



# Memorial School Building Renovation & Reuse Project

Date: February 27, 2018

architecture

engineering

management

## Project Overview

The intent of the following report is to provide an initial review of the existing conditions for the Adams Memorial Middle School.

The existing conditions were determined from existing drawings and visual inspection of the Adams Memorial Middle School building. This review is primarily focused on the HVAC systems but related components are also addressed.

## HVAC Existing Conditions

The existing HVAC equipment is original to the building. The building was constructed in 1952.

The American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) published life expectancy for HVAC equipment pertaining to this project is listed below.

Radiant Heaters (Steam)	25 years
Controls	20 years
Ventilating Roof-Mounting Fans	20 years
Steam Coils	20 years
Condensate Pumps	15 years
Pneumatic Controls	20 years
Pneumatic Valve Actuators	20 years
Diffusers, Grilles, and Registers	27 years
Induction and Fan-Coil Units	20 years

As can be seen, all HVAC equipment has well outlived its useful life.

## Building Heating System

The building heating terminal system consists primarily of low pressure steam fan-coil units, convectors and finned tube radiation. In most locations units are located at the floor level on the exterior walls of the rooms. There are some locations (locker rooms, shops, bathrooms, and corridors) where the fan-coils are located above the ceiling. Existing controls consist of pneumatic control valves located on the equipment and thermostats located in rooms. The heating system terminal units are original to the building and condition is poor/non-functional.

Heating systems for the Gymnasium consist of two (2) air handling units with steam coils, mixing box, supply and return ductwork, outside ductwork with damper and louver intake, supply fan, and registers and diffusers. Air handling units are located

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above the ceiling along the southwest wall. Existing air handling units all contain pneumatic control valves. Thermostats are located in the room. The heating systems are original to the building and condition is poor.



Figure 1 – Typical Air Handler Unit

Temporary heat for the building is being provided by a natural gas fired, 100% outside direct fired make-up air unit. The unit is located in a fenced in area just outside of the building. A 24" diameter supply duct from the unit penetrates the building through the existing windows and dumps air in the main ground floor corridor. There are fans and blowers located throughout the building to help distribute the air.



Figure 2 – Temporary Make-Up Air Unit

A Building Management System (BMS), located in the Administration Offices is present but does not appear to be utilized.

#### ***Building Ventilation and Exhaust Air Systems***

Ventilation air for the building, excluding the Gymnasium, is provided by the operable windows and by induction through the fan-coil units. Ventilation exhaust is provided by two (2) exhaust systems.

1. Bath/shower room exhaust systems located in both the boys and girl's locker/bathroom. Exhaust fans for these systems are down blast fans located on the roof.
2. The general exhaust system is located in the existing Shop Areas. This consists of a ductwork system that exhausts air from each room using one (1) 24"x24" register located on the interior wall just above the finished floor. The exhaust fan for this system is a down blast fan located on the roof.

For the Gymnasium, ventilation air is provided by the air handler units located above the ceilings. Ventilation exhaust for the Gymnasium is provided by four (4) separate exhaust systems, one located at each corner of the gymnasium. Each system consists of a ductwork system that exhausts air from the gym using one (1) 36"x48" registers located just above the finished floor. Exhaust fans for these systems are down blast fans located on the roof.



Figure 3 – Typical Gymnasium Exhaust Register

### **Plumbing Existing Conditions**

The existing plumbing fixtures and domestic hot and cold-water piping are all original to the building. Building fixtures do not meet the Americans with Disabilities Act (ADA) Requirements.

### **Electrical Existing Conditions**

Existing electric service is a temporary service and is rated for 400 Amp, 120/208 V, 3 phase. Power is fed from a pole mounted 150 KVA transformer bank, located in the parking area behind the existing building. This transformer bank is fed on the primary side by the utility from lines on Harding Ave. The service runs overhead to another utility pole adjacent to the building and then underground and into the Existing Electrical Vault located in the basement of the Gymnasium area. In the vault, the service is fed thru metering transformers to the original service bus at the ceiling, it then reuses the original 800 Amp conduit and cable to back feed the old existing 800 Amp, Main Switchboard (MSB) located in the basement existing

mechanical room. This switchboard distributes power thru branch circuit breakers to panels throughout the entire building. Most panelboards in the Gym area are old and in poor condition. These panelboards provide power for the lighting and convenience receptacles in this area. There is an existing 30 KW generator and Automatic Transfer Switch in the existing mechanical room which feeds the emergency egress lighting throughout the building.

## **Architectural systems Existing Conditions**

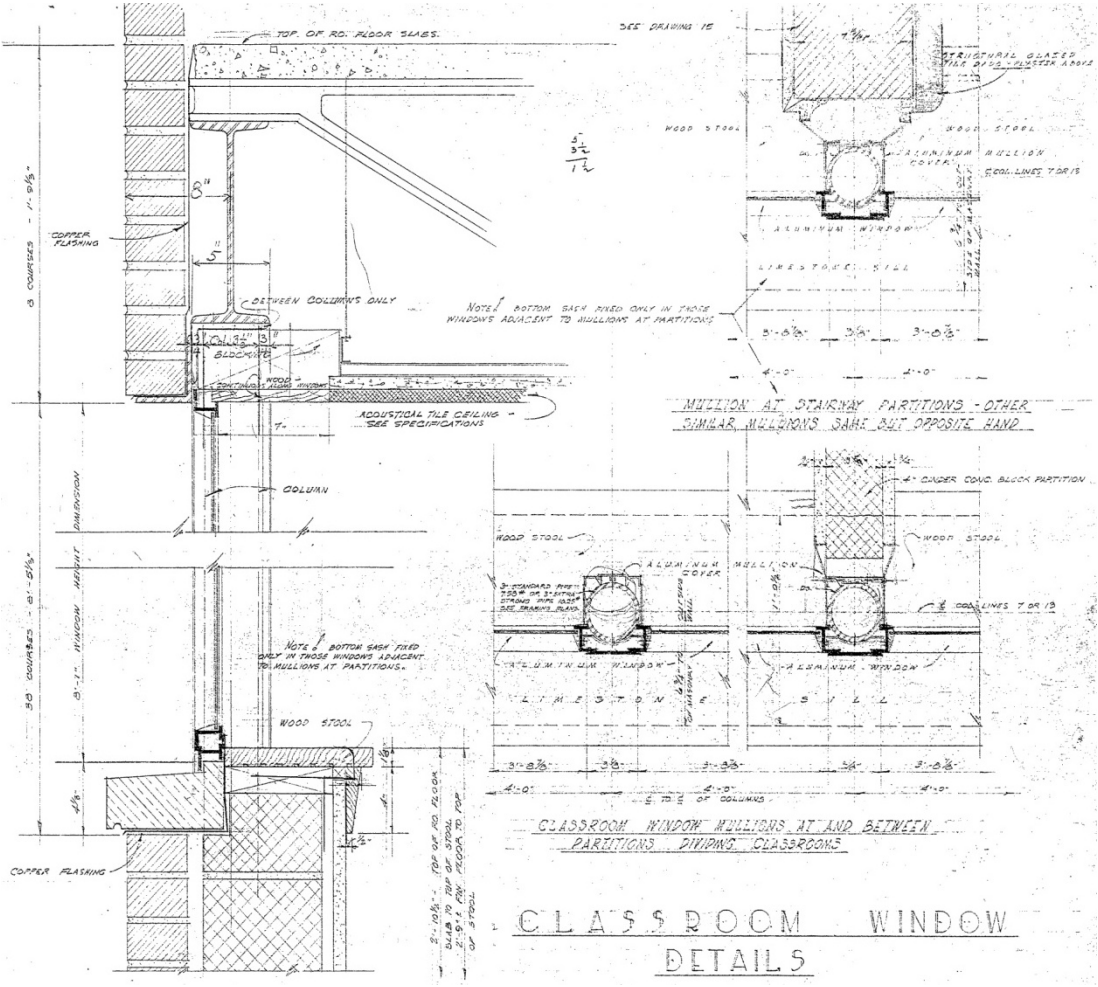
### ***Windows***

The original windows are non-thermally broken aluminum units with single pane glazing. They are in poor condition and offer no thermal separation from the outdoors. Many panes in the work area are cracked, and have been secured from the outside with chicken-wire screens. In the existing shop areas, the upper windows have been boarded over with painted plywood.



Wood trim surrounds the window shades, which would have to be removed should the windows be replaced. Existing interior trim is in poor condition and will need to be removed to allow for future window replacement.

There is a pipe column located between each window, supporting the continuous lintel above. The windows have stone sills, which are heavily stained, but are otherwise in passable condition.



**Doors**

The original exterior doors appear to be thermally broken aluminum entrance doors with full glass lites. Most are in acceptable condition. The two doors out the southwest, to either side of the gym are half glass with spandrel panel below. These two doors have cracked/broken glass and bent panels.



The existing interior doors consist primarily of solid core flush panel naturally finished wood in painted hollow metal frames. The doors and frames are in passable condition. None of the doors around the gym or corridor of the work area have fire ratings, except for the doors into the stairwell. Many doors are pairs of 2'-6" leaves, which may need to be removed, replaced, or provided with power operators to make passage accessible (should accessibility thresholds be triggered).

## **Recommendations**

### ***Building HVAC System***

Provide HVAC systems to meet the 2015 International Mechanical Code and Energy Conservation Code.

Building heating and cooling systems with the exception to the Gymnasium consist of installing four (4) high efficiency, natural gas fired, sealed combustion, direct vented furnaces with direct expansion (DX) cooling coil section. Direct expansion cooling coil section to be connected to high efficiency outdoor, roof mounted condensing units. Furnaces to provide heating and cooling the existing zones. Ventilation for the building to be provided by operable windows and energy recovery ventilator units.

Gymnasium heating and cooling system to consist of installing two (2) indirect natural gas fired roof top units with high efficiency direct expansion (DX) cooling coil. Ventilation for the space to be provided by the roof top units and incorporate differential enthalpy economizer.

### ***Building Plumbing System***

Provide plumbing fixtures to meet the Americans with Disabilities Act (ADA) Requirements and the Massachusetts Plumbing Code. Provide two (2) point of use water heaters, one per bathroom.

### ***Architectural System***

Existing aluminum windows to be replaced with new fiberglass windows of similar operation with a fixed unit above and an operable awning unit below. The windows will meet the current energy code requirements for U-value and shading coefficient. Replace damaged exterior doors and replace interior door to create required fire separation.