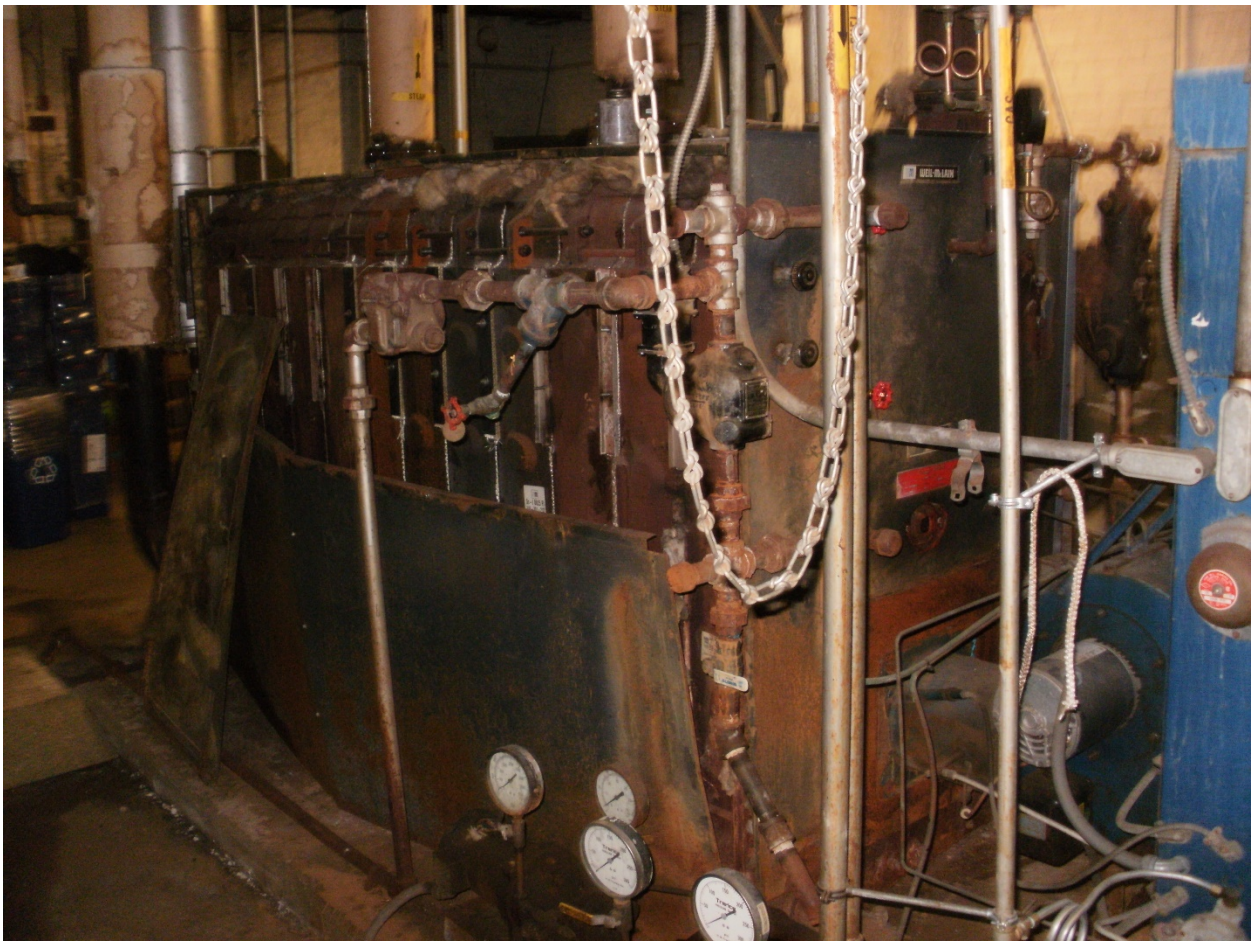

Photo No. 8 – Side View of the Existing Boiler.

Photo No. 9 – A typical surface mounted low pressure steam radiator located in the gym