Attachment A

St. Mary's County Public Schools

Esperanza Middle School

Study

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Esperanza Middle School

Table of Contents

1. Executive Summary
2. General
3. Existing Conditions
4. Recommendations
5. Rough Order of Magnitude Cost

1. Executive Summary

The purpose of this study is to review and evaluate multiple facets of the building including the existing HVAC systems and equipment, lighting, fire alarm, and electrical switchgear. In addition, this investigation also provides a condition assessment and recommendations for the exterior façade elements, including existing windows, doors, and masonry throughout the building. Finally, this study includes commentary and recommendations for the existing painted finishes in the building

Esperanza Middle School is served by a central chilled water-cooling plant, central hot water heating plant, and four pipe hydronic distribution system. Areas outside the two-story classroom wing are served by rooftop air handlers. Where these systems serve multiple spaces, they utilize VAV boxes with reheat coils. The two-story classroom wing is served by terminal unit ventilators with high fresh air percentages.

Generally, the hydronic and air distribution systems have a fifty (50) year life while the equipment has a 20–25-year life expectancy. Based on field observations, the air handling equipment has capacity for heating/cooling but does not have the capability for a dehumidification control mode, resulting in humidity buildup throughout the school. The terminal cooling and heating units, typically unit ventilators, were in fair condition, however the equipment is approaching its useful life expectancy. This issue can be traced back to the fact these units are not designed to cool air to low enough temperatures to dehumidify when the people density is as high as it is in a classroom. The chilled water piping appears to be in good condition, however building staff has raised concerns about scattered locations with deteriorating pipe.

Recommendations include replacement of all major equipment and associated Building Automation System (BAS) (excluding the chiller which will be replaced in a different project) while reusing existing hydronic heating piping and air distribution systems to the fullest extent possible. Hydronic chilled water piping is to be fully replaced. Equipment and controls replacement is recommended for energy conserving enhancements and/or indoor air quality improvements (temperature, relative humidity control) so as to bring the building to code and extend the useful life of the building for another ~30 years:

The existing exterior facade consists of brick, split-faced block, limestone masonry units, EIFS, aluminum-framed windows and doors, hollow metal doors and frames, and exposed structural concrete columns and beams. Generally, the exterior walls are in fair to good condition, though miscellaneous repairs are recommended to preserve longevity. Recommendations include brick replacement, mortar repointing, resetting loose masonry elements, patching limestone masonry units, EIFS repairs and concrete repairs to maintain the wall integrity in a sound and relatively weathertight condition. Additionally, masonry control joints must be properly located, sized and resealed to prevent cracking and water penetration, and building expansion joints (at walls) should be replaced with manufactured vertical expansion joints. Exposed structural concrete elements and EIFS should be coated with an elastomeric coating, following repairs.

The existing aluminum windows and doors are generally in subpar condition due to glazing/gasket failures compromising insulated glass units, failures of perimeter sealants/flashing of rough openings, and deterioration of head lintels. Thus, the windows and doors are nearing the end of their useful service life. Since many insulated glass units have already failed, particularly at the front of the building, REI recommends replacing windows and doors with new high performance windows and doors with insulated glass and thermally broken frames. If increased security is desired, then the glass should be upgraded for ballistic and shatter resistance. One-way mirror effect options are also available if desired. These recommended upgrade options will be further discussed if SMCPS decides to move forward with replacing the window and door systems. Additionally, the hollow metal doors are generally in fair condition, exhibiting similar deterioration of head lintels and miscellaneous coating failures, and should also be replaced as part of a window/door replacement project.

The interior wall finishes generally consist of painted CMU and gypsum board, and some limited substrate repair should be undertaken as part of any comprehensive re-painting effort.

Select acoustical tile ceiling replacement will be dealt with under the mechanical portion of the project to facilitate that scope of work, but re-painting of existing gypsum board ceilings and bulkheads, as well as open / exposed ceiling areas should be included in the re-painting effort

The re-painting project should include some select accent colors for use as a “wainscot” element throughout the corridors, and potentially introduce additional accent walls to the project.

The rough order of magnitude (ROM) HVAC construction cost is estimated to be $19,416,600. A base scope ROM is also included which excludes condensing boiler addition, heating and chilled water piping replacement, unit ventilator, fan coil and terminal heating unit replacement. The ROM of this base scope is $14,043,225 The rough order of magnitude (ROM) lighting upgrade cost is estimated to be $1,919,925. The rough order of magnitude (ROM) for construction cost of a facade renovation project is estimated to be $3,552,557. The rough order of magnitude (ROM) for construction cost of a school-wide interior re-painting project is estimated to be $685,839. The total rough magnitude cost (ROM) of all recommendations is $25,260,971.

2. General

Esperanza Middle School is a 115,866 square-foot facility, which was built in 1960, with subsequent additions constructed in 1965, 1969, 1976, and the most recent in 2000. The building consists of a single-story gymnasium, auxiliary gymnasium, locker rooms and administration wing in area A, cafeteria, music wing, kitchen and technology education wing in area B, and a 2-story classroom wing with a one story FACS wing in area C. The mechanical boiler/pump room is located on the north side of area B.

Based on existing drawings available for the school, it is unclear which sections of the building are original (1960), and which were part of the pre-2000 additions. However, the Grimm and Parker (G&P) Drawings from 1998 indicate the extent of the 40,316 square-foot addition constructed in 2000, which included the main entrance, gymnasium, cafeteria, kitchen and administrative offices at the front of the building (west elevation), as well as a two-story science wing with first floor media center on the north side of the building. Additionally, the G&P Drawings indicate that windows at older sections of the building were replaced during the 2000 renovation; brick veneer was replaced at an existing portion of the north elevation; some windows and doors were removed and infilled with brick masonry at the south elevation; EIFS was installed to infill portions of some of the existing window openings on the east and south elevations, and in the courtyard; exposed structural concrete was repainted; new wall louvers were installed; and miscellaneous masonry repointing/replacement repairs were performed throughout the building.

The building had a full HVAC system replacement in 1998. The building HVAC system is now 27 years old. The building is served by a central chilled water-cooling plant, central hot water heating plant and four pipe hydronic distribution system. This system is piped to a series of Unit Ventilators and Fan Coil Units in the classroom wing, Rooftop Air Handlers, Unit Heaters, and Terminal Heating Coils. The air-cooled chiller will be replaced with a separate project and will not be detailed in this report.

The building consists of a single-story gymnasium, auxiliary gymnasium, locker rooms and administration wing in area A, cafeteria, music wing, kitchen and technology education wing in area B, and a 2-story classroom wing with a one story FACS wing in area C. The mechanical boiler/pump room is located on the north side of area B.

3. Existing Conditions

A. HVAC

1. Central Heating Plant

The existing central hot water heating plant consists of three (3) non-condensing, gas fired boilers with an output rating of 624.6 MBH. The boilers were constructed by the Burnham corporation series 4FW and use Gordon-Piatt gas burners. These boilers are no longer manufactured and have not been since the early 2000's. RTM can safely assume these units are at least 25 years old, which is nearing their useful life of ~30 years.

There is also a primary pump with standby and secondary variable flow building distribution pump and standby. A 3-way control valve in the primary boiler loop modulates to bleed water into the secondary loop to maintain supply water temperature which is reset based on outside air temperature. The primary and secondary system flow rates are equal at 540 gpm for the central heating plant.

2. Central Heating Plant

The chilled water piping is mostly hidden through walls and ceilings. It is original to the 1998 renovation and is ~27 years old.

3. Gym, Auxiliary Gym, Locker Rooms, Administration Offices (Area A)

The gym is served by one (1) rooftop air handling unit AHU-8. The space is high volume with supply air distribution system located high and exposed in the space. The space is equipped with standard horizontal throw style diffusers. In a high-volume space, horizontal throw diffusers in the heating mode leaves potential for air stratification using warm buoyant supply air. The return air ductwork is in the adjacent wall buildout with return grilles located near the entrance doors to the gym. The unit consists of an exhaust damper and fan, a mixing box with outside air connection, a filter section, chilled water coil, hot water coil, and supply fan section. A space temperature sensor controls the heating and cooling coil to vary the supply air temperature to maintain space setpoint temperatures. The rooftop air handling unit is rated for 7000 CFM and 3660 CFM outside air (52% outside air). The rooftop unit was manufactured by Trane.

The aux gym is served by one (1) rooftop air handling unit AHU-10. The space is high volume with supply air distribution system located high and exposed in the space. The space is equipped with standard horizontal throw style diffusers. In a high-volume space, horizontal throw diffusers in the heating mode leaves potential for air stratification using warm buoyant supply air. The return air ductwork is in the adjacent wall buildout with return grilles located near the entrance doors to the aux gym. The unit consists of an exhaust damper and fan, a mixing box with outside air connection, a filter section, chilled water coil, hot water coil, and supply fan section. A space temperature sensor controls the heating and cooling coil to vary the supply air temperature to maintain space setpoint temperatures. The rooftop air handling unit is rated for 1300 CFM and 720 CFM outside air (55% outside air). The rooftop unit was manufactured by Trane.

The Locker Rooms are collectively served by one (1) rooftop air handling unit AHU-7. The unit consists of an exhaust damper and fan, a mixing box with outside air connection, a filter section, chilled water coil, hot water coil, and supply fan section. A space temperature sensor located in the vestibule between the two locker rooms controls the heating and cooling coil to vary the supply air temperature to maintain space setpoint temperatures. The locker rooms are also equipped with exhaust fans which are sized to exhaust 100% of all air from the rooftop air handler. The rooftop air handling unit is rated for 2000 CFM and 2000 CFM outside air (100% outside air). The rooftop units were manufactured by Trane.

The administration offices are served by one (1) rooftop air handling unit AHU-9, rated for 5500 CFM supply and 1900 CFM outside air (35%). Each room served by AHU-9 has a Hot Water Control Unit (VAV Box) above the ceiling to heat the space. A space temperature sensor controls the heating coil to vary the supply air temperature to maintain space setpoint temperatures.

4. Cafeteria, Music, Kitchen, Tech Ed (Area B)

The cafeteria is served by one (1) rooftop air handling unit AHU-4. The space is high volume with supply air distribution system located high in the space. The space is equipped with standard horizontal throw style diffusers in sidewalls and standard four-way diffusers in bulkheads. In a high-volume space, horizontal throw diffusers in the heating mode leaves potential for air stratification using warm buoyant supply air. This risk is lessened by the four-way ceiling mounted diffusers. The return air ductwork is in the adjacent wall buildout with return grilles located near the stage. The unit consists of an exhaust damper and fan, a mixing box with outside air connection, a filter section, chilled water coil, hot water coil, and supply fan section. A space temperature sensor controls the heating and cooling coil to vary the supply air temperature to maintain space setpoint temperatures. The rooftop air handling unit is rated for 7200 CFM and 3660 CFM outside air (51% outside air). The rooftop units were manufactured by Trane.

Tech Ed is served by (1) rooftop air handling unit (AHU-1). The Music wing is served by (1) rooftop air handling unit AHU-2. Each room served by AHU-1 and AHU-2 has a Hot Water Control Unit (VAV Box) above the ceiling to heat the space. A space temperature sensor controls the heating coil to very the supply air temperature to maintain space setpoint temperatures.

The kitchen is served by (1) rooftop air handling unit (AHU-3), (1) Kitchen Makeup Air unit, (1) Kitchen Hood Exhaust Fan, and (1) Dishwasher Hood Exhaust Fan. The air handling unit consists of an exhaust damper and fan, a mixing box with outside air connection, a filter section, chilled water coil, hot water coil, and supply fan section. A space temperature sensor controls the heating and cooling coil to vary the supply air temperature to maintain space setpoint temperatures. The rooftop air handling unit is rated for 4400 CFM and 2800 CFM outside air (63% outside air). The rooftop units were manufactured by Trane.

5. Two-Story Classroom Wing (Area C)

Classrooms located in Area C are served by Unit Ventilators located below the windowsills of each room. The Unit Ventilators are responsible for the heating, cooling and ventilation of each room. Air is then pushed out of each room by means of gravity relief hoods to maintain proper air pressure.

The two (2) story classroom wing utilizes 37 unit ventilators for classrooms and 5 Fan Coil units for smaller support spaces and offices. Most of the Unit Ventilators are floor mounted with outdoor air intake louvers in the exterior wall. There is a modulating outside air damper and return air damper in the unit. The unit ventilators have a hot water heating coil and a chilled water-cooling coil, each with independent control valves. There are three (3) modes of control: heating, economizer, and cooling. During economizer mode, the outside air damper and return air damper modulate to maintain space temperature. In the heating mode and cooling mode, the coil control valves modulate to maintain space temperature.

There are four (4) different sizes of Unit Ventilators.

Scheduled Design	O/A	S/A	EAT (DB/WB)	LAT (DB)
UV-1	300	750	83°F/70°F	63°F
UV-2	480	1000	84°F/70°F	61°F
UV-3	480	1250	83°F/70°F	55°F
HUV-4	480	1000	84°F/70°F	61°F

*Leaving Air Temperature (LAT) was calculated based on the scheduled sensible capacity of the cooling coil.

Fan Coil Units are lower capacity and lower air flow terminal units similar to unit ventilators, however they typically do not have the coil capacity for conditioning a high percentage of outside air. The fan coil units are controlled similarly to the Unit Ventilators.

Each of these units upon inspection is in good condition, but they are all past their useful lives of 25 years.

6. Family Consumer Science (Area C)

The FACS wing is served by (1) rooftop air handling unit (AHU-5). rated for 3000 CFM supply and 1050 CFM outside air (35%). The FACS wing is separated into five zones, each with a Hot Water Control Unit (VAV Box) above the ceiling to heat the space. Each zone has a space temperature sensor to control the heating coil to vary the supply air temperature to maintain space setpoint temperatures.

7. Corridors and Miscellaneous Spaces

All corridors, toilet rooms, communicating stairs, lobbies, storage rooms, etc. that are heated are done so with terminal heating devices (cabinet unit heaters, vav boxes).

8. Automatic Temperature Controls

The existing Building Automation System is original to the latest building renovation project and is outdated. The full ATC system should be updated.

B. Electrical

1. Electrical Switchgear

The electrical switchboard is located in a main electrical room located on the south side of the building. It is a Cutler-Hammer Pow-R-Line switchboard rated at 480/277V, 3-phase, 4-wire, 3000A with a manufacture date of 01/14/1999 and fed from an exterior utility pad-mounted transformer rated at 750kVA. The switchboard contains a 3000A main breaker and contains a distribution section that feeds panels throughout the building, elevator, and chiller. The main electric room contains panelboards and transformers that feed other loads and panels throughout the building which are manufactured by Cutler-Hammer and also have a manufacture date of 01/1999.

2. Lighting

Lighting fixtures throughout the building typically consist of 2’x’4’ recessed fluorescent troffers. Other fixture types include linear pendants and downlights in the main lobby and media center, high bay fixtures in the cafeteria, stage, gymnasium, and track lighting in the stage area. Lighting controls throughout consisted of manual toggle switches and didn’t appear to include any occupancy-based sensors.

Exterior lighting consisted of wall packs located around the perimeter of the building.

C. Architectural

1. Existing Brick, Split-Faced Block Masonry, EIFS, and Exposed Concrete Framing

Exposed concrete framing with brick masonry infill on the south and east elevations is architecturally very similar to original construction of Chopticon High School (also part of SMCPS), designed by Frederick Tilp in 1964, suggesting that these remaining wall areas of Esperanza Middle may have also been designed by the same Architect during the same time period (likely original 1960 construction or 1965 addition). Thus, based on the architecture, the visible age of brickwork throughout the facade, minor color variations in the brick/mortar, and locations of expansion joints, we suspect that much of the two-story portions of the south/east elevations are original 1960 construction or a combination of the 1960 and 1965 projects. It appears that the one-story Family and Consumer Science Lab at the south elevation was likely part of one of the later additions in 1969 or 1976, and the one-story area that houses the Art rooms, Computer Lab, and Technology Labs on the south side of the building was also one of the later additions, before the 2000 project. The G&P Drawings also indicate which sections of brickwork were installed or replaced as part of the 2000 renovation.

The masonry veneers include concave mortar joints, and periodic control and expansion joints sealed with urethane sealant. Wall sections constructed before the 2000 project contain standard-sized red clay brick set in running bond pattern with Flemish headers (alternating stretcher and header brick) every sixth course, referred to as Common bond. Brick installed during the 2000 project is over-sized, lighter/pinker in color, contains greater color variation, and is installed in running bond. Several other features of the 2000 masonry also differ from pre-2000 masonry, including soldier courses installed along lintels of window and door openings, split-faced architectural CMU block at the base of the walls and an upper band at the west elevation, and special shaped brick and architectural CMU at windowsills. Split-faced CMU block is also installed in running bond at these sections.

EIFS was also introduced to the façade during the 2000 addition. Several older window openings at the south and east façade were infilled with EIFS as part of that project. Additionally, an EIFS cornice was installed at older walls on the east/south elevations, and newer walls of the 2000-addition gymnasium, north elevation, and west elevation. Upper portions below the arched roofs of the newer cafeteria and the newer main entrance were also clad in EIFS in 2000.

2. Existing Windows and Doors

Existing windows and doors include: Aluminum framed, fixed and operable windows with insulated glass units (IGU) installed at newer walls constructed during the 2000 Addition; Aluminum framed, fixed and operable windows with IGUs installed in existing (older) wall openings during the 2000 Addition; Aluminum storefront windows and doors with IGUs installed as part of the 2000 Addition; Aluminum curtainwalls with IGUs installed as part of the 2000 Addition; Hollow metal doors and frames installed as part of the 2000 Addition; Hollow metal doors and frames installed during previous additions.

3. Interior Wall and Ceiling Finishes

The interior wall finishes generally consist of painted CMU, although there are a few select areas of the school framed with metal stud and gypsum walls (primarily the front office area), and some locations where painted brick is present.

Ceilings are generally acoustical tile ceiling, although there are painted gypsum board bulkheads present throughout the school, as well as gypsum board ceilings in restrooms, storage spaces, and other building support areas. There are also multiple spaces in the school which have exposed, painted deck and structure, including the gymnasiums, cafeteria, main vestibule, and technology / production labs.

Esperanza Middle School is primarily painted one color throughout, though corridors and some additional select spaces (kitchen, gymnasiums) have an accent wall color carried partway up the wall (wainscot height in corridors and the kitchen, and top of door frames in the gymnasiums). In addition, the front office area is painted a different color than the remainder of the school. In select open ceiling areas, exposed ductwork is painted a different color than the ceiling.

There are many stencils / decals around the school exhibiting the “Pirate” theme.

4. Recommendations

A. HVAC

1. Central Heating Plant

The existing central heating plant is ~27 years old and is in working condition but nearing the end of its useful life. The industry has been transitioning to higher efficiency, cleaner burning gas fired condensing style boilers. While non-condensing boilers' maximum efficiency is approximately 85%, condensing boilers can operate at +95% efficiency in a condensing mode. Water temperatures need to be less than 140°F for condensing conditions. When transitioning from non-condensing to condensing boilers, which operate at a maximum of 140°F for increased efficiency, all heating coils must be replaced since the heat transfer efficiency is reduced when using lower water temperatures. Heating distribution piping is to be reviewed in depth to confirm if hydronic heating mains can remain in place. Hydronic heating branch piping to individual units will need to be replaced.

It is recommended to replace the existing heating water pumps and variable speed drives while reusing the existing building heating water piping distribution system to its fullest extent possible.

It is also recommended to extend the natural gas line from the boiler room, across the roof to serve all rooftop units to eliminate the requirement for freezing protection of hydronic coils exposed to freezing conditions.

2. Chilled Water Piping

The chilled water piping has been described by building maintenance as “deteriorating”. This is ~23 years short of its standard useful life. This can be due to a few reasons. Building staff have described humidity problems which will be explained below. When the piping vapor barrier is breached or the insulation is weakened, humid air above the ceiling can condense on the exterior of the chilled water piping. This will allow bacteria to break down the piping. It could be related to a lack of proper chemical treatment in the building loop. When closed loop water isn't treated, it can sometimes lean more acidic and can break down piping.

It is recommended to replace all existing chilled water piping. All new piping should be properly insulated and protected with a vapor barrier and chemical shot feeder.

3. Gym, Auxiliary Gym, Locker Rooms, & Administrative Offices (Area A), Cafeteria, Kitchen, Music, Tech Ed (Area B), and Family Consumer Science (Area C)

These spaces are all served by either constant volume or variable volume Rooftop Air Handling Units. The Gym and Aux Gym contain horizontal throw diffusers, which lead to the possibility of air stratification in heating mode. This means the buoyant hot air will not travel down to the floor where heating is most important. The existing Rooftop Air Handling Units in the Gyms, Locker rooms, Cafeteria and Kitchen all operate at a constant air flow rate and do not have dehumidification capability unless the boilers are operated during the cooling mode. The current energy code does not allow reheat for dehumidification except when using waste and or recovered heat. To comply with the energy code the spaces with existing Constant Air Volume Units need to be variable flow based on load compared to the existing constant flow always operating based on the maximum calculated cooling load. Additionally, high density occupied spaces require a Demand Controlled Ventilation (DCV) control strategy such as using space carbon dioxide sensors to minimize energy usage for conditioning outside air. The energy code also requires a heat recovery device be used to precondition outside air using relief air. Typically, these heat recovery devices significantly increase the size of air handling unit and/or require a separate heat recovery piece of equipment that is ducted to the air handling unit.

The rooftop air handlers appear to be original to the building renovation. They are not equipped with humidification control systems, not compliant with current energy code and need to be upgraded. The building staff has complained about humidity build up in the spaces served by Rooftop Air Handlers. This is a result of a lack of humidity control and the units only being sized for heating/cooling and not for maximum ventilation load. These units are therefore not able to keep up with the humidity building up from outside air and water infiltration and the result is a noticeable rise in humidity. All rooftop unit's nameplates have been worn off from weather over the last 27 years, so we were unable to determine exact age. The ductwork and hydronic distribution systems appear to be in good condition and have another 25 years of expected useful life.

It is recommended that all air handling systems be provided with a dehumidification system that is enabled whenever indoor relative humidity conditions exceed 60% RH. Dehumidification is typically a byproduct of air conditioning. At high cooling load conditions, cold air is needed to satisfy the space cooling load. High indoor relative humidity conditions typically occur at part/low load conditions. By reducing supply air temperatures to 55F or less when there is minimal cooling load, the space can sub cool if not reheated. This can also lead to high relative humidity conditions. Typically providing reheat to warm subcooled supply air means operating the central heating water plant. The current energy code does not allow using a central heating plant to reheat air that has been mechanically cooled. The code indicates it is permissible to reuse waste heat. Waste heat can be by using heat recovery devices (heat wheel, plate heat exchanger) in the air stream, hydronic heat pumps, hot gas from the refrigeration system or other methods.

Out of these reheat methods, we recommend installation of a small water to water heat pump in the mechanical equipment room or adjacent to the hot water heater. The heat pump absorbs heat from the chilled water return from the building and generates low temperature hot water which can be circulated by the heating system pump. The system can also operate at low load conditions to simultaneously heat and cool the building without a chiller or boiler.

The units can be replaced in kind with 4-pipe central station units. It is recommended that the air handling system be replaced with new code compliant systems and provided with a dehumidification system that is enabled whenever indoor relative humidity conditions exceed 60% RH. It is recommended to reuse the existing supply and return air distribution system where possible while adjusting the distribution in the Gyms to vertical throw diffusers which prevent air stratification in heating mode.

4. Two Story Classroom Wing (Area C)

It was made clear to RTM that the most pressing issue needing to be resolved is consistent high indoor relative humidity in the two-story classroom wing where the unit ventilators are located.

The 2-story classroom wing suffers from high indoor relative humidity conditions served by Unit Ventilators and Fan Coil Units. High relative humidity is a result of the amount of moisture in the air based on temperature of the air. High indoor relative humidity is typically caused by outside air or water infiltration (i.e. roof leak), outside air injected into the building by the HVAC system, or moisture generated within the building (waxing floors, shampooing carpet, etc.). People also generate moisture which is taken into consideration when selecting cooling equipment.

When there is a high cooling load requirement, the colder the supply air temperature needs to be to maintain space temperature set point and consequently the more dehumidification occurs with colder supply air temperatures. Low load conditions occur during moderate outdoor temperature conditions and/or low indoor sensible heat load (people, lights, plug loads) that can occur during non-educational times. It is typical when the school year is complete, the air conditioning system runs during the summer at low sensible load conditions that mold will appear in August.

Unit Ventilators and Fan Coil Units control space temperature and not space relative humidity. Classrooms are densely occupied spaces which results in high outdoor air flow rates for ventilation and high percentage of outdoor air supplying air. The minimum balanced outdoor flow rate is always being injected into the space when operating in the occupied mode. This outside air if cooled, not dehumidified, will increase the indoor relative humidity levels as colder temperatures hold less grains of moisture than hotter temperatures.

We recommend a fully system replacement. There is insufficient ceiling space to install an all-air Variable Air Volume system in the two-story classroom wing similar to other areas within the building. The typical approach would be to install recirculating ducted fan coil units located above the classroom ceiling and duct to ceiling supply air diffusers. Since we do not have the room in the ceiling, we would need to install new fan coil units in existing unit ventilator locations. This would give us the advantage of upsizing the hot water coils and allowing us to install all new high-efficiency condensing boilers rather than non-condensing. This process would involve insulating and patching all ventilation air openings behind existing unit ventilators.

We would install Dedicated Outdoor Air System (DOAS) unit(s) located on the roof with supply and relief air ducted to the space. The DOAS unit would be a packaged direct expansion cooling system with hot gas reheat and a gas fired furnace. The DOAS unit will sub cool the supply air to 55°F or less to dehumidify, then use the hot refrigerant gas to reheat the air to a neutral temperature, typically 70°F, to prevent subcooling of the spaces. This will provide protection against outdoor humidity.

5. Corridors/Miscellaneous Areas

   The existing terminal heating units, fans and controls are recommended to be replaced with new.

6. Building Automation System (BAS)

   The existing automatic temperature control system for the building is outdated and is recommended to be replaced in its entirety to control replaced equipment with current energy conserving strategies. The BAS shall connect to the district's Energy Management System.

B. Electrical

1. Electrical Switchgear

With the electrical distribution equipment including switchboard, panels, and transformers being over 25 years old it is nearing its end of life, it's recommended to replace the equipment in the next 5-10 years. Modifications to the electrical distribution including adding new panels or modifying existing panels will be required for the HVAC upgrades throughout the building.

2. Lighting

It is recommended to replace all the lighting fixtures throughout including interior and exterior with LED type fixtures. Replacement would also include upgrading lighting controls to comply with current energy codes which include the use of occupant based sensors and dimming controls throughout.

C. Architectural

1. Existing Brick, Split-Faced Block Masonry, EIFS, and Exposed Concrete Framing

The masonry (brick and split-faced CMU) veneer is generally in good condition at the 2000 Addition but in fair condition at all other locations. The following deficiencies were observed: Deteriorated mortar joints; Damaged brick units; Loose split-faced block masonry; Missing mortar cover over steel lintels; Step cracks from corners of window openings; Failed sealant at vertical control joints; Lack of manufactured expansion joints, where building expansion joints are located; Unsealed pipe penetrations through the veneer; Soiled brick and vegetation growth.

Masonry surfaces should be closely inspected. Deteriorated brick and split-faced block units should be replaced, loose masonry should be reset, and deteriorated mortar joints should be repointed. Exposed steel items should be cleaned, primed and coated with high-performance coating. Additional vertical control joints should be installed to control cracking, and existing control joints should be resealed. Manufactured vertical expansion joints should be installed to replace sealed building expansion joints at additions, and other relevant locations. Wall penetrations should be sealed with backer rod and sealant. Finally, once repair work is completed, masonry surfaces should be cleaned to remove vegetation growth and soiling.

The exposed concrete framing at the older walls is generally in poor condition. There are numerous cracks and spalls that must be repaired to ensure their structural integrity, and to prevent further water infiltration and deterioration. Once the concrete is repaired, exposed concrete surfaces should be coated with an elastomeric coating to conceal the repaired areas and protect the concrete.

The existing EIFS is generally in good condition. EIFS surfaces should be closely inspected, and isolated EIFS patch repairs should be performed, where applicable. At some areas, particularly where EIFS was previously installed to infill window openings, existing EIFS must be partially demolished and patched to remove adjacent façade elements to properly flashing window/door openings. Following flashing replacement, and EIFS patching, EIFS surfaces should be recoated with an elastomeric coating to prolong the integrity of the EIFS.

The following work regarding brick masonry and exposed concrete framing should be performed: Replace deteriorated brick and split-faced block units; Reset loose masonry; Repoint deteriorated mortar joints; Patching damaged limestone sill masonry; Clean, prime and paint exposed steel elements; Repair cracked and spalled concrete at exposed concrete framing; Repair damage EIFS surfaces; Coat existing exposed concrete framing and EIFS with elastomeric coating; Reseal existing brick control joints, and install additional vertical control joints to control cracking; Install manufactured vertical expansion joints at building expansion joints; Seal penetrations through brick veneer; Clean masonry surfaces to remove vegetation growth and soiling.

2. Windows and Doors

Many windows at older sections of the building contain formed limestone sill masonry units (one or multiple) below the windows. Several of these units contain chips, spalls, cracks or similar deficiencies. Due to the size and limited availability of full replacement units, we recommend patching deteriorated limestone sills, rather than full replacement. Masonry repair specialists, such as Cathedral Stone Products, manufacture historic patching mortars for a variety of masonry colors/textures, which would provide excellent aesthetic matches to the original limestone. Thus, we recommend patching deficiencies in the limestone sills.

Many steel lintels at window and door heads are corroded. When the windows/doors are eventually replaced, existing steel lintels should be inspected and those with significant loss of cross section should be replaced. Existing sound lintels should be cleaned, primed and coating with high-performance coating.

Cotton rope weeps indicate throughwall flashing locations at the heads and sill of many windows/doors from the 2000 addition. Additionally, the 2000 G&P Drawings indicate metal flashing to be installed at window/door head/sill conditions at newer walls. When the windows and doors are eventually replaced, SMCPS should consider removing masonry above the lintels and below the window sills to properly install head/sill throughwall flashing.

The aluminum framed fixed and operable windows are generally in poor to subpar condition, and are near the end of their useful service life. The frames are generally in fair condition, however, approximately five percent of the IGUs have failed allowing moisture and condensation between the panes of the glass. Sealant joints at perimeters of window openings (between window frame and wall) throughout the building are failed at most fenestration elements. Other deficiencies include: missing, loose, or short gaskets; failed glazing sealants; holes in glass at multiple windows; and severely deteriorated/failed sealant and backer rod at window/door joints.

Failed IGUs can be replaced without replacing the entire window; however, other IGUs will continue to fail as they are near the end of their useful service lives. Additionally, unless the same or similar glazing can be obtained, there will likely be a difference in appearance between original and replacement glazing. Therefore, REI recommends SMCPS replace the windows with newer energy efficient windows meeting current Building Code requirements.

Hollow metal doors and frames are generally in subpar condition. Some doors and frames are deteriorated with visible corrosion and could be repaired or replaced. Others may provide an additional 5 to 10 years of useful service life provided periodic maintenance is performed. The following deficiencies were observed at these doors: failed IGUs at integral lites; corroded frames; damaged or corroded hinges and/or hardware; peeling paint; and missing weatherstripping.

Damaged or severely corroded doors and frames should be replaced, including those doors with failed IGUs. Damaged or corroded hinges and hardware, and damaged or missing saddles should be replaced. Finally, weatherstripping should be replaced to ensure no leaks.

Alternatively, hollow metal doors could be replaced as part of a window replacement project to avoid another major replacement project shortly thereafter. This would also eliminate the possibility of new doors not matching adjacent repaired doors.

The 2021 International Energy Conservation Code (IECC) requires fixed windows to have a

U-Factor less than or equal to 0.36; operable windows to have a U-Factor less than or equal to 0.45; and, entrance doors to have a U-Factor less than or equal to 0.63 for Saint Mary's County, Maryland (Climate Zone 4). The 2021 IECC requires air leakage requirements of windows and doors to be in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 or NFRC 400; and curtainwall, storefront, and commercial doors must be in accordance with NFRC 400 or ASTM E283 at 1.57 psf.

The following work regarding windows and doors should be performed: Replace fixed and operable windows and doors with new Architectural grade aluminum, thermally broken, windows and doors with insulated glass. If increased security is desired, then the glass should be upgraded for ballistic and shatter resistance and a one-way mirror effect; Install new head and sill flashings when windows are replaced; Clean, prime, and coat existing steel lintels at door/window heads. Replace lintels where significant section loss has occurred; Replace hollow metal doors and frames, including those doors with failed IGUs.

3. Interior Wall and Ceiling Finishes

It is unclear when the last comprehensive re-painting effort was undertaken at Esperanza Middle School. While the painted finishes throughout the school appear to have held up fairly well, there are rather frequent instances of paint starting to peel off the wall, often where there is evidence of previous wall coverings, posters, or similar items. In addition, there are many locations where older technology has been removed, leaving behind abandoned fastener holes.

The interior wall substrates are generally in fair to good condition, although there are many locations where existing CMU are pitted or “pock-marked”, likely from the previous removal of display surfaces.

Finishes on gypsum board ceilings, bulkheads, and open ceiling areas appear to be generally in fair to good condition.

It is recommended that Esperanza Middle School undergo a comprehensive interior re-painting project for both wall and ceiling finishes. Wall substrates which have been damaged by removal of previous items should be repaired and properly prepared to receive new paint as part of this effort.

Acoustical tile ceiling replacement is included under the mechanical scope on an “as-needed” basis to facilitate that scope of work. Gypsum board ceilings, bulkheads, and open ceiling areas should be included in the comprehensive re-painting effort.

In addition to the current “wainscot” accent colors present in various portions of the school, a re-painting effort could perhaps consider some additional accent walls / areas, subject to approval by SMCPS personnel.

Finally, it should be discussed whether replacement of the thematic “Pirate” decals and stencils around the school will be part of the re-painting project, or whether they will be separately addressed by school personnel following completion of the re-painting project.

5. Recommendations

A. Mechanical Upgrades Base Bid. Base bid does not include the following:

- Upgrade to condensing boilers. Scope is one to one replacement of conventional boilers
- Replacement of all heating and chilled water piping. Scope will include inspection of existing chilled water piping and replacement where necessary.
- Unit Ventilator and terminal unit replacement. Scope will include inspection of existing unit ventilators and fan coils and replacement where necessary. All unit ventilators, whether proposed or existing will require updated controls.

1. General Conditions/Temporary Conditions	**$800,000**
2. Demolition	**$500,000**
3. Ceilings/Finishes (allowance)	**$1,000,000**

4. Structural** (allowance)	**$400,000**
5. Electrical	**$800,000**
6. Heating Water Plant	**$300,000**
7. Flues	**$200,000**
8. Air Handling Units and DOAS Units	**$1,500,000**
9. Terminal Heating Only Units	**$100,000**
10. Hydronic Piping Modifications	**$800,000**
11. Natural Gas Piping	**$100,000**
12. Fan Coil Units/Unit Ventilators	**$1,000,000**
13. Air Distribution System Modifications	**$2,000,000**
14. Building Automation System	**$750,000**
15. Water Treatment	**$30,000**
16. Insulation	**$230,000**
17. Testing And Balancing	**$40,000**
18. Water to Water Heat Pump (free reheat)	**$180,000**
19. Fans	**$150,000**
20. Patching and Repair	**$150,000**
21. Fire Protection	**$600,000**
Subtotal	**$11,630,000**
Design Contingency (15%)	**$1,744,500**
Subtotal	**$13,374,450**
Construction Contingency (5%)	**$702,161**
TOTAL*	**$14,043,225**

Full Scope:

1. General Conditions/Temporary Conditions	**$1,000,000**
2. Demolition	**$750,000**
3. Ceilings/Finishes (allowance)	**$1,000,000**
4. Structural** (allowance)	**$400,000**
5. Electrical	**$1,000,000**
6. Heating Water Plant	**$550,000**
7. Flues	**$200,000**

8. Air Handling Units and DOAS Units	**$1,500,000**
9. Terminal Heating Only Units	**$300,000**
10. Hydronic Piping Modifications	**$1,900,000**
11. Natural Gas Piping	**$100,000**
212. Fan Coil Units/Unit Ventilators	**$2,500,000**
13. Air Distribution System Modifications	**$2,500,000**
14. Building Automation System	**$1,000,000**
15. Water Treatment	**$30,000**
16. Insulation	**$230,000**
17. Testing And Balancing	**$40,000**
18. Water to Water Heat Pump (free reheat)	**$180,000**
19. Fans	**$150,000**
20. Patching and Repair	**$150,000**
21. Fire Protection	**$600,000**
Subtotal	**$16,080,000**
Design Contingency (15%)	**$2,412,000**
Subtotal	**$18,492,000**
Construction Contingency (5%)	**$924,600**
TOTAL*	**$19,416,600**

*In 2026 dollars. Excludes soft cost, engineering cost, moving furniture, etc.

**Investigations did not include a structural analysis to determine structural steel requirements for supporting new rooftop equipment. Additionally, cost excludes upgrades to the electrical service and gas service if required for DOAS equipment.

B. Lighting Upgrades

1. General Conditions/Temporary Conditions	**$60,000**
2. Demolition	**$80,000**
3. Lighting Fixtures & Controls	**$1,450,000**
Subtotal	**$1,590,000**
Design Contingency (15%)	**$238,500**
Subtotal	**$1,828,500**
Construction Contingency (5%)	**$91,425**
TOTAL*	**$1,919,925**

*In 2026 dollars. Excludes soft cost, engineering cost, moving furniture, etc.

C. Facade Renovation ROM Cost

1. General Conditions/Temporary Conditions	**$268,000**
2. Demolition	**$80,000**
3. Replace deteriorated brick (allowance)	**$65,000**
4. Replace deteriorated block masonry (allowance)	**$1,800**
5. Repoint masonry (allowance)	**$300,000**
6. Patch limestone masonry (allowance)	**$33,000**
7. Clean, prime, and paint steel	**$5,000**
8. Concrete repairs (allowance)	**$29,750**
9. EIFS repairs (allowance)	**$3,825**
10. Coat Concrete and EIFS	**$171,000**
11. Reseal control joints	**$60,000**
12. Install expansion joints	**$22,200**
13. Seal wall penetrations	**$500**
14. Clean masonry surfaces	**$20,000**
15. Replace aluminum windows and doors	**$1,484,000**
16. Replace head and sill flashings	**$200,000**
17. Clean, prime, and coat steel lintels	**$26,000**
18. Replace hollow metal doors	**$172,000**
Subtotal	**$2,942,075**
Design Contingency (15%)	**$441,312**
Subtotal	**$3,383,387**
Construction Contingency (5%)	**$169,170**

TOTAL*	**$3,552,557**

*In 2026 dollars. Excludes soft cost, engineering cost, moving furniture, etc.

D. Interior Painting ROM Cost

1. General Conditions/Temporary Conditions	**$51,600**
2. Wall patching / repair (allowance)	**$100,000**
3. Prep and paint ceilings	**$68,750**
4. Prep and paint walls	**$347,598**
Subtotal	**$567,982**
Design Contingency (15%)	**$85,197**
Subtotal	**$653,180**
Construction Contingency (5%)	**$32,659**
TOTAL*	**$685,839**

*In 2026 dollars. Excludes soft cost, engineering cost, moving furniture, etc.