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# 1. Executive Summary

## FEASIBILITY STUDY TEAM

<table>
<thead>
<tr>
<th>Anne Arundel County Public Schools</th>
<th>Anne Arundel County Public Schools</th>
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<tbody>
<tr>
<td>Kyle Ruef</td>
<td>Anne Arundel County Public Schools</td>
</tr>
<tr>
<td>Jolyn Davis</td>
<td>Anne Arundel County Public Schools</td>
</tr>
<tr>
<td>Kim Salamy</td>
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</tr>
<tr>
<td>Erik Schuster</td>
<td>Anne Arundel County Public Schools</td>
</tr>
<tr>
<td>Scott Schuler</td>
<td>Anne Arundel County Public Schools</td>
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<tr>
<td>Mary Patz</td>
<td>Anne Arundel County Public Schools</td>
</tr>
<tr>
<td>Ginger Henley</td>
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<tr>
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<tr>
<td>Kim Terry</td>
<td>Hillsmere Elementary School</td>
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<tr>
<td>Kathy Cole</td>
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<tr>
<td>Diana Helmick</td>
<td>Hillsmere Elementary School</td>
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<tr>
<td>Cassie Heckman</td>
<td>Hillsmere Elementary School PTO</td>
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<tr>
<th>Maryland State Department of Education</th>
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<tr>
<td>Gloria Mikolajczyk</td>
<td>Maryland State Department of Education</td>
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<tr>
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<td>Esra Martin</td>
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<td>Janet Patterson</td>
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<tr>
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<tbody>
<tr>
<td>Andy Endres</td>
<td>BKM – Burdette, Koehler, Murphy &amp; Associates</td>
</tr>
<tr>
<td>Matt Sol</td>
<td>BKM – Burdette, Koehler, Murphy &amp; Associates</td>
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<td>Ryan Klein</td>
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<td>Dave Wetzel</td>
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<tr>
<td>Atul Patel</td>
<td>Faisant Associates, Inc.</td>
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<tbody>
<tr>
<td>Nick Wilson</td>
<td>MK Consulting Engineers, LLC</td>
</tr>
<tr>
<td>Jason Alexander</td>
<td>MK Consulting Engineers, LLC</td>
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<th>Cost Estimators</th>
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<tr>
<td>Scott Martin</td>
<td>CBRE / HEERY</td>
</tr>
<tr>
<td>Greg Ridgely</td>
<td>CBRE / HEERY</td>
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<tr>
<td>Rhonda Eckenrode</td>
<td>CBRE / HEERY</td>
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<tr>
<th>IT / AV Consultants</th>
<th>IT / AV Consultants</th>
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<tbody>
<tr>
<td>Bill Richardson</td>
<td>Educational Systems Planning</td>
</tr>
<tr>
<td>Scott Boyd</td>
<td>Educational Systems Planning</td>
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EXECUTIVE SUMMARY

Anne Arundel County Public Schools (AACPS) has embraced a five-year strategic plan spanning from 2018 to 2023, which includes a redevelopment of existing school facilities. Hillsmere Elementary School is the latest facility to undergo an extensive study to determine how best to meet the current and future needs of the students, staff, and community. This study will determine the feasibility of pursuing the six following options: 1) Do Nothing, 2) Patch and Paint, 3A) Addition / Renovation without Swing Space, 3B) Addition / Renovation with Swing Space, 4A) Replacement in Field without Swing Space (prototype school) and 4B) Replacement Over Existing Building with Swing Space (prototype school). Using the AACPS Education Specifications together with input from the Hillsmere staff and community, the proposed options will promote and provide for education programs meeting the requirements and standards of AACPS and the State of Maryland. This study will also evaluate and assess the existing facility and site conditions including an analysis of architectural, structural, mechanical, electrical, site, code, and accessibility conditions.

Methodology

Gaudreau, Inc. and its design team were hired by AACPS to prepare this Feasibility Study which will graphically and narratively document the existing conditions of the school facility and provide multiple schemes for consideration of future redevelopment. AACPS will then use this information to make a determination on the best approach to meet the distinctive needs of Hillsmere Elementary School and its community. Starting with an extensive investigative survey of the site, reviewing existing documents, studying previous building improvements, and speaking with school staff, the team was able to identify unique aspects of the existing building while determining areas that were in need of programmatic and systemic upgrades. This information, along with requirements set forth in the AACPS Education Specifications, became the basis for the development of multiple design schemes presented to the AACPS / Hillsmere Elementary School team.

The design team worked closely with AACPS, Hillsmere Elementary School staff and community representatives in a series of weekly planning sessions to arrive at the information presented in this Feasibility Study. During these interactive meetings, the design team presented multiple schemes. These presentations provided an opportunity for open dialogue with attendees to discover the concerns and desires of the Hillsmere staff and community over and above the criteria set forth in the Education Specification. The schemes explored different scenarios for an existing building renovation with a new addition and a total replacement of the existing building. Advantages and disadvantage of each proposed scheme were evaluated resulting in the collective team narrowing down the redevelopment choices to six options. These options are represented in this report as Option 1, Option 2, Option 3A, Option 3B, Option 4A, and Option 4B. Cost estimates were generated based on these options, current state funding formulas, local conditions and recently submitted bids. These estimates can be found Section 5 of this report.
Feasibility Study Goals

The goal of this Feasibility Study is to identify options for the successful redevelopment of the Hillsmere Elementary School, with the intention of bringing the facility up to the program and systemic standards necessary to support academic achievement for all students. The six redevelopment options presented in this report address the following general design criteria identified by AACPS and the Hillsmere Elementary School team as important considerations in all the proposed design options:

- Cluster similar grade level classrooms together.
- Separate primary and intermediate grade level classrooms.
- Locate Pre K and K classrooms adjacent to the Administration Suite.
- Provide a clear, efficient circulation system, easily understood by students, parents, community members, and visitors.
- Locate the Administration Suite at the building’s main entrance with good supervision sightlines to all entering/exiting students and visitors.
- Provide adequate car queuing area for parent pick-up.
- Separate the public use spaces and the academic areas so the public use space can be used while preventing access to the academic areas.
- Provide a safe and secure site for students including safe vehicular circulation with separation of cars and buses, and safe pedestrian circulation for students who walk from adjacent neighborhoods.
- Secure outdoor play areas.
- Provide a flexible building layout to support progressive instructional programs that enhances student success through inter-disciplinary instruction.
- Identify a vernacular that facilitates instructional groupings while fostering intra-cooperative educational experiences between teachers and students.
- Create an environment that illuminates the identity and image of the school within the community and encourages stability of the student population through exemplary educational programs and positive multi-cultural experiences.
- Create a site layout that respects the surrounding community.
- Improve the security and operational/maintenance aspects of the facility.
- Increase resources available to the school staff and faculty to focus on student success.
- Provide enhanced interior environmental quality levels through improved comfort systems and attractive finishes.
- Provide building improvements while maintaining instructional capability on-site throughout construction (where feasible).
- Address the many program areas, which are undersized.
- Preserve the existing memorials and exterior mosaics.
- Address ADA non-compliant issues for the site and building.
- Provide natural daylighting for all teaching spaces.
Option Overview

The following overview provides a general description of the options documented in this study.

Option 1 - Do Nothing: This option does not recommend any improvements to the existing building or site improvements at this time.

Option 2 - Patch and Paint: This option would cosmetically update finishes with only superficial patching, repairing and painting of damaged surfaces, new flooring, and new ceilings to provide a clean, new appearance to the existing building.

Option 3A - Addition / Renovation without Swing Space: This option proposes a renovation of the existing building with a public space addition placed at the south end of the east academic wing. Interior partitions will be demolished along with the kitchen, music room and a small portion of the east academic wing to reconfigure spaces in the existing building to meet AACPS Education Specification area requirements. A relocated main entry and the newly constructed public use space addition will close off the existing courtyard creating a circulation loop. Site improvements will include additional parking spaces and a relocated parking lot with a generous on-site parent drop-off queuing lane and a separate bus loop. The existing playing field would shift slightly with a retaining wall required to accommodate site slope. Hard and soft play surfaces will be relocated to the academic side of the building. While requiring the least amount of site work, this scheme will require a relocation of existing utilities and sanitary sewer lines with their accompanying easement. This option will utilize a phased construction approach which will allow Hillsmere staff and students to remain at their current location during the entire construction period. On-site relocatable classrooms will be used on a temporary basis during the renovation phase.

Option 3B – Addition / Renovation with Swing Space: This option is a duplicate of Option 3A, however, the Hillsmere staff and students would relocate to an off-site school(s) during the entire construction period.

Option 4A – Replacement in Field without Swing Space: This option places a newly constructed building over the existing multi-purpose play field. Due to existing site slope constraints, the building is located as close as possible to Arundel on the Bay Road and a low retaining wall will run along the Chesapeake Critical Area line. In order to maintain a maximum 5% slope on the site, a significant volume of fill dirt will be required. A prototype model will replace the existing building. The existing building will stay operational until the new building is complete then it will be demolished making room for a new enlarged parking lot with a generous on-site parent drop-off queuing lane and new multi-purpose field. This option will require the most site work of all the options but will allow the Hillsmere staff and students to remain in the existing building with minor disruptions during the entire construction period. Relocatable classrooms would not be required for this option.

Option 4B – Replacement over Existing Building with Swing Space: This option places a newly constructed building over the existing building. A prototype model will replace the existing building. The existing building will be demolished at the start of construction requiring Hillsmere staff and students to relocate to an off-site school(s) during the entire construction period. A new enlarged parking lot with a generous on-site parent drop-off queuing lane and new bus lane will be located over the existing multi-purpose field. A low retaining wall placed along the northeast corner of the multi-purpose field is required to maintain a 5% maximum site slope. This option requires the least amount of site work and does not require the relocation of the sanitary sewer and the storm drain.
### Option 2 – Patch and Paint

<table>
<thead>
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<th>Area of existing building</th>
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<tr>
<td>Total Estimated Construction Cost</td>
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### Option 3A – Addition / Renovation w/o Swing Space

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<tr>
<td>Area of renovation</td>
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<tr>
<td>Area of new construction</td>
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<td>Total area of school with addition</td>
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### Option 3B – Addition / Renovation w Swing Space

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<tr>
<td>Area of demolition</td>
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<td>Area of renovation</td>
<td>40,700 GSF</td>
</tr>
<tr>
<td>Area of new construction</td>
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### Option 4A – Replacement in Field w/o Swing Space

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### Option 4B – Replacement over Existing Bldg w/Swing Space

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<tr>
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<td>Project duration</td>
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**Note:**
- **EXISTING TO BE DEMOLISHED**
- **EXISTING TO BE RENOVATED**
- **ADDITION / NEW CONSTRUCTION**
RECOMMENDATIONS

After carefully considering the (6) options presented in this Feasibility Study, the Hillsmere Elementary School Feasibility Study Team has determined that Option 4A – Replacement in Field without Swing Space using the AACPS prototype model is the preferred option. This option allows the existing school to remain occupied during the entire construction period with only minor disruptions to the staff and students. When the new building is complete, the existing building will be demolished making room for a new enlarged parking lot with a generous on-site parent drop-off queuing lane, a separate bus lane and a new multi-purpose field.

This prototype model will not only fit the needs of Hillsmere Elementary School staff and students but will also efficiently meet the AACPS Education Specifications space and adjacency requirements and mandated area gross square footage. Additionally, the new building will provide new energy efficient mechanical, electrical, and plumbing systems, fire protection, AV/IT and security systems. It will meet required State guidelines, current life safety and building codes, ADA accessibility requirements and address security concerns. Although this option will require the most site work of all the options, the Hillsmere Elementary School Feasibility Study Team prefers this scheme.
2. Project Summary

**Project Summary**

- 2018 Enrollment: 390
- Current Capacity: 509
- Utilization: 77%
- Proposed Capacity (2024): 506
- Existing Building Area: 45,885 GSF
- Existing Building Max Height: +/- 18’-0”

**Proposed Project Schedule (from Ed. Spec – dated May 1, 2019)**

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<th>Event</th>
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<tr>
<td>Feasibility Study Completion</td>
<td>October 2019</td>
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<tr>
<td>Design Team Selected</td>
<td>*Fall 2019</td>
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<tr>
<td>Project Design Phase</td>
<td>*Fall 2019 – Fall 2020</td>
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<tr>
<td>Start Construction</td>
<td>*April 2021</td>
</tr>
<tr>
<td>School Occupied</td>
<td>*August 2023</td>
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*Project schedules are subject to revision each year.*
ANNE ARUNDEL COUNTY PUBLIC SCHOOLS’ MISSION

MISSION – WHY WE ARE HERE….

'It is the mission of Anne Arundel County Public Schools to nurture and educate all of our students to be well-prepared for community engagement, career entry, and college – ultimately empowering them to create a better quality of life for themselves, their communities, and the next generation.

VISION – HOW WE SEE THE FUTURE….

Our students will graduate as caring citizens with the dispositions and skills necessary to think, read, write, compute, collaborate, and communicate effectively in our fast-paced, complex world. They will be ready to think critically and creatively; work independently and collaboratively with others from diverse backgrounds; engage in innovative interdisciplinary analysis and problem solving, and confidently contribute to solutions for real world issues.

STRATEGIC PLAN 2018-2023 – DRIVING VALUES….

I. ALL MEANS ALL

A. All Students, Families, Employees & Community Members Feel Welcome

From our youngest students, to parents or guardians reaching out to support their children, to the most seasoned educator or staff member, to our community members generously volunteering their time and talents – each and every individual is capable of learning more and contributing more when they feel they are an appreciated, connected and contributing member of the Anne Arundel County Public Schools family. Progress can be made and goals met or surpassed with greater ease when all stakeholders feel a sense of belonging in our schools and offices across the district.

B. Diversity is Invited, Nurtured, and Celebrated

We are committed to providing all AACPS students and employees with access to safe, equitable, and engaging environments to learn and work. As Anne Arundel County’s citizenry grows more diverse, we increase our attention and dedication to making our schools and offices places where all may thrive. Students and staff bring a wide range of traditions and cultures from their homes into our schools and workplaces. We respect and honor this diversity and work purposefully to make all feel they are able to grow to great heights where their successes will ultimately be celebrated and rewarded. As we grow, we strive to recruit and retain a high quality, diverse workforce who will work to raise student engagement and achievement, regardless of race, ethnicity, gender, national origin, religion, age, disability, or sexual orientation.

C. Everyone in the AACPS Family Fosters Student Growth

We accept and embrace the challenge and responsibility to meet every student uniquely based on individual needs. Every member of the AACPS family must make a meaningful contribution to student growth, if we are to support our students to develop into caring, competent, and contributing citizens. All employees have an important role to play to address the social emotional, physical, and cognitive needs of our students. We take pride in our work to build relationships with students, families, and partners – all who provide engaging and supportive fertile ground in which our students grow to reach their potential.
II. READY, SET, LAUNCH!

ALL STUDENTS ARE PREPARED FOR COLLEGE, CAREER, AND COMMUNITY

A. Inside the Classroom

We are committed to readying our students to become literate, independent, caring, and contributing adults who are able to successfully navigate and positively impact the 21st century global society. Before exiting high school, students will have uncovered and explored their many talents and passions, interacted with professionals from career fields in which they have interest, understood how to put their talents and skills to use in multiple career areas, participated in professional internships with a community or industry mentors, planned with college or career counselors, and met all Maryland high school graduation requirements. In preK-12 formal and informal learning settings, we will offer all students important and relevant content, tools, skills, and experiences so every student is able to confidently build and cross their own unique bridge from school to civic engagement, workforce participation, and college enrollment.

B. Beyond the Classroom Walls

Valuable student learning occurs inside and outside our classroom walls. Students should have opportunities to explore or enrich their personal interests, engage in unique learning experiences, and interact with others who share their passions in clubs, organizations, and competitions that take place outside of classroom settings. We are working to increase the number of quality co-curricular offerings available for students, schedule them at flexible times, thus allowing for maximum student participation, provide experts from all community sectors to facilitate these relevant offerings, and reduce barriers to student participation affected by transportation challenges in Anne Arundel County.

III. SOUND STEWARDSHIP

A. AACPS Business Practices are Designed for Quality, Effectiveness, and Efficiency

We take pride in the establishment and implementation of quality business practices which lead to the effective management of all school system resources. We are committed to continuing the prudent development, deployment, and evaluation of streamlined business processes and procedures to maintain resource stewardship excellence while striving to increase our efficiency, productivity, and service delivery levels.
3. Existing Conditions

SITE OVERVIEW

SITE DESCRIPTION

The subject site for Hillsmere Elementary School is located at 3052 Arundel on the Bay Road, Annapolis, MD 21403. The site is approximately 16.12 acres and currently contains the existing Elementary School and five (5) relocatable classroom buildings. The property is also known as Parcel 139 as shown on tax map 57, grid 7. The respective tax account number for the property is 02-000-00214025. The site is owned by the Anne Arundel County Board of Education. The property is bound by: Arundel on the Bay Road to the east, Old Annapolis Neck Road and single-family residential homes to the north, single-family residential homes and Edgemere Drive to the west, and single-family residential homes to the south.

SITE CIRCULATION AND PARKING

There are two existing access points onto the site. One of these access points is located along the southern end of Old Annapolis Neck Road. The other located along the east side off of Arundel on the Bay Road. The Old Annapolis Neck Road access point is located approximately 100 feet Northwest of Arundel on the Bay Road. This access point provides vehicular access to the parent drop-off loop and one-way bus loop as well as the main parking facility. The main parking facility which is located within the drop-off loop contains forty-nine (49) vehicular parking spaces including two (2) ADA accessible parking spaces. The other access point heading south on Arundel on the Bay is primarily used as staff parking as well as a service area for refuse removal and kitchen deliveries. This secondary parking area contains thirteen (13) vehicular parking spaces. The site as a whole contains sixty-two (62) parking spaces for vehicles.

There are several pedestrian sidewalks located throughout the site that take pedestrians from the parking areas to the building's main entrance. There is also a pedestrian sidewalk connection from the school's basketball courts and play areas to the neighboring residential streets that is located of east of Edgemere Drive. This walkway is partly bridged and dead-ends at a crosswalk on Edgemere Drive.
ZONING INFORMATION

The property is currently zoned as R2 - Residential District. The properties surrounding the school site to the north, south, and west are zoned Residential (R2). The property to the east is zoned Open Space (OS).

The following specific development standards for the R2 zone (an excerpt from Article 18-Zoning) of the Anne Arundel County Code are provided for guidance only. Per Article 18, §18-2-101(a), the (Zoning) applies to all land located in the County, except that it does not apply to land owned or leased and developed by the County or the Board of Education unless Federal or State law requires compliance with this article. Therefore, the project would essentially be exempt from the zoning regulations unless Federal or State law required compliance. Although the site is exempt from all local codes, it is currently in compliance.

Bulk Zoning Regulations in an R2 zone is as follows:

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<th>Requirement</th>
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<tbody>
<tr>
<td>Minimum lot size</td>
<td>15,000 square feet</td>
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<tr>
<td>Maximum coverage by structures</td>
<td>30% of gross area</td>
</tr>
<tr>
<td>Minimum width at front building restriction line; for waterfront lots, the building restriction line is measured from the rear lot line</td>
<td>80 feet</td>
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<tr>
<td>Minimum setbacks for principal structures:</td>
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<tr>
<td>Front lot line</td>
<td>30 feet</td>
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<tr>
<td>Rear lot line</td>
<td>25 feet</td>
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<tr>
<td>Side lot lines</td>
<td>7 feet</td>
</tr>
<tr>
<td>Corner side lot line</td>
<td>20 feet</td>
</tr>
<tr>
<td>Principal arterial or higher classification road</td>
<td>40 feet</td>
</tr>
<tr>
<td>Minimum setbacks for accessory structures other than sheds that do not exceed 64 square feet in area and eight feet in height:</td>
<td></td>
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<tr>
<td>Front lot line</td>
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<tr>
<td>Side and rear lot lines</td>
<td>7 feet, for structures less than 8 feet in height (other than swimming pools, tennis courts, basketball courts, and similar private recreational facilities accessory to single-family detached, duplex, or semi-detached dwelling), OR 5 feet</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Corner side lot line</td>
<td>20 feet</td>
</tr>
<tr>
<td><strong>Maximum height limitations:</strong></td>
<td></td>
</tr>
<tr>
<td>Principal structures</td>
<td>35 feet</td>
</tr>
<tr>
<td>Accessory structures</td>
<td>25 feet or the height of the principal structure, whichever is less</td>
</tr>
</tbody>
</table>

**SITE SOILS**

According to information obtained from the United States Department of Agriculture Natural Resources Conservation Service, the site falls into three (3) distinct soil groups:

**AuB**: Annapolis-Urban land complex, 0 to 5 percent slopes.  
**CnB**: Colemantown-Urban land complex, 0 to 5 percent slopes.  
**DuB**: Donlonton-Urban land complex, 0 to 5 percent slopes.

Additional information regarding these soils is identified in the table below:

<table>
<thead>
<tr>
<th>Map Unit</th>
<th>Percent of Site Area</th>
<th>Hydrologic Soils Group</th>
<th>USCS Classification</th>
<th>Hydric Soils</th>
<th>Topsoil Source</th>
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<tbody>
<tr>
<td>AuB</td>
<td>60.20%</td>
<td>C</td>
<td>SM</td>
<td>No</td>
<td>Fair</td>
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<tr>
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<td>Yes</td>
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<tr>
<td>DuB</td>
<td>18.60%</td>
<td>D</td>
<td>SC-SM</td>
<td>No</td>
<td>Fair</td>
</tr>
</tbody>
</table>
SITE TOPOGRAPHY

The site topography has moderate changes in elevation. The highest elevations on the site are at the parent drop-off loop and main parking lot. The highest elevation on site in this area is 40.0±. The existing school building sits on a fairly flat plateau. This building plateau slopes north to south at an approximate 0.5-1% grade from elevation 32.0± in the north to elevation 30.0± just south of the school building.

From the building plateau heading north, the grades are fairly gradual and relatively flat having slopes of approximately 2%. The steepest elevation on site occurs south of the building in the grass playfields. The elevation east of the relocatable classroom buildings sits at approximately 32.0± and the grade slopes southerly across the playfields to the lowest elevation of 8.0± at the southern edge of the property. Grades across these playfields have slopes of approximately 5-8%.

PUBLIC / PRIVATE UTILITIES

Water

Existing record documents show a 12-inch water main along Arundel on the Bay Road. There is a 4-inch water line that provides water service to the elementary school building. There are two (2) fire hydrants located along Arundel on the Bay Road. One is located at the corner of Old Annapolis Neck Road and other approximately 500 linear feet further south along Arundel on the Bay Road.

Sanitary Sewer

The existing building is currently served by a private sanitary sewer system. The existing sewer leaves the building along the east side in the service area parking lot. The existing sanitary sewer line runs south along the relocatable classrooms. The sewer line is 8” terra cotta pipe and is collected at a manhole just off the southeast corner of the building. From the manhole, the 8” sewer line heads west and passes through two additional manholes before connecting to a manhole located within Edgemere Road where there is an existing 8” public sewer line that runs to the north and south. The existing 8” sewer that serves the building is placed in a 10’ utility easement through the site and an adjacent residential property where it ties into Edgemere Road. Along with the 8” on site sewer pipe, a 10” Sewer FM runs through the site in the same 10’ easement from Edgemere Road east and connects to an existing 16” Sewer FM in Arundel on the Bay Road. Based on as-built record drawings there is an abandoned lift station on site at the southeast edge of the staff parking lot/service area.
Storm Drains

Storm water around the site is conveyed via a combination of overland flow and closed storm drain system. Primarily, the closed storm drains convey runoff from the existing building roof, paved parking areas and public roads. The storm drains range in size from 15”-27” in size. The storm drain system discharges to the southeast of the school building, within the school property.

A public 15” HDPE storm drain pipe and open back inlet discharges runoff from Arundel on the Bay Road into a small grove of trees and underbrush southeast of the existing relocatable classrooms.

The overland flow from the storm drain system travels to the southeast to an existing variable width storm drain and utility easement that provides for drainage to the Kitty Duvall Creek, through the Kitty Creek subdivision.

Gas, Electric, Telephone

The existing school building does not currently have gas service. Based on available Baltimore Gas & Electric gas mapping information, there is a 4” gas main located at the corner of New Church Road and Arundel on the Bay Road, approximately 170 feet from the southeastern corner of the Hillsmere Elementary School property.

Currently, overhead primary and secondary electric lines run along the south side of Arundel on the Bay Road. An electric service transformer is located just south of the service area, between the main school building and the relocatable classrooms.

Fuel Oil

Based on the as-built documentation that is available, there is an existing underground 10,000-gallon fuel oil storage tank on-site. The tank is located within the paved service area north of the transformer.
EXISTING SITE AMENITIES / MEMORIALS

The school has several amenities that past students have helped to create over the years. There is a painted field stone pathway located just north of the paved playground. There are mosaics located on the exterior walls of the existing school building. There is also a memorial located at the main entrance to the school building for Vincent M. DiBerardinis.
STORMWATER MANAGEMENT

The site does not have any existing storm water management facilities on site. Any new construction that occurs will be required to meet the requirements established by the Maryland Stormwater Act of 2007. These guidelines establish a process by which new construction needs to utilize sustainable or environmental site design (ESD) to the maximum extent possible to satisfy water quality requirements. ESD’s include but are not limited to micro-bioretention, dry and/or wet swales, rain gardens, etc. Attempts should be made to provide for impervious disconnects and to allow for adequate open space to construct multiple smaller facilities throughout the site to satisfy these requirements.

FLOODPLAINS, WETLANDS, AND WATERWAYS

The site is not located within the 100-year floodplain as delineated on FEMA flood insurance rate map 24003C0253F. The site is located in Zone X which means an area determined to be outside the 0.2% annual chance floodplain. A review of the Maryland Department of Natural Resources (DNR) mapping indicates that no wetlands or streams exist on the site.

LANDSCAPE, TREES, AND FOREST CONSERVATION

This site has numerous mature trees scattered throughout its limits. These trees provide shade for all seating areas around the school. A small forested area is located on the south end of the site. There are multiple wooded areas around the perimeter of the site that do not meet county standards to be considered forest.

One specimen tree was noted and located on site. A 31-inch DBH White Oak (*Quercus alba*) was found on the west side of the site. Further analysis of the forested area is necessary to determine if there are additional specimen trees. A forest conservation plan will be required for any development that exceeds 40,000 square feet on the site. Any specimen tree removal that may be required will require a modification request as well as mitigation as part of any design that impacts any of these trees that are determined to meet specimen tree requirements.
ATHLETIC FIELDS / ATHLETIC COURTS / PLAY AREAS

The property has several on-site recreational areas scattered throughout. In the front of the school building, there are multiple outdoor seating areas. These areas are decorated by multiple planted pots. A courtyard is located in the southwest end of the school building that is comprised of raised planting boxes, outdoor classrooms and mosaics. All throughout the courtyard, painted stones and other crafts are found. All play areas are located on the south and southwest side of the building. There is a designated playground area located on the south side of the building. There are two (2) paved basketball courts on the west side of the building. There are multiple non-designated soft surface play areas located to the south side of the building. In the area where the soft surface play areas are located, there is currently one (1) grassed multi-purpose field located on the south side of the property. There is also a single backstop located at the southeast corner of the multi-purpose field.
BUILDING OVERVIEW

HISTORY

Hillsmere Elementary School, built in 1967, is located on 16.12 acres along Arundel on the Bay Road in Annapolis, Maryland. There have been no significant alterations or additions to the original footprint of this facility. Interior renovations comprise of: minor reconfigurations of Pre K and Kindergarten classrooms in 1995, minor renovations to the Art room in 2005, the Media Center in 1985, and the Health Suite in 2001, a Boiler replacement in 2001, a series of ceiling and lighting upgrades between 2007 - 2010, and window air conditioner installation in 2002. The entire roof was resurfaced in 2005 with a partial resurface of the southern half of the east classroom wing in 2017. The Girl's Restroom located in the west wing was rearranged in 2017 to provide an ADA accessible toilet stall. The Boy's Restroom located in the east wing also underwent an ADA accessible alteration prior to 2014. Additionally, asbestos abatement has occurred at various times throughout the life of this building.

The existing structure covers in total 45,885 gsf over a single story and is a good example of typical school construction in the 1960s. The “U” shaped building is comprised of a main corridor flanked by two double-loaded corridor wings housing classrooms. The main corridor is occupied by the administration offices, cafeteria/gym, media center, health suite, teacher's lounge and additional staff offices. The art room and music room are located at the end of the east classroom wing. The cafeteria/gym is located directly off the main entry while the administration offices and media center are a short distance away along the main corridor. The boiler room and kitchen are adjacent to the cafeteria/gym. There is no direct link from the main entrance to the administration offices where visitors are required to check in; consequently, there is no supervision of visitors which creates a security challenge. There are currently five relocatables on site accounting for approximately 3,245 sf.
BUILDING ENVELOPE / INTERIOR

Exterior Walls

The exterior walls are comprised of brick veneer on CMU backup walls with metal copings and concrete sills at masonry openings. A review of the original drawings indicates that there is no air space, air barrier or insulation between the brick and CMU backup walls lending itself to an energy inefficient building envelope. Weep holes are provided at the base of the brick. Exterior masonry is in good condition with very minor repointing and cleaning at ground level required. Minor brick replacement will be required at the southwest corner of the east classroom wing. At typical door/window openings, the concrete sills are generally in good condition. The metal coping, soffit and fascia panels are all in good condition.

A band of mosaic art, created by Hillsmere students, extends below the classroom windows on the building’s west side. Another mosaic is located on the exterior wall of the media center inside the courtyard. Preservation of this timeless artwork is desired.
Entrances / Exterior Doors / Windows

All exterior windows and doors are original to the building. The main entrance doors, as well as all other exterior egress doors are painted wood with hollow metal frames and are in good condition. The exterior door leading to the boiler room is hollow metal with hollow metal frame. Sidelight glass is wire glass. Egress doors have accessible hardware while the doors to storage areas have standard knob locksets and vandal resistant plates. The two entrances on the north side of the building have combination locksets. The smaller, north side, entrance doors will require painting and minor dent repair. All public entrances are at grade level and are accessible by an ADA compliant concrete sidewalk.

The exterior windows are painted, steel framed with single pane glazing. They are energy inefficient, do not contribute to the integrity of the energy envelope, and have reached the end of their useful life. Existing drawings note that the spandrel above the clear glazing is a colored asbestos panel with rigid insulation behind and the existing soffits are noted as asbestos panels. These items will require abatement and replacement.
Main Entrance

Egress doors

Electronic door hardware

Awning windows at Gymnasium
Roof

The original building roof is a low-slope, built-up roofing system with aggregate cover terminating in a gravel stop. The entire roof was resurfaced in 2005 with the same system. The southern half of the east classroom wing has been resurfaced a third time with a TPO built-up membrane roof. A roof curb extending the entire width of this wing was added to separate the new TPO roof from the built-up roof. The roof appears to be in fair condition with significant drainage problems on the two classroom wings. Standing water was evident during the site survey. Roof drains were covered with debris and the roof surface surrounding these drains pitched higher than the roof surface preventing water from draining properly. Based on information from the facility manager, the area with the third roof typically has standing water. Tree branches were hanging over the roof in three areas which prevents the roof from drying properly. Moss is growing on the roofing under these branches. The gravel stops at the edge and flashing at parapets and curbs appears to be in good condition. The high roof over the gymnasium and the roof over the kitchen are in good condition. These two areas appear to be draining properly.
Interior / Circulation

Finishes in the building are mostly original and are generally clean and well maintained. Double loaded classroom corridor wings are connected by a main administration corridor. Terrazzo flooring is used on all main corridor floors. It is in good condition with minor floor cracks infilled with grout in several locations. Main circulation corridors are a minimum of 10'-0" wide. Corridor walls are typically glazed CMU wainscot up to 64" with painted CMU above. Academic wing corridors have lockers on both sides with clerestory windows above. These windows are located at 5'-8" above the floor to the ceiling and are typical at all classroom and media center corridor walls. Wall base is coved, glazed CMU units. Walls, base, lockers, and clerestory windows are in good condition. All corridors have 2x4 acoustic panel ceilings with lay-in 2'x4' fluorescent lights. Most are in good condition. Some ceiling panels are sagging in a few locations and some have water-damage stains.
Interior Doors and Hardware

Interior doors are solid core wood doors in hollow metal frames. The flush classroom doors are natural wood stained with painted metal frames. These doors are surrounded by wire glass transoms and hinge-side sidelites that are in good condition. It’s not clear if the classroom doors are original to the building as the original drawings call for a fixed louver on the lower half of the door. Most doors in this building will require some measure of repair of nicks and staple holes. Typical door hardware has been upgraded to door levers which meet ADA requirements; however, doors to miscellaneous areas including storage still have the original non-compliant door knob hardware. These doors typically have a fixed louver on the lower half and appear to be original to the building. Classroom door access clearance on the corridor side is impeded by the location of the lockers flush with the door jamb.

![Egress doors](image1)

![Classroom door](image2)

![Typical interior classroom wood doors and painted metal frames with transoms and sidelites](image3)
Toilet Rooms

Boy’s and girl’s toilet rooms are located in the both academic wings adjacent to the main corridor. The girl’s toilet room in the east classroom wing has original finishes and fixtures. Conversely, the girl’s toilet room in the west academic wing was reconfigured to include an ADA compliant toilet stall. The boy’s toilet room was reconfigured to include an ADA compliant toilet stall and has a reduced toilet count. Finishes in all multi-user toilet rooms are in fair-to-good condition. The floor finish is terrazzo. Walls are typically coved, glazed CMU base with glazed CMU wainscot up to 80” and painted CMU above. Ceilings are gypsum board with glossy paint and surface mounted 1’x4’ fluorescent fixtures. Toilet partitions are floor mounted overhead braced and vary between either stainless steel or plastic partitions. The toilet partitions in the girl’s east academic wing bathroom have been painted with artwork. Fixtures appear to be original to the building. Soap dispensers are not provided at each sink. Total fixture counts are likely not sufficient for the proposed facility improvements and a code analysis would be required to confirm fixture quantities.

Single occupant toilet rooms are located throughout the building. With the exception of the new Health Suite toilet and Pre-K toilet, none meet ADA accessibility requirements and appear to have original fixtures. Typical flooring is a 6x6 ceramic tile with glazed CMU wainscot up to 80” and glazed CMU coved base. Typical ceilings are painted gypsum board. All fixtures and finishes in these rooms are in fair-to-good condition.
Casework

Most of the built-in casework and millwork throughout the building is original. Casework in classrooms are a wood veneer base cabinet with stainless steel counters and porcelain sinks. With the exception of the Art Room, classroom casework is generally in good condition. The Art Room base cabinets are in poor condition and should be replaced. The casework on the north wall of the Pre K classroom was replaced with plastic laminate base cabinets, wall cabinets and countertop in 1995, and are in fair-to-good condition.
Classrooms

Considering the age of the building, the typical classrooms are in good condition. The flooring is 12"x12" VCT and the walls are painted CMU with glazed CMU straight base. With the exception of a few classrooms in the west wing, the ceilings were recently replaced with a 2'x2' suspended acoustical panel ceiling and 2'x4' recessed fluorescent lighting. Each classroom has original wood casework, stainless steel countertops and integral sinks with vinyl baseboard. In general, this casework is in good condition. Plastic laminate casework can be found in the Pre K classroom on the north wall next to the toilet room.

All classrooms have original exterior windows with a glazed bullnose sill and window A/C units. Covered radiators are located below the exterior windows. The radiator covers are in good condition.

Display boards (chalkboards and cork boards) are located on both the front and back walls of the room with a sliding projection display system on the teaching wall. Some of the display boards have been covered by glossy vinyl sheeting to use as a marker board.
Resource / ESOL

The Resource / ESOL room construction is similar to a typical classroom with the exception of the east wall, which is a painted gypsum board partition with vinyl base. Lay-in ceiling panels with 2'x4' fluorescent light fixtures are in poor condition and do not appear to have been replaced during other ceiling replacement renovations. The ceiling panels have recently tested positive for asbestos. With the exception of the ceiling and minor repairs to the vinyl base, this room is in good condition.

Art Room

The art room construction is similar to a typical classroom with the exception of the west wall which is a painted gypsum board partition with vinyl base. There is casework along both the east and west walls that has an island with a large undermount sink. The original casework doors have delaminating wood veneer and are in poor condition. The floor in this room is in fair condition. The fixtures, equipment and displays do not meet current Ed Specs.
Media Center / Computer Room / Copy Area

The media center with designated copy area and adjacent computer room are centrally located across from the administration office. The media center has direct access to the computer room via an interior door. Typical finishes in both rooms include VCT flooring and painted CMU walls with glazed CMU straight base. These finishes are in good condition with the exception of a loose floor tile at the location of a floor expansion joint. The 2'x2' acoustical lay-in ceiling with 2'x4' lay-in fluorescent lights is in good condition in the computer room. The ceiling panels and grid in the media center appears to be original to the building and are in poor condition. Wire glass clerestory windows are located on all corridor walls and exterior windows line the two exterior walls providing abundant natural light. The metal shelving units and librarian desk in the media center are in good condition. There is a resource area consisting of copiers and wall shelving located in the southeast wing of the media center. Low partition wall panels have been installed to separate this area.
Administration

The administration area is located adjacent to the main entry, accessible by the main corridor. There is limited supervision of visitor arrivals. Also, there is no security vestibule as required in the Ed Spec nor does the layout meet the required program square footage. The Principal's office with a private toilet room and a storage room are accessible from the administration office. Finishes in the administration area are similar to classroom construction with the exception of carpet in the Principal's office. The corridor wall is interior storefront framing with wire glass and two entry doors. The door into the Principal’s office is wood with a glazed transom above. There is a viewing window located between the Health Suite and Administration Office. Finishes in this area appear to be in good condition; however, there is a major lack of storage space.

Teacher’s Lounge

The teacher’s lounge is centrally located in the main administration corridor. The flooring is 12"x12" VCT, walls are painted CMU with a glazed CMU straight base and the ceiling has 2’x4’ acoustical panels with lay-in 2’x4’ fluorescent lights. The floor, walls, and ceiling are in good condition. A full size refrigerator and vending machine are located in this room. A single occupant toilet is located within this space. The size of this lounge appears to be too small for the number of staff it services and does not meet current Ed Spec requirements.
Health Suite

The health suite underwent improvements in 2001, which included an ADA compliant toilet, a rest area (girl/boy), and a nurse’s office. The rest area construction is similar to the corridor with glazed CMU wainscot up to 64” and painted CMU above. The floor in the rest area and toilet is 6”x6” ceramic tile. Floor grout joints have some discoloration. The toilet walls are covered with a 4”x4” glazed ceramic tile wainscot up to 6’-4” with painted CMU above. Ceilings in this suite are typical 2’x2’ acoustical panels with 2’x4’ fluorescent lay-in fixtures. Construction of the nurse’s office is similar to a typical classroom except for a dividing wall that is painted gypsum board with a vinyl base.

Music Room

The music room is located across the hall from the platform (stage) entrance and adjacent to the gymnasium / cafeteria. It is constructed similar to a typical classroom with 12”x12” VCT flooring, painted CMU walls, glazed CMU straight base and 2’x2’ acoustical panels with 2’x4’ fluorescent lay-in fixtures. The finishes in this area are in good condition. This room is acoustically isolated from the academic areas; although, it does not meet AACPS Education Specification for mandated square footage, equipment, acoustical enhancements, ceiling height, sound system, and storage requirements.
Gymnasium / Cafeteria

The Gymnasium / Cafeteria has direct access to the main lobby. The finishes in this space are generally in good condition, although there is minor cracking in the 12”x12” VCT flooring. Walls are glazed CMU wainscot up to 88” with painted CMU above and glazed CMU straight base. Clerestory windows with wire glazing run the length of both the east and west walls along with exposed painted steel columns. The ceiling has 2’x2’ acoustic panels with lay-in 2’x4’ fluorescent lights and exposed painted steel beams. There is no additional acoustic treatment around the perimeter of the space. A climbing wall is located on the north wall.

A platform (stage) with curtains, located at the south end of the space, is accessed by two narrow stairs at either end. There is no ADA compliant access to this stage nor are there risers across the width of the proscenium from the Gym/Cafeteria floor as is required in current Ed Specs. The platform wood floor is in poor condition. The ceiling is exposed with suspended mechanical units. There is a large retractable projection screen located in front of the back section of curtains. The curtains are in fair-to-good condition.
Food Service

The kitchen has terrazzo flooring, full height glazed CMU walls and a painted gypsum board ceiling with surface mounted 1’x4’ fluorescent fixtures. Kitchen finish materials are in generally good condition except for the ceiling which has paint bubbles in many locations. Stainless steel counters and equipment are included throughout the work space. An exhaust hood with back-to-back work areas is centrally located. Kitchen support spaces (including storage, a single occupant toilet, an adjacent locker room, and janitor closet) have 6”x6” ceramic tile on the floor. A walk-in capacity refrigerator is located between the kitchen and support spaces.

The food service area includes a single serving line, stainless steel counters and equipment. The floor finish is terrazzo and is in good condition. Wall finish is full height glazed CMU side walls and painted CMU at the double loaded entry wall. The wall base is coved, glazed CMU.
Outdoor Classrooms and Courtyard

Courtyard

Outdoor Classroom #1

Outdoor Classroom #2

Relocatables
STRUCTURAL SYSTEMS OVERVIEW

The existing school is a one story building, steel framed structure with flat roof of varying roof heights, designed in 1967. The existing roof structure, except over the gymnasium, consists of 2” thick gypsum on a ½” thick formboard with bulb-tee at 32½” o. c. supported by open web 16” to 18” deep steel joists (Photo SP1). The roof joists are generally spaced at approximately 48” on center. The roof overhangs are constructed using a cantilever roof plank at the exterior wall (Photo SP2). The roof structure is supported by wide flange steel beams, channels and tube columns. The columns are typically placed along the exterior and corridor walls.

The roof structure over the existing gymnasium consists of 2” thick gypsum on a 1/2” thick formboard with bulb-tee at 32½” o. c. supported by 12” deep purlins on 25½” deep box girders at the column grids with steel tube columns (Photo SP3).

There was a rainwater ponding over a south-west classroom wing (Photo SP4).

The existing first floor above the crawl space consists of 6” deep Dox Plank with 1½” concrete topping at the Kitchen, 4” deep Dox Plank with 2” topping at the corridors, kitchen area; and 6” deep Dox Plank with 2” concrete topping at all other areas (Photo SP5). The floor at the restroom area is 6 ½” thick framed concrete slab. The boiler room located south of the auditorium has a sunken floor and a partial basement space underneath the auditorium stage. There is an exterior areaway with a stair leading to the outside access. The floor at the boiler room is 6” thick concrete slab on grade. The superstructure columns and first floor planks are supported by a series of exterior and interior CMU foundation walls with a spread footing foundation. The existing building foundation was designed for a 4,000 psf allowable soil bearing pressure.

Existing structural drawings for the original building are dated 1967. Existing structural drawings indicate that the structure was designed for a roof live load of 30 pounds per square foot. The first floor at classrooms were designed for a live load of 60 pounds per square foot and corridors for a live load of 100 pounds per square foot. Live load for the gymnasium/auditorium, kitchen and media room is not noted on the drawing. There is a fairly substantial crawl space under the entire school.

Field observations of the existing roof deck have been performed by removing suspended ceiling tiles in several rooms. Based on a limited observation of the existing roof deck, the existing deck appears to be in satisfactory condition and no corrective action is anticipated. The full extent observation of roof decking will be required after the removal of the existing ceiling during construction phase.

Limited crawl space structure was observed through the access openings at the basement level. Full access was limited due to hanging electrical cables, pipes and stagnant air condition. The crawl space is ventilated through exterior areaway around the building. Generally, existing Dox Plank above the crawl space at the accessible areas are in satisfactory condition. The full extent observation of Dox Plank above the crawl space will be required with the cooperation of AACPS either during a design phase or a construction phase.

Exterior of the building is in satisfactory structural condition with minor brick veneer and concrete spalling (Photo SP6).
SP1: Typical roof structure

SP2: Roof Overhang

SP3: Gymnasium: Box Girder and Tube Column

SP4: Roof ponding

SP5: Crawl Space

SP6: Areaway for crawl space ventilation and brick spall
MECHANICAL SYSTEMS OVERVIEW

General

The purpose of this study is to assess the existing Hillsmere Elementary School facility and evaluate options to upgrade or replace the school. Hillsmere Elementary School is located at 3052 Arundel on the Bay Road in Annapolis, Maryland and is part of the Anne Arundel County Public School system (AACPS). The 45,885 square foot facility was originally built in 1967. Relocatable classrooms were added to the site at a later date. There have not been any major renovations to the existing building other than a boiler replacement project in 2001.

Heating System

The school is currently served by a steam heating system. The original oil-fired steam boilers and associated accessories were replaced in 2001. The current boilers are Weil McLain boilers, each with a capacity of 3,190 MBH. These boilers are served by a 10,000 gallon underground fuel oil tank located outside the boiler room. The tank and oil piping appear to be original to the building.

The boilers appear to be in an N+1 arrangement with each boiler sized for 100% of the load. The boiler exhaust flues are ducted out of the building through a masonry stack. The duplex condensate pump system was also replaced in 2002 to support the steam condensate return system. This system was manufactured by Shipco and is located adjacent to the boilers.

Steam piping is distributed from the boilers to a heating and ventilating unit serving the multi-purpose room, classroom unit ventilators and other miscellaneous heaters throughout the building. All of the piping and heating equipment appear to be original to the building. The majority of the piping is located in the crawl space, which is approximately 44” high in most locations. It should be noted that portions of the steam piping are corroded / rusted and missing sections of insulation.

The boilers appear to be in fair condition and have approximately ten years of remaining life expectancy. However, all other heating equipment and piping have reached the end of their useful life.
Cooling System

Hillsmere Elementary School does not currently have a central cooling system. Cooling has been added to administration areas and classrooms in the past 20 years via split system AC units and window air conditioning units. There is currently no cooling in the multi-purpose room, stage, or kitchen. Wall fans have been added in these areas to promote air movement however, users indicated these have very minimal effect on the comfort level in the space.

In 2001, there was a health suite renovation project which included the addition of three approximately 1.5 ton split system air conditioning units. These are wall mounted units manufactured by Mitsubishi. In 2002, window air conditioning units were added to all the classrooms. The administration area and media center also have window air conditioning units but it is unclear when these were installed.

The split systems and window air conditioners are past the end of their useful life and are generally not recommended as a reliable source of cooling. Also, after discussions with the maintenance staff, it appears the unit ventilators are manually de-energized during the cooling season. The unit ventilators are shut down because they have no means to cool or dehumidify the outside air resulting in temperature and humidity issues in the classrooms. However, this means that the classrooms are not provided with the code required ventilation air during the cooling season. This needs to be addressed as part of the upgrades to the school.
Air Distribution

As mentioned above, the main air distribution system for the classrooms are unit ventilators. These heating only unit ventilators sit below the windows at the perimeter of the classrooms. Ventilation air is introduced directly into the back of each unit. Unit ventilators are not ideal from a comfort standpoint due to the aforementioned humidity control issues. Also, these units take up floor space within the classroom and are relatively noisy compared to above ceiling distribution systems. It appears that the relief system for the unit ventilators occurs through the corridors which is not compliant with current building codes.

The multipurpose room is served by a heating and ventilating air handling unit located in a mechanical room adjacent to the main boiler room. All of the air distribution occurs at the face of the stage (supply registers are high and return registers are low) which is not ideal. The room is equipped with relief vents located in the center of the space. It should be noted that there is very limited clearance space around this unit in the mechanical room. Piping and limited head room block access to the unit which likely inhibits maintenance access.

The exhaust fans serving the building appear to vary in age. Many fans appear to be original to the building while others were replaced in 2017. The kitchen hood and other relief vents in the building appear to be original to the building.

Most of the equipment (other than a few exhaust fans) have exceeded their life expectancy. It should be noted that there is very limited ceiling space available for replacement HVAC systems / ductwork. The ceilings are currently at 9’-4” with only a few inches clear to the structure. There is also glass in the wall between the classrooms and corridors which extends up to the current ceiling height. The addition of ductwork (which is recommended from a temperature / humidity control standpoint) will require lower ceilings (by approximately 18”) and potentially eliminating the glass along the corridors. This will be discussed in more detail in the recommendations portion of the study.
Automatic Temperature Controls

The existing control system for the school is a Honeywell pneumatic system, with valve and damper components provided with pneumatic operation. An air compressor system is located within the boiler room and serves the building’s pneumatic control components located throughout this school. Air supplied from this compressor is fed through a refrigerated air dryer system.

Plumbing

The school is served by a 4” domestic water main extending from Arundel on the Bay Road and entering the crawl space under the kitchen. The majority of the domestic water mains and plumbing fixtures appear to be original to the building. The oil fired domestic water heater and circulator pump was replaced in 2002 as part of the boiler replacement project. The domestic water heater is a 199 MBH, 86 gallon unit manufactured by A.O Smith.

An 8” sanitary pipe exits the east side of the building adjacent to the boiler room. At one time a sewage ejector was required to remove the waste from the building. However, the ejector has been abandoned on site and all piping leaving the building is gravity fed. Another 4” sanitary main exits the kitchen and is routed to a grease interceptor located adjacent to the fuel oil storage tank. It was noted by the facilities staff that the lack of floor drains in janitors closets has caused recent flooding. All piping and accessories appear to be original to the building.

The roof of the school experiences large amounts of ponding. It appears that portions of the roof do not have proper sloping to allow for the water to reach the roof drains. Other roof drains are very clogged with dirt, sticks and other debris. The storm water piping within the building appears to be original.

The building does not currently have natural gas; however, there is a BGE gas main at the intersection of Arundel on the Bay Road and New Church Road. This is approximately 170 feet from the edge of the schools property. The size of the pipe is 4”; however, the pressure is unknown at this time.
Fire Protection

The school does not currently have a sprinkler system.

Relocatables

Hillsmere Elementary School has five relocatable classrooms located in a fenced in area on the east side of the building. Each relocatable has an independent HVAC unit mounted on the side of the structure. These units are manufactured by Marvair. The relocatables do not have any water or plumbing fixtures.
ELECTRICAL SYSTEMS OVERVIEW

General

The purpose of this study is to assess the existing Hillsmere Elementary School facility and evaluate options to upgrade or replace the school. Hillsmere Elementary School is located at 3052 Arundel on the Bay Road in Annapolis, Maryland and is part of the Anne Arundel County Public School system (AACPS). The 45,885 square foot facility was originally built in 1967. Relocatable classrooms were added to the site at a later date. There have not been any major renovations to the existing building other than a boiler replacement project in 2001.

Electrical Service and Distribution

Hillsmere Elementary receives electrical service from a single service entrance supplied by Baltimore Gas and Electric (BGE).

Electrical Service and Distribution – Main Building

The main building service is fed by a BGE transformer located behind the building. The transformer was replaced during a 2002 renovation. This transformer feeds a service entrance disconnect located within a main switchboard MSB in the boiler room. MSB is rated 1200A at 208Y/120 volts, three phase, four wire and was manufactured by Schneider Electric QED2 Power Style type. The switchboard was installed during a service renovation project in 2002 and consists of 2 sections.

- Section 1: Incoming current transformer (CT) cabinet and 1,200A main circuit breaker.
- Section 2: Distribution section with 16 feeder breakers, and additional front space that may be usable for additional circuit breakers.

MSB supplies the following major downstream equipment:

- Lighting and appliance branch circuit panels located throughout the school in janitor closets and storage rooms. These panels were installed during the 2002 renovation and are manufactured by Schneider Electric.
- Kitchen equipment panels located within the kitchen. These panels were installed during the 2002 renovation and are manufactured by Schneider Electric.
• The 5 relocatable classrooms appear to be supplied from switchboard MSB. However, there is a separate BGE meter adjacent to MSB labelled “portables electric meter.” After contacting BGE this meter has not recorded load since July 2018.

The school does not currently have a generator or emergency power distribution system. Emergency lighting is provided by wall mounted battery lighting units. Life safety systems such as fire alarm and security are backed up with integral batteries and chargers.

**Lighting – Main Building**

Interior lighting in classrooms, administration area, corridors, and general learning spaces consist of recessed 2'X4', 4 lamp fluorescent lighting that appear to have been installed during the 2009 systemic renovation. These lights appear to be in good condition. 1'X4' surface mounted fluorescent wrap-arounds are used in kitchen and restrooms. The media center uses a combination of surface mounted 1'X4' fixtures and 2'X4' fluorescent lighting. The gym/cafeteria has recessed 2'X4' fluorescent lights and were installed during 2007 renovation. These lights appear to be in good condition. Lighting controls generally consist of localized manual on/off switching in most areas.

Emergency lighting consists of self-contained battery pack type egress lights and exit signs. These fixtures appear to be installed as part of the original building construction and are in poor condition.

Exterior lights consist of the following:

- Building mounted wall packs: These fixtures appear to be installed more recently after the original building construction, appear to be HID type and appear to be in good condition.
- Canopy lights: These were installed more recently after the original building construction, appear to be surface HID type, and appear to be in good condition.
- Parking Lot lights: These fixtures appear to be installed more recently after the original building construction, appear to be pole-mounted HID type, and appear to be in good condition.
Lighting – Relocatables

Lighting is integral to the relocatables and generally consists of recessed fluorescent lighting. Lighting controls consist of localized manual on/off switching.

Fire Alarm

The existing fire alarm system in the main building was manufactured by Silent Knight and the main control panel is a Model 5808. The system is addressable and consists of manual pull stations, smoke detectors, horns and strobes. The system appears to have been replaced sometime after the original building construction.

There are fire alarm system devices located in the modular trailers. These are connected back to the main building fire alarm system.

Other

This facility does not have a lightning protection system.

AV / IT OVERVIEW

General Information

The IT/AV/Security Systems Site Assessment was conducted at the Hillsmere Elementary School building on July 18, 2019 as part of the Feasibility Study. The voice, video and data communications infrastructure are of the vintage of the Technology in Maryland Schools (TIMS) installed in 1990’s. The communications infrastructure is designed in the traditional star configuration with a central Telecommunication Equipment Room (TER) and one (1) Telecommunication Rooms (TR). Corridor and crawl space pathways for communications cabling in the single-story building service the complete building. The overall installation or rack, cabinets, cabling and pathways in all telecommunications rooms is fair but does not appear to be well conditioned.
Existing Conditions

Telecom Spaces

The Telecommunications Equipment Room (TER) is in a storage room located off the media center. The 10’ x 12’ room is not well air conditioned, hot, and not dedicated to use as the TER. The TER consists of an open floor data rack, wall board for video splitters and voice cable terminations, and a video head-end floor cabinet.

Telecommunications Equipment Room
The floor rack contains:
- 4 48 port patch panels
- 4 48 port switches

Cabinet #1 contains:
- Video head-end equipment

Wallboard
- Fiber distribution center
- 110 blocks for phone cabling

Floor UPS

Telecommunications Room #1 located in un-numbered storage between room 114 and 115 and contains a half-size floor data rack which contains:
- 3 48 port patch panels
- 3 48 port switches
- 4 rack mounted 110 blocks for voice
- UPS
- Fiber patch panel
Data Network

The existing data network was installed under the TIMS program of 1998-99 and consists of category 5E UTP cabling in the horizontal and fiber optic backbone cabling. Switches provide 10/100 to the desktop and Gigabit Ethernet in the backbone. The TER has a core switch and 48 port switches. The data network equipment is consistent in the TR. The TR uses Extreme switches, UPS (uninterrupted power supply), and consists of 48 port patch panels. TR equipment seems to be in good working condition, but the room is not dedicated to use as a telecommunications room.

Most classrooms have 2 data drops at the teaching station with multiple drops in the rear of the classroom for student workstations as per the old TIMS standards with pathways coming up thru the floor from the crawl space below:

Security System

For the security system the school uses motion sensors and video surveillance cameras. Security cameras are limited. The cameras are enclosed in smoked domes and hang from the ceiling or attached to wall.

Phone-Intercom System

The public address/phone system is a Telecor II located in the main school office and is old but reportedly in fair working condition. The Telecor II Communication System is a microprocessor-based system that provides two-way intercom communications, full-duplex telephone communications, and a built-in Master Clock.
Classroom Audio-Visual

Classrooms have either an Epson short-throw projector shown at left below or a ceiling mounted projector as shown on the right below.

![Projectors](image1.png)

Video Distribution System

An analog coaxial “Tap and drop” distribution system is currently in place in all sections of the building. Amps are in telecom spaces. The head-end equipment is in a floor mounted cabinet in the TER (telecommunications equipment room).
4. Description of Options

INTRODUCTION

The Design Team investigated (6) options for Hillsmere Elementary School.

Option 1 – Do Nothing
Option 2 – Patch & Paint
Option 3A – Addition / Renovation without Swing Space
Option 3B – Addition / Renovation with Swing Space
Option 4A – Replacement in Existing Field without Swing Space
Option 4B – Replacement over Existing Building with Swing Space

A comprehensive assessment of the existing facilities was used to establish the baseline for each of the options. Deficiencies included site circulation and safety, program and space adjacencies, life cycle and condition of existing systems and life safety / accessibility. Each of these areas were analyzed and addressed in each of the following options for review and consideration.
**OPTION 1 – DO NOTHING**

**Overview:**
The “Do Nothing” option does not make any physical modifications to the existing facility at this time. There are no associated costs with this option as its purpose is a baseline to compare with proposed design Options 2 - 4. This option provides an opportunity for AACPS to explore building modifications at a future time.

**Description:**
This option does not involve work to the existing facility, nor any associated costs.

**Statistics:**

<p>| | |</p>
<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Duration</strong></td>
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<tr>
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<td><strong>Estimated Life Cycle Cost</strong></td>
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<table>
<thead>
<tr>
<th><strong>Advantages</strong></th>
<th><strong>Disadvantages</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Site</strong></td>
<td></td>
</tr>
<tr>
<td>✔</td>
<td>❌ Does not correct parking, drop-off and vehicular / pedestrian circulation issues</td>
</tr>
<tr>
<td><strong>Building</strong></td>
<td></td>
</tr>
<tr>
<td>✔ No cost to the project</td>
<td>❌ Does not address program, Life Safety, Accessibility or systemic deficiencies</td>
</tr>
<tr>
<td>✔ No interruption to school operations</td>
<td>❌ Existing building envelope will remain energy inefficient</td>
</tr>
<tr>
<td>✔ Memorials and Mosaics preserved</td>
<td>❌ Does not address the presence of (5) relocatable classrooms on site</td>
</tr>
<tr>
<td><strong>Systems</strong></td>
<td></td>
</tr>
<tr>
<td>❌ Building remains without a fire sprinkler system</td>
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</tr>
</tbody>
</table>
OPTION 2 – PATCH AND PAINT

Overview:
This option includes cosmetic improvements to portions of the existing facility not currently in proper working order as well as patching and painting of building finishes. Most areas of the building will have cosmetic enhancements only by simply patching and painting finished surfaces. There are no systemic updates in this proposed option nor any strategies to address program deficiencies or life safety and building code short falls.

Description:
This option would cosmetically update finishes with only superficial patching, repairing and painting of damaged surfaces, new flooring, new ceilings, etc. to provide a clean, new appearance to the existing building.

Statistics:

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Duration</td>
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<td>Square Footage</td>
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<tr>
<td>Estimated Life Cycle Cost</td>
<td>$98,900,000</td>
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</table>

Advantages | Disadvantages
---|---
**Site** | ✗ Does not correct parking, drop-off and vehicular / pedestrian circulation issues

**Building**

✓ Minimal project cost
✓ Memorials and Mosaics preserved
✓ Interior finishes will be upgraded

✗ Does not address program, Life Safety, Accessibility or systemic deficiencies
✗ Existing building envelope will remain energy inefficient
✗ Roof drainage issues not resolved
✗ Does not address the presence of (5) relocatable classrooms on site

**Systems**

✗ Building remains without a fire sprinkler system
Anticipated Scope of Work:

Architectural - Interior
- Interior wall and ceiling finishes repaired and painted
- Lay-in ceilings replaced
- Damaged casework repaired or replaced
- Door hardware replaced to meet code
- Terrazzo flooring reconditioned

Architectural - Exterior
- Perimeter sealants and control joints replaced
- Finishes repaired and painted

Structural, Mechanical, Electrical, Plumbing, IT, AV and Data Systems
- Existing to remain
OPTION 3A – ADDITION / RENOVATION WITHOUT SWING SPACE

Overview:

The intent of the “Addition / Renovation” option is to preserve a beloved building that has served the community well for over 50 years with multiple generations in the same family attending this school. By carefully placing a 1-story addition at the south end of the building, creating a circulation loop, and reconfiguring spaces within the existing building, the design team was able to preserve unique elements of this 1-story school while providing for student and staff needs as outlined in the AACPS Education Specification. Through an extensive renovation of the existing school, this Addition / Renovation scheme also addresses State requirements by updating the mechanical, electrical, plumbing, fire protection, AV/IT and security systems and brings the building into compliance with current life safety, building codes, and accessibility requirements. Improvements to the existing building will include refurbishing interior and exterior finishes, repairing the existing roof and replacing exterior window and door systems. Interior existing walls will be demolished and spaces reconfigured as necessary to comply with area and adjacency requirements outlined in the AACPS Education Specifications. Additionally, site improvements will complete this renovation to resolve bus and car circulation, parking capacity, stormwater management, security concerns, requirements for play areas and emergency vehicle access. This option will allow the Hillsmere staff and students to remain at their current location during the construction period by utilizing a phasing approach.

Statistics:

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<th>Description</th>
<th>Value</th>
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<tr>
<td>Square Footage</td>
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<td>Total Estimated Construction Cost</td>
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<tr>
<td>Estimated Life Cycle Cost</td>
<td>$98,100,000</td>
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</table>

Description:

This option demolishes a small portion of the east academic wing, kitchen and adjacent music room. A new public use addition will be constructed at the south end of both existing academic wings with the main entrance facing Arundel on the Bay Road. The new site layout also provides a safe separation of cars and buses entering the site. The bus drop-off is located in front of the building and has adequate space to accommodate six buses. For bus use, one curb cut is required for this scheme as buses enter and exit in one location. Cars will enter and exit the site at one location requiring only one curb cut. The parking lot has 105 parking spaces and is configured to provide a generous lane for queuing. Both car drop-off and bus drop-off feed into the main entry lobby from a
centralized location with maximum visibility from the administration suite. Two fire lanes are accessed from both the bus lane and parking lot. The service area near the kitchen is accessed from one of the fire access lanes. A new multi-purpose field is located near the existing field and requires a low retaining wall to maintain a 5% maximum sloping grade from the building to the field. ADA compliant ramps have been provided for field access. Soft and paved play areas are located north of the existing building with direct access from the academic wings.

The newly configured building footprint closes off the end of the existing courtyard with a public use addition. A main circulation corridor connects the existing corridors creating a new loop circulation path. The main entrance and administration suite have been relocated to the new addition and are placed near the front of the site for maximum visibility and supervision. The gymnasium/cafeteria was moved to the new addition and are now separate spaces with an operable wall in between to expand the spaces for large events. The media center is now located at the southwest corner of the new addition and is across from the gymnasium. It has an exterior wall with a view of the courtyard. The music rooms have been relocated adjacent to the main entry and across the hall from the platform for convenience during performances. This location is ideal as it is away from teaching spaces for noise control. The art room and learning studio remain in the existing building but have been relocated to the northeast corner in the current multi-use area with higher ceiling, clerestory windows, and north facing – ideal for the art room.

The existing building will undergo extensive demolition of classroom interior walls to reconfigure spaces that meet the AACPS Education Specification classroom area requirements. The existing corridor walls will remain intact. Early childhood programs will now reside in the newly reconfigured east academic wing classrooms adjacent to the administration suite. The north and west academic wings will house 1st to 5th grades. These classrooms will also be enlarged to meet area requirements. Double doors have been located at the entrance to the east and west academic wings so these areas may be closed off from the main public corridor.

During the renovation portion of the construction project, the existing building will be completed in phases. On-site and some additional relocatable classrooms will house students and teachers while their portion of the existing building is reconfigured and upgraded. At the end of each renovation phase, newly constructed areas will be occupied by the temporarily relocated group and another group will take their place in the relocatable classrooms. This process will continue until all areas of the existing building have been completed. At the end of the construction period, all relocatable classrooms will be removed from the property.
OPTION 3A – ADDITION / RENOVATION

The graphics below accentuate the extent of work involved with the renovation of the existing building. The floor plan shows the portions of the exterior to be demolished prior to construction and the interior components to be demolished prior to renovating the existing building.
OPTION 3 – ADDITION / RENOVATION

First Floor Plan
### OPTION 3A – ADDITION / RENOVATION

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Site</strong></td>
<td></td>
</tr>
<tr>
<td>✓ Separate, safer, and more efficient bus and car access</td>
<td>✗ Site level differences require a retaining wall along the multi-purpose field</td>
</tr>
<tr>
<td>✓ Only two curb cuts on Arundel on the Bay Road</td>
<td>✗ Reforestation required at new parking lot</td>
</tr>
<tr>
<td>✓ Curb cut for bus traffic serves entry and exit</td>
<td>✗ Requires relocation of force main sanitary sewer piping systems</td>
</tr>
<tr>
<td>✓ Bus and car traffic well separated on site</td>
<td></td>
</tr>
<tr>
<td>✓ Minimal re-routing of stormwater piping required</td>
<td></td>
</tr>
<tr>
<td><strong>Building</strong></td>
<td></td>
</tr>
<tr>
<td>✓ Existing building remains functional during building addition construction</td>
<td>✗ Existing building envelope will remain energy inefficient</td>
</tr>
<tr>
<td>✓ Strong sense of arrival to main building entry location</td>
<td>✗ Construction phasing issues require more time for construction and inconveniences to students and staff – classes move to relocatables already on site</td>
</tr>
<tr>
<td>✓ Clear Administrative visibility to car queuing (drop-off and pick-up)</td>
<td>✗ Renovation projects may have unforeseen issues arise which create potential scheduling delays and cost increases</td>
</tr>
<tr>
<td>✓ Building entry sited far away from the road</td>
<td>✗ New building addition is close to houses</td>
</tr>
<tr>
<td>✓ Building centralized on site</td>
<td>✗ Play space is close to road – needs fencing</td>
</tr>
<tr>
<td>✓ Building remains 1 level</td>
<td>✗ New building addition needs exterior ramp/stairs at egress locations for Gym, Cafeteria and Mechanical room due to site slope</td>
</tr>
<tr>
<td>✓ Closed courtyard created</td>
<td>✗ Long corridors and travel distances</td>
</tr>
<tr>
<td>✓ Memorials and Mosaics preserved</td>
<td>✗ Less area efficient than all new construction</td>
</tr>
<tr>
<td>✓ Service area not visible upon site approach</td>
<td>✗ Some additional relocatable classrooms needed for on-site swing space.</td>
</tr>
<tr>
<td><strong>Systems</strong></td>
<td></td>
</tr>
<tr>
<td>✓ Existing building will be upgraded to include an automatic fire sprinkler system</td>
<td>✗ Additional cost / complexity due to phase occupied renovation – must keep existing MEP systems operational while installing new systems</td>
</tr>
<tr>
<td>✓ Potentially re-use portions of existing sanitary / stormwater piping and electrical infrastructure</td>
<td></td>
</tr>
</tbody>
</table>
Anticipated Scope of Work:

Architectural - Interior
- Bring existing building up to current Building, Life Safety and Accessibility codes and standards
- Design and reconfigure spaces in existing building to meet current Ed. Spec. guidelines
- Upgrade existing building finishes to meet current Ed. Spec. guidelines
- Replace flooring finishes (carpet / floor tile) and base
- Repair and recondition existing terrazzo flooring
- Replace ceramic tile throughout
- Repair and paint existing-to-remain interior wall and ceiling finishes
- Replace lay-in ceilings
- Replace interior doors, frames and hardware to meet current accessibility standards
- Replace existing casework
- Replace existing lockers
- Abate hazardous materials
- Design interiors to meet AACPS guidelines
- Provide compliant interior signage
- Upgrade and construct toilet rooms for ADA compliance
- Demolish existing kitchen and adjacent classroom from northwest corner of building
- Demolish a portion of the existing classroom wing at the east end of building
- Construct addition to include new main entry, music program, mechanical room, kitchen, cafeteria, gymnasium, media center and connecting corridors
- Relocate administration to east wing adjacent to new main entry

Architectural - Exterior
- Replace roofing
- Clean all masonry
- Repoint, repair and replace damaged brick where required
- Replace perimeter and control joint sealants
- Preserve memorials and mosaics
- Replace existing soffits
- Replace window and door systems
OPTION 3A – ADDITION / RENOVATION

Site:

This option includes significant site renovations to improve the safety of students during arrival and dismissal. The site work in this option, includes constructing a large building addition on the south side of the existing building. The existing parking lots will be replaced with separate Bus and Visitor parking lots with separate entrances along Arundel on the Bay Road. The student drop-off area, for buses and parents, is located next to the main entrance and the Administration Offices.

Construction of the new bus parking and drop-off area will require the relocatable classrooms to be removed. The new entrance for the bus parking lot and drop-off will also provide fire access along the north side of the building. The new bus loop will provide stacking for 6 buses as required by the Educational Specification.

The new parent/visitor parking lot and service area will be constructed on the south side of the new building addition. The entrance to this parking facility will be off of Arundel on the Bay Road and separate from the bus loop. The new parking facility will also have a partial fire lane with a “T” style turnaround constructed off the southern side. The new parking facility will accommodate parking for 105 vehicles including 5 ADA accessible parking spaces. A small service and fire lane will be constructed on the south side of the new addition to provide added fire access coverage for the building. The total parking provided on-site will be 105 spaces which will meet the Educational Specifications requirement of 105 parking spaces.

A perimeter fire lane cannot be constructed around the entire building due to the location of the existing building and its proximity to the property line. The new dead end fire lanes will have appropriate turnaround space provided or will fall in the length category for not requiring a turnaround. Grades to the north of the existing building will be maintained for the most part in the construction of the play areas. Positive drainage away from the building and play areas will be directed into the storm drain system. Grades along the east side of the building will be revised to provide ADA accessibility from the Bus and Parent Drop-off areas, including pedestrian pathways from Arundel on the Bay Road. The south side of the new addition and parent parking lot will see the majority of the fill material required to maintain ADA design requirements within the parent parking lot. ADA ramps and retaining walls will be required to provide access to the multi-purpose field area. Grades along the west side of the building and new addition will largely be unchanged with the exception of what is required to construct the fire lane.

Prior to construction beginning for the new addition, the relocation of the public sanitary sewer pipes, manholes and a large diameter force main, including their respective easements to the south will be required. Existing sanitary sewer connections should be abandoned and a new connection made to the existing/relocated sewer main, but on the west side of the new addition, where the existing gravity sewer system drains westward. The existing 4-inch water service, located at the northeastern corner of the existing building will remain. A fire service water main and associated fire hydrants will be placed onsite to provide adequate fire protection to the renovated elementary school building. This new fire service line will be connected to the existing 12” water main in Arundel on the Bay Road.
OPTION 3 – ADDITION / RENOVATION

The majority of the existing storm drainage systems should be able to remain functional during the construction of the site improvements. A small diameter storm drain relocation will be required in the area of the proposed parent parking lot. Runoff from Arundel on the Bay Road currently drains through this storm drain pipe. This existing system can be connected to the future storm drain system that will be managing the runoff from within the parent parking lot. Future runoff from the rooftop and new bus loop will be directed into the future storm drain system serving the parent parking lot, discharging south of the multi-purpose field.

Environmental Site Design (ESD) will be utilized to the maximum extent possible. ESD facilities such as Rain Gardens, Micro-bioretenion and Bio-swales will be utilized within the green spaces that are located near the parking bays, within the bus loop and near other paved surfaces. We anticipate the construction of 6-8 separate ESD facilities.

New outdoor play areas will also be constructed along the northern and southern portions of the site. One soft surface play area and one hard surface play area for grades 1-5 will be constructed to the north side of the building and fire lane. A smaller soft surface play area and hard surface play area will be constructed on the north side of the building, between the building and fire lane, for Kindergarten. A new multi-purpose field measuring 210’x360’ with an integral softball field will be constructed to the south of the new building addition and parking lot area. The outdoor play areas will meet the Educational Specification required sizes. To achieve the construction of the multi-purpose field some cutting and filling will be done in conjunction with the parking facility grading. The site grading will require the import of suitable fill materials.

Structural:

ADDITION

Roof Structure

The typical structure will be comprised of galvanized, 1-1/2” deep, wide-ribbed steel deck supported by open-web, K-series steel joists, spanning between structural steel girders supported by steel columns located along the exterior and corridor walls. Joist spacing will vary between 5'-0” and 6'-0” on centers. Interior and exterior CMU walls will be non-load.

At the gymnasium, cafeteria, and kitchen areas, the structure will consist of 1-1/2” deep, 22 gauge wide-ribbed or acoustical steel deck, supported by long-span, open web steel joists spaced at 5'-0” on centers. Vertical support will be provided by 12” thick reinforced CMU bearing walls.

Mechanical equipment that cannot be placed within the building will be located on the roof, above the corridors or other areas as necessary, and will be supported by KCS-series steel joists.

The structure above the main central corridor will be comprised of 3” deep, galvanized steel deck, supported by structural steel tube portal frames. This system will extend continuously between the north and south canopied entrances.
OPTION 3A – ADDITION / RENOVATION

Double wythe 8" reinforced CMU fire walls, will be constructed between the north academic wing and main central corridor.

Floors

The typical ground level floor construction will be 5” thick concrete slab-on-grade. The slab will be thickened to 6” at heavily loaded floors such as mechanical rooms. The slab will be haunched to a thickness of 12” below masonry partition walls exceeding 6 inches in thickness. At locations where portions of the existing building will be demolished, the new slabs will be placed on compacted soil infill of the existing crawlspace.

Lateral Stability

Wind and seismic loads will be resisted by interior and exterior reinforced CMU shear walls and by ordinary moment resisting steel frames in the academic wing and main central corridor.

Foundation

Based on the original building drawings, it is anticipated that the foundation will be a shallow, spread footing system supported on natural soil or structural fill. New footings located adjacent to the existing crawl space will require stepping to meet existing footing elevations.

EXISTING BUILDING RENOVATION

New mechanical rooftop units, serving the classrooms, will be supported by modified existing framing above the classroom corridors. New framing will be added as necessary.

Conversion of the multi-purpose room will require modifications of the existing wall openings. The stage floor structure will be removed and replaced with one of the two following options: Option 1 is to infill the crawl space with structural fill and pour a 5” thick concrete slab-on-grade. Option 2 is to install a slab above the crawlspace comprised of 2” deep composite steel deck with 4-1/2” of concrete topping, supported by steel beams bearing on the crawl space walls. At the boiler room, a new 5” thick reinforced concrete slab on structural fill will be provided. These floors will match the existing floor elevation.

Miscellaneous structural modifications will be required for existing members at new roof, floor, and wall openings. At the proposed addition adjacent to the existing building, a new 8” reinforced CMU fire wall, supported by a spread footing foundation, will be constructed. Expansion joints will be provided where the new addition abuts the existing building.
OPTION 3A – ADDITION / RENOVATION

Mechanical:

General

The proposed addition/renovation concept involves a 28,000 SF addition to the existing school, as well as, a full renovation to the existing building. As part of this option, approximately 5,100 SF of the existing school will be demolished. The new addition will house the two classrooms, the cafeteria, kitchen, gymnasium, media center, music rooms, the main mechanical and electrical rooms, as well as, other miscellaneous support spaces. The existing building renovations include but are not limited to the relocation of the administration/health suite, relocation of the art rooms and upgrades to all the classrooms. Due to the age and condition of the existing mechanical equipment, as well as, the relocation of the main mechanical room, all mechanical systems are recommended to be replaced under this option.

Depending on swing space available in local schools, this option will likely be a phased-occupied project. The existing mechanical systems will need to remain in place while the new mechanical room and equipment is being installed. New HVAC and domestic water piping will likely be installed parallel to the existing piping in the crawl space to allow for a quick transition from the existing systems to the new systems. The new mechanical systems are described in greater detail below.

HVAC System Options

After discussions with the AACPS mechanical staff and considering the physical limitations in the existing building, two systems will be considered for the addition/renovation option during the design phase of the project. These two systems include:

a. **Option 1 – Two-pipe Fan Coil Units:** This option will include a chiller and boilers as the main cooling and heating sources for the building. Chilled and heating water will be circulated throughout the building to serve fan coil units (FCUs) in each classroom. The FCUs will be re-circulating units providing heating and cooling to each occupied space. Ventilation air will be provided through rooftop DOAS (dedicated outside air system) units with energy recovery wheels. These units will have DX cooling and hot water heat. The administration area, media center, gymnasium and cafeteria will be likely be equipped with an independent form of DX cooling as well to allow for summer operation without the chiller.

b. **Option 2 - Geothermal System:** The heating/cooling source equipment includes multiple heat pump types utilizing geothermal heat exchange (via vertical wells) as the heat rejection for the heating/cooling system. A condenser water loop will serve individual water-to-air heat pumps located in each classroom. The classrooms will also be served by dedicated outside air (DOAS) units to provide code required ventilation air. The DOAS units will likely be heat pumps which are tied into the condenser water loop and will be equipped with energy recovery wheels. It is anticipated that the administration area, media center, gymnasium, cafeteria, etc. will be de-coupled from the geothermal loop and provided with an independent heating / cooling source.
Heating System

Under both HVAC system options, the existing steam system will be demolished in its entirety and a new heating water boiler system will be provided. The fuel source for the boiler(s) will be determined during the design phase, however, natural gas fired condensing boilers are preferred. As mentioned in the existing conditions portion of this study, the current main fuel source for the existing building is a 10,000 gallon underground fuel oil tank. As part of this project, the design team will investigate the feasibility of bringing natural gas to the building. There is a BGE gas main at the intersection of Arundel on the Bay Road and New Church Road. This is approximately 170 feet from the edge of the school’s property. Natural gas is the preferred heating source due to efficiency, cost and maintenance advantages. The design team will work with BGE and AACPS to determine if the gas main has adequate pressure to serve the building and evaluate the costs of bringing the gas piping to the building.

For HVAC system option 1 (i.e. two pipe fan coil units), the heating plant will consist of high efficiency gas fired condensing boilers (if natural gas is available) with stainless steel heat exchangers. If natural gas proves to not be practical for this building, fuel oil or propane boilers will be considered. The boiler arrangement will be sized for the total heating load as well as to provide N+1 boiler capacity. Heating water supply temperatures will be in the range of 120 – 160 degrees F. Heating water will flow through a two-pipe dual temperature piping system to serve air handling equipment (see air distribution section below) throughout the building. Change over valves will be located in the main mechanical room to allow for heating water flow during the heating season and chilled water flow during the cooling season.

Two (2) dual temperature water pumps (primary and standby) will circulate heating water supply throughout the building. The pumps will be base mounted end suction type with inertia pads and vibration isolation to minimize vibration transmission to the building structure. The dual temperature water pumps will be controlled by variable frequency drives to maximize energy conservation.

For HVAC system option 2 (i.e. geothermal), the geothermal system will provide condenser water which will serve small independent water-to-air heat pump units. Ventilation air will be provided to the classrooms by dedicated outside air (DOAS) units which will also likely be served by the geothermal condenser water loop.

The administrative/health spaces, media center, gymnasium and cafeteria are anticipated to be decoupled from the condenser water loop. The heating source for these spaces, as well as, miscellaneous heaters throughout the building will likely be heating water from the boiler(s). The boilers may also be tied into the geothermal piping loop to ensure that loop temperatures do not fall below low limit setpoints.

The geothermal water system and heating water system will each be provided with two circulating pumps (primary and standby). The pumps will be base mounted end suction type with inertia pads and vibration isolation to minimize vibration transmission to the building structure. The pumps will be provided with variable frequency drives to maximize energy conservation. The pumps, boiler(s) and incoming geothermal piping will all be located in the main mechanical room.
Under both options, the majority of the HVAC piping will be located in the crawl space due to limited space available above the ceilings.

**Cooling System**

For HVAC system option 1 (i.e. two pipe fan coil units), the cooling source will include an outdoor air cooled high efficiency chiller. The outdoor machine will utilize screw compressors and will be located in an enclosure on grade adjacent to the mechanical room. Glycol water will flow through the chiller for freeze protection purposes. In order to de-couple the glycol water from the main building distribution, a flat-plate heat exchanger and a set of two (2) glycol water pumps (primary and standby) will be provided. The glycol water pumps will circulate the glycol water through the “source” side of the heat exchanger and back to the chiller.

Two (2) dual temperature water pumps (primary and standby) will pump fresh water through the “system” side of the heat exchanger to produce chilled water which will be circulated to cooling coils within each air handling unit (see “Air Distribution System” description). The pumps will be base mounted end suction type with inertia pads and vibration isolation to minimize vibration transmission to the building structure. The dual temperature water pumps will be provided with variable frequency drives to maximize energy conservation. Change over valves will be located in the main mechanical room to allow for heating water flow during the heating season and chilled water flow during the cooling season.

The administrative/health spaces, media center, gymnasium and cafeteria will be provided with an independent cooling source to allow for operation when the chiller is de-energized. A variable refrigerant flow (VRF) system is anticipated in the administration area. Rooftop air handling units are anticipated to serve the other spaces. These rooftop air handling units will likely be provided with a chilled water coil, as well as, an independent DX coil.

For HVAC system option 2 (i.e. geothermal), the geothermal system will provide condenser water which will serve small independent water-to-air heat pump units. Ventilation air will be provided to the classrooms by dedicated outside air (DOAS) units which will also likely be served by the geothermal condenser water loop.

The administrative/health spaces, media center, gymnasium and cafeteria are anticipated to be decoupled from the condenser water loop. The cooling source for these spaces, will likely be in the form of air cooled DX units (i.e. VRF in the administration area and packaged rooftop units elsewhere).

Two circulating pumps (primary and standby) will be provided to circulate the geothermal water loop. The pumps will be base mounted end suction type with inertia pads and vibration isolation to minimize vibration transmission to the building structure. The pumps will be provided with variable frequency drives to maximize energy conservation.

Under both options, the majority of the HVAC piping will be located in the crawl space due to limited space available above the ceilings.
Air Distribution System

 Whether system option 1 or 2 is selected, the air distribution systems will look very similar. Each classroom will be equipped with a dedicated terminal unit (either fan coil unit under option 1 or heat pump under option 2). As mentioned earlier in this study, there is very limited ceiling space available in the existing classrooms. In order to keep ceiling heights at a reasonable level, the terminal units will likely be located on the floor at the perimeter of the classroom (i.e. non-ducted type). Ducted terminal unit options (i.e. above ceiling type or located in mechanical closets) can be considered if ceiling heights in the 8'-0" range are acceptable.

Re-circulating air handling units will provide conditioned and ventilated air to the gymnasium, cafeteria and media center. Under option 1, the air handling units will be connected to the chilled / heating water piping system and will likely have an independent DX cooling coil for scheduling flexibility. Under option 2, these units are anticipated to be de-coupled from the geothermal piping loop. Conditioned supply air will be distributed through low pressure ductwork to each space. In areas without a ceiling (i.e. exposed ductwork), double wall spiral / flat oval ductwork will be utilized. In areas with a ceiling, rectangular ductwork will be extended to louvered type supply air diffusers. The use of flexible ductwork will be limited to three (3) feet in length.

The administration area will be served by a VRF system, likely in the form of ceiling mounted cassette units in each space.

Dedicated outside air (DOAS) units will be provided to meet the ventilation needs of the classrooms and administration area. These units will be located on the roof and equipped with supply/exhaust fans, heating/cooling source (see sections above), filters, as well as access sections for maintenance accessibility to all coils, filters, etc. These units will also be equipped with energy recovery, likely in the form of an energy recovery wheel. The DOAS units will distribute tempered ventilation air directly to each space through low pressure ductwork.

Roof mounted, direct drive, exhaust fans will be provided to ventilate the toilet rooms and janitor’s closets within the facility. Electrical and telecommunications rooms will be provided with dedicated DX cooling units as required to maintain temperature requirements.

Control System

The existing pneumatic control system and associated components will be removed and replaced with a direct digital control (DDC) type system with electric actuation. Each control function and associated control point of all mechanical equipment shall be incorporated into the building temperature control system.

All new temperature control work shall be provided by EASI and will interface with the current AACPS open protocol Tridium front end system located at the Fort Smallwood facility.

Each learning space (classrooms, etc.) will be considered a temperature control zone and will be provided with independent temperature controls. The DOAS units will be provided without packaged controls. EASI will provide independent controls on the DOAS units so that it can be controlled and monitored from the central EMCS.
OPTION 3 – ADDITION / RENOVATION

All major mechanical equipment items (DOAS units, air handling units, fan coil units, heat pumps, etc.), as well as, all temperature sensors, filter status, etc., will be capable of being controlled and/or monitored locally at the building and through the central EMCS.

Plumbing

The existing incoming domestic water service will be replaced with a new minimum 6” combination domestic/fire service. This service will likely enter the building in the new main mechanical room. The domestic water service will be provided with a reduced pressure backflow preventer assembly. A flow test will be performed to confirm that adequate pressure is available.

As mentioned above, the feasibility of bringing a new gas service to accommodate the heating and domestic hot water requirements of the building will be evaluated during the design phase. Connection will be made to the low pressure side of the gas meter to be provided by BGE.

Domestic hot water will be generated from a gas-fired water heater located in the main mechanical room. If gas is not available, fuel oil, propane or electric will be considered for the heating source. Domestic hot water distribution temperature will be set for 110°F (adjustable). The use of solar domestic hot water heating will be evaluated (i.e. energy savings benefits weighed against first cost) during the design phase of the project.

All of the existing plumbing fixtures will be replaced with low water use fixtures to maximize water conservation. Low flow fixtures are anticipated to include 1.28 gallon per flush (gpf) water closets, 0.125 gpf urinals as well as 0.5 gpm sinks and lavatories. In addition, manual operated flush valves and faucets are anticipated to be provided.

All new type L copper domestic water piping will be provided. In addition, all piping will be insulated in accordance with ASHRAE 90.1 and a hot water recirculation system will be provided, with a dedicated pump. All domestic water piping is anticipated to be located in the crawl space to conserve space above the ceilings.

All sanitary and vent piping is recommended to be replaced but could be evaluated for re-use if the budget requires. All waste and drainage piping will be cast-iron. PVC piping may be used below slab within the building perimeter and 10 feet outside building perimeter per AACPS design standards.

Roof drains and the associated storm water distribution system are recommended to be replaced. Storm water mains in the crawl space may be evaluated for re-use if the budget requires. A secondary storm water drainage system will be provided parallel to the primary system to meet the secondary drainage requirements. The secondary system will discharge through the exterior wall above grade at locations to be determined.
OPTION 3 – ADDITION / RENOVATION

Fire Protection:

The existing building currently does not have a sprinkler system. Under this project a wet pipe fire protection sprinkler system will be provided for the existing building and the addition. As mentioned above, a new 6” combination fire/domestic water service is anticipated. The sprinkler system will be designed in accordance with NFPA and the local authority having jurisdiction, including a double-check backflow preventer at the incoming service.

Recessed type sprinkler heads will be utilized in all areas except storage rooms, mechanical rooms, etc. Where piping is exposed, upright heads will be provided.

A flow test will be performed during the design phase to determine the available pressure to the building. Calculations will then be performed to determine if a fire pump will be required.

Electrical:

General

The proposed addition/renovation concept involves a 28,000 SF addition to the existing school, as well as, a full renovation to the existing building. As part of this option, approximately 5,100 SF of the existing school will be demolished. The new addition will house the two classrooms, the cafeteria, kitchen, gymnasium, media center, music rooms, the main mechanical and electrical rooms, as well as, other miscellaneous support spaces. The existing building renovations include but are not limited to the relocation of the administration/health suite, relocation of the art rooms and upgrades to all the classrooms. Due to a combination of equipment age, capacity, proposed renovations and program modifications, it is recommended that all electrical systems be replaced under this option.

Electrical Service and Distribution – Main Building

Based on load information, the existing 1,200A, 208Y/120 volt service has a peak demand load of 233.7 kilowatts (BGE meter value (187 kW) X 1.25 per NEC Art. 220.87). Utilizing a 0.9 power factor, this equates to a peak demand load of 259.7 kVA or 720 amperes at 208Y/120 volts, three phase, four wire. Based on the existing peak loads, the existing service has inadequate capacity to serve the proposed addition and mechanical systems.

For these reasons, it is recommended a new 480Y/277 volt secondary service be provided. The new service would require the installation of a new BGE pad mounted transformer which will provide secondary service to a new 480Y/277volt switchboard. We estimate the service entrance to be 2,000A at this time. The existing pad mounted BGE transformer located outside the building would be removed and replaced/upsized to new location on site. The new service will provide power to the entire building.

The 5 existing 100A, 208Y/120V circuit breakers supplying the modular classrooms would be removed.
A 480Y/277volt service entrance switchboard will be provided in the main electrical room of the proposed elementary school building to distribute power throughout the building. The switchboard will be provided with the following components:

- BGE approved CT cabinet.
- 2,000A main circuit breaker.
- Distribution section with group mounted molded case circuit breakers.
- Digital power monitoring device.
- Surge protective device (SPD)

The existing distribution system including panels, feeders, branch circuits, and devices will be removed and replaced due to proposed renovation and program modifications in this area. Additionally, existing branch circuits were installed during the original building construction, and are nearing the end of their useful life and should be replaced.

**Electrical Service and Distribution – Modular Classrooms**

The 5 existing 100A, 208Y/120V circuit breakers supplying the modular classrooms would be removed when the trailers are removed.

**Feeders and Branch Circuits**

All conductors/circuits will be installed as follows:

- Interior concealed branch circuit wiring located in dry locations will be installed in electrical metallic tubing (EMT). Liquid-tight flexible metal conduit will be used for final connections to vibrating equipment such as motors and transformers. Metal-clad (MC) cable will be allowed for final connections to light fixtures.
- Exposed interior branch circuits will be rigid galvanized steel where subject to physical damage and EMT elsewhere.
- All EMT fittings (where allowed) will be steel compression fittings with insulated throats.
- Wiring installed in exterior and wet locations will be installed in rigid metal conduit with liquid-tight flexible metal conduit used for final connections.
- Underground conductors will be installed in direct buried PVC conduit except as noted below.
- Underground service conductors and generator conductors will be installed in concrete encased PVC ductbanks.
- All interior conductors will be copper conductor with type THHN, THHW, or XHHW insulation.
- All exterior underground conductors will be copper with type RHW insulation.
- All feeders and branch circuits will be provided with a separate green insulated equipment grounding conductor. Conductor sizes #10 and smaller shall be solid; conductor sizes #8 and larger shall be stranded.
- Conduits will not be installed within concrete floor or below/within slab on grade unless absolutely necessary.
OPTION 3A – ADDITION / RENOVATION

Grounding

A complete grounding electrode system and equipment grounding system will be provided in accordance with NFPA 70, National Electrical Code, and local codes and regulations. The grounding system will be specified to have a maximum overall resistance of 10 ohms to ground at the main ground bus.

Should a lightning protection system be provided, copper ground rods will be provided at each corner of the building and at 100-foot maximum intervals in between for the lightning protection system. This system will be bonded to the building grounding system in accordance with the National Electrical Code.

Distribution Equipment

The 480/277 volt panelboards will be provided to support large motor load and lighting throughout the school. Energy efficient dry type step down transformers will be used to step down the voltage from 480 volt to 208/120 volt for the 208/120 volt panelboards serving receptacles, food service equipment and small power loads. All panelboards will be provided with copper bus bars, equipment ground busses, and bolt-on, molded case circuit breakers.

Motors will be controlled using individual full voltage, combination motor starters and motor circuit protector disconnects. Localized disconnect switches will be provided for all motor-driven equipment. Variable Frequency Drives (VFD) will be provided for all motors that require adjustable speed operation. VFD’s will be required to meet harmonic limits as specified in IEEE 519.

Short Circuit and Arc Flash Calculations

A short circuit study will be performed based on the short circuit capacity available at the new service transformer. The maximum available short circuit capacity at the main service points will be calculated based on the available utility short circuit capacity and any notable contributions from motor loads.

Maryland Emergency Management Agency Requirements

The Maryland Emergency Management Agency (MEMA) has issued a waiver to remove AACPS from the Emergency Shelter Compliance Process. They determined that Hillsmere Elementary School is in close proximity to one or more designated shelters; therefore, the Anne Arundel County Office of Emergency Management does not recommend this site for an emergency shelter. See Appendix D.
Emergency Power

A 480/277 volt generator will be located outdoors in a sound attenuated weatherproof enclosure. The generator will be diesel powered with a sound attenuated enclosure and sub-base fuel tank capable of running the generator for 72 hours at full load. NOTE: AACPS personnel have requested to use a natural gas powered generator on previous projects; however, this preference will need to be coordinated with AACPS and with the Authority Having Jurisdiction (AHJ) for this project. The generator will be used to supply power to emergency and optional standby distribution systems located in the building. The generator will supply two (2) automatic transfer switches (ATS) located in the building, one for the emergency system and one for the optional standby system. Loss of normal power at either ATS will result in the automatic starting of the generator.

The following loads will be connected to the generator supplied emergency system and must be operational within ten (10) seconds after a power outage:

- Egress and exit lighting.
- Fire detection and alarm system (also provided with integral battery backup).
- Public Address System.
- Telephone System.
- Receptacles adjacent to fire and security panel.
- Generator auxiliary systems.
- HVAC split system(s) serving telecomm rooms.

AACPS personnel have requested additional equipment should be connected to the generator that will be connected to the generator supplied optional standby system:

- Kitchen refrigeration and freezer equipment.
- Student health suite.
- Sewage pump station (if applicable).
- Well (if applicable).

Lighting

The existing lights, branch circuits and control systems will be removed and replaced due to the extent of proposed renovations and program modifications in this area.

The lighting design for the building will be in accordance with the design requirements, AACPS requirements and usage of each area. Zonal cavity and/or point by point calculations will be performed for each space or representative space utilizing effective reflectances of ceiling, wall, floor, light loss factor and the co-efficient of utilization to maintain the recommended light level at the working surfaces. Coefficient of utilization will be obtained from the particular lighting fixture cuts after the final fixture selections are completed. IES and AACPS recommended footcandle levels will be maintained throughout the building.
OPTION 3A – ADDITION / RENOVATION

The majority of lighting within the building will be provided with 2’ x 4’ and 2’ x 2’ high efficiency LED volumetric fixtures with acrylic lenses. Industrial type LED fixtures will be utilized in electrical/mechanical equipment areas, and other infrastructure areas without ceilings such as storage rooms. Accent lighting using LED lamping will be provided in locations where specialty lighting is required. LED light fixtures in gymnasium shall be provided with cage and safety chain. High-abuse wall-mounted LED luminaires will be provided in stairwells.

Occupancy sensors using dual technology incorporating ultrasonic and infrared will be provided within individual rooms. Infrared occupancy sensors will be provided in transit areas such as corridors. Localized low voltage lighting controls will consist of multi-level switching for classrooms with the typical zoning being student desk area, daylight (lights along the window wall), corner light that is adjacent to both window and the teaching wall, and lights adjacent to teaching wall. Daylighting controls will be provided as required to meet energy conservation requirements. All lighting controls will be connected into a building wide central system.

Egress, exit and exit discharge lighting will be provided in accordance with NFPA Life Safety Codes. The egress and exit lights will be connected to emergency circuits with generator backup. Batteries will not be used in egress light fixtures.

Exterior lighting will be provided along the perimeter of the building using wall mounted LED lighting fixtures. Lighting fixtures located at points of exit discharge will be connected to the emergency generator for compliance with emergency lighting for exit discharge. Parking lot and roadways lights will be provided consisting of LED luminaires mounted on aluminum poles.

The lighting power densities will be based on the power budget density guidelines as defined by the current ASHRAE or IECC standards as applicable.

Fire Alarm Systems

A new addressable fire alarm system with voice evacuation will be provided.

Initiating devices will include manual stations, smoke detectors, carbon monoxide detectors (as applicable), thermal detectors, duct type smoke detectors, interface modules for sprinkler flow switches and OS&Y valve position switches. Indicating devices will include combination speaker/strobe devices and supplementary visual devices. Auxiliary devices will include control modules for remote signaling and control. All fire alarm circuits will be installed in conduit. A fire alarm annunciator panel with voice handset, speaker zone controls and control switches for mechanical systems will be provided at the main entrance.

The design will comply with the following codes: NFPA-72, NFPA-101, IBC, and Maryland Accessibility Code 05.02.02.
OPTION 3A – ADDITION / RENOVATION

Lightning Protection System

Discussions with AACPS will be held to determine the need/preference for a lightning protection system. Currently, the existing building does not have a system in place. For the purposes of this study, it is assumed that a lightning protection system is preferred, therefore, an Underwriters Laboratories (UL) Master Label lightning protection system will be specified for the building.

Copper lightning protection components will be used throughout including all air terminals. All down leads will either be copper conductors installed in non-ferrous conduit or steel columns will be utilized in accordance with NFPA 780 where practical. The down leads or steel columns will be connected to the building’s grounding system as outlined in Grounding Section.

All grounding connections below grade will be exothermic welds.

IT / AV:

From a technology perspective, the differences in the level of effort among Addition / Renovation Option, Replacement Option 4, and Replacement Option 5 are very small and insignificant. All three options require the same new communications infrastructure (cable plant). The extensiveness of the MEP upgrades and the age of the existing communications infrastructure will require total replacement in the Addition / Renovation option to meet current AACPS standards. Likewise, all three options will require new classroom AV systems, telephone/intercom data networking and security systems.

Telecommunication Rooms

A standard sized (10’ x 10’) Telecommunication Room should be provided for every 70,000 square feet of floor space. These rooms should contain good environmental conditioning including air conditioning, emergency power-protected circuits, and good lighting. The main Telecommunication Equipment Room should be better sized for a more technology rich school and located near the media center. The final determination of the number and location of TR's will be determined during the schematic design phase.

Structured Cabling System (Telephone and Data)

The school-wide computer network should be an implementation of 10/100/1000 Mbit Ethernet over Category 6 copper UTP cable and Gigabit Ethernet over multimode fiber, complying with the Institute of Electrical Engineers’ (IEEE) 802.3 standards for Ethernet. Backbone cabling between the telecommunications equipment room (TER/"head end") and all telecom rooms (TR's) shall be a multimode/single-mode fiber optic cable (18 / 6 Strands). All horizontal cabling shall be terminated in Category 6 rack-mounted patch panels in the telecom rooms, and in communication network outlets (CNO’s) at the workstation. A major renovation of the school that included new systemic system upgrades would require replacement of the communications infrastructure systems. Wireless connectivity should be available throughout the building.
Data outlets intended for owner provided wireless access points shall be cross-connected to owner provided inline powered switch ports. ESP will work with the client to refine the number of data drops in all types of instructional and non-instructional spaces to ensure that it complies with Anne Arundel County Public School standards and guidelines.

**Video Distribution**

AACPS is transitioning away from a coaxial based video distribution system and may not include a coaxial based video distribution system. The IP data network shall allow for video distribution via the Category 6 UTP and fiber distribution network. A small number of coaxial drops may be installed in strategic areas such as the main reception area, principal’s office and main conference space.

**Classroom Technology**

AACPS currently includes a Light Speed sound enhancement amplifier/mixer in all learning spaces with a wall mounted Epson Powerlite 685W ultra short throw projector. The purpose of the sound enhancement system in classrooms and laboratories is to equalize sound levels throughout the classroom to ensure that students hear the presentation, regardless of proximity to the speaker. The system allows a presenter’s voice to be amplified via a lanyard or a hand-held infrared microphone.

**Security Systems**

Closed Circuit Television should provide video surveillance of the school, internally and externally, 24 hours per day. The CCTV will utilize owner procured and installed IP based cameras that are connected to the data network through switching equipment in Telecom Rooms.

The Access Control and Intrusion Detection system should allow/prevent access, track movement throughout the facility and provide an alarm signal on and offsite in the event of an unauthorized entry. The systems should be integrated and be controllable on and offsite to allow for efficient system management. The system shall consist of motion detectors, door and window contacts, card readers, door controllers, power supplies and intelligent software all connected to alarm panels throughout the facility.
OPTION 3B – ADDITION / RENOVATION WITH SWING SPACE

Overview:

The intent of the “Addition / Renovation” option is to preserve a beloved building that has served the community well for over 50 years with multiple generations in the same family attending this school. By carefully placing a 1-story addition at the south end of the building, creating a circulation loop, and reconfiguring spaces within the existing building, the design team was able to preserve unique elements of this 1-story school while providing for student and staff needs as outlined in the AACPS Education Specification. Through an extensive renovation of the existing school, this Addition / Renovation scheme also addresses State requirements by updating the mechanical, electrical, plumbing, fire protection, AV/IT and security systems and brings the building into compliance with current life safety, building codes, and accessibility requirements. Improvements to the existing building will include refurbishing interior and exterior finishes, repairing the existing roof and replacing exterior window and door systems. Interior existing walls will be demolished and spaces reconfigured as necessary to comply with area and adjacency requirements outlined in the AACPS Education Specifications. Additionally, site improvements will complete this renovation to resolve bus and car circulation, parking capacity, stormwater management, security concerns, requirements for play areas and emergency vehicle access. To eliminate the need for a phased construction schedule, the Hillsmere staff and students will relocate to an off-site school(s) for the entire construction period.

Statistics:

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Description:

This option demolishes a small portion of the east academic wing, kitchen and adjacent music room. A new public use addition will be constructed at the south end of both existing academic wings with the main entrance facing Arundel on the Bay Road. The new site layout also provides a safe separation of cars and buses entering the site. The bus drop-off is located in front of the building and has adequate space to accommodate six buses. For bus use, one curb cut is required for this scheme as buses enter and exit in one location. Cars will enter and exit the site at one location requiring only one curb cut. The parking lot has 105 parking spaces and is configured to provide a generous lane for queuing. Both car drop-off and bus drop-off feed into the main entry lobby from a
centralized location with maximum visibility from the administration suite. Two fire lanes are accessed from both the bus lane and parking lot. The service area near the kitchen is accessed from one of the fire access lanes. A new multi-purpose field is located near the existing field and requires a low retaining wall to maintain a 5% maximum sloping grade from the building to the field. ADA compliant ramps have been provided for field access. Soft and paved play areas are located north of the existing building with direct access from the academic wings.

The newly configured building footprint closes off the end of the existing courtyard with a public use addition. A main circulation corridor connects the existing corridors creating a new loop circulation path. The main entrance and administration suite have been relocated to the new addition and are placed near the front of the site for maximum visibility and supervision. The gymnasium/cafeteria was moved to the new addition and are now separate spaces with an operable wall in between to expand the spaces for large events. The media center is now located at the southwest corner of the new addition and is across from the gymnasium. It has an exterior wall with a view of the courtyard. The music rooms have been relocated adjacent to the main entry and across the hall from the platform for convenience during performances. This location is ideal as it is away from teaching spaces for noise control. The art room and learning studio remain in the existing building but have been relocated to the northeast corner in the current multi-use area with higher ceiling, clerestory windows, and north facing – ideal for the art room.

The existing building will undergo extensive demolition of classroom interior walls to reconfigure spaces that meet the AACPS Education Specification classroom area requirements. The existing corridor walls will remain intact. Early childhood programs will now reside in the newly reconfigured east academic wing classrooms adjacent to the administration suite. The north and west academic wings will house 1st to 5th grades. These classrooms will also be enlarged to meet area requirements. Double doors have been located at the entrance to the east and west academic wings so these areas may be closed off from the main public corridor.
The graphics below accentuate the extent of work involved with the renovation of the existing building. The floor plan shows the portions of the exterior to be demolished prior to construction and the interior components to be demolished prior to renovating the existing building.
OPTION 3B – ADDITION / RENOVATION

First Floor Plan
### OPTION 3B – ADDITION / RENOVATION

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Site</strong></td>
<td></td>
</tr>
<tr>
<td>✓ Separate, safer, and more efficient bus and car access</td>
<td>✗ Site level differences require a retaining wall along the multi-purpose field</td>
</tr>
<tr>
<td>✓ Only two curb cuts on Arundel on the Bay Road</td>
<td>✗ Reforestation required at new parking lot</td>
</tr>
<tr>
<td>✓ Curb cut for bus traffic serves entry and exit</td>
<td>✗ Requires relocation of force main sanitary sewer piping systems</td>
</tr>
<tr>
<td>✓ Bus and car traffic well separated on site</td>
<td></td>
</tr>
<tr>
<td>✓ Minimal re-routing of stormwater piping required</td>
<td></td>
</tr>
<tr>
<td><strong>Building</strong></td>
<td></td>
</tr>
<tr>
<td>✓ Existing building remains functional during building addition construction</td>
<td>✗ Existing building envelope will remain energy inefficient</td>
</tr>
<tr>
<td>✓ Strong sense of arrival to main building entry location</td>
<td>✗ More portables required to move entire school off-site</td>
</tr>
<tr>
<td>✓ Clear Administrative visibility to car queuing (drop-off and pick-up)</td>
<td>✗ Renovation projects may have unforeseen issues arise which create potential scheduling delays and cost increases</td>
</tr>
<tr>
<td>✓ Building entry sited far away from the road</td>
<td>✗ New building addition is close to houses</td>
</tr>
<tr>
<td>✓ Building centralized on site</td>
<td>✗ Play space is close to road – needs fencing</td>
</tr>
<tr>
<td>✓ Building remains 1 level</td>
<td>✗ New building addition needs exterior ramp/stairs at egress locations for Gym, Cafeteria and Mechanical room due to site slope</td>
</tr>
<tr>
<td>✓ Closed courtyard created</td>
<td>✗ Long corridors and travel distances</td>
</tr>
<tr>
<td>✓ Memorials and Mosaics preserved</td>
<td>✗ Less area efficient than all new construction</td>
</tr>
<tr>
<td>✓ Service area not visible upon site approach</td>
<td>✗ Renovation construction relies on school schedule for start of existing building interior demolition</td>
</tr>
<tr>
<td>✓ No construction phasing issues</td>
<td></td>
</tr>
<tr>
<td><strong>Systems</strong></td>
<td></td>
</tr>
<tr>
<td>✓ Existing building will be upgraded to include an automatic fire sprinkler system</td>
<td></td>
</tr>
<tr>
<td>✓ Potentially re-use portions of existing sanitary / stormwater piping and electrical infrastructure</td>
<td></td>
</tr>
</tbody>
</table>
Anticipated Scope of Work:

**Architectural - Interior**
- Bring existing building up to current Building, Life Safety and Accessibility codes and standards
- Design and reconfigure spaces in existing building to meet current Ed. Spec. guidelines
- Upgrade existing building finishes to meet current Ed. Spec. guidelines
- Replace flooring finishes (carpet / floor tile) and base
- Repair and recondition existing terrazzo flooring
- Replace ceramic tile throughout
- Repair and paint existing-to-remain interior wall and ceiling finishes
- Replace lay-in ceilings
- Replace interior doors, frames and hardware to meet current accessibility standards
- Replace existing casework
- Replace existing lockers
- Abate hazardous materials
- Design interiors to meet AACPS guidelines
- Provide compliant interior signage
- Upgrade and construct toilet rooms for ADA compliance
- Demolish existing kitchen and adjacent classroom from northwest corner of building
- Demolish a portion of the existing classroom wing at the east end of building
- Construct addition to include new main entry, music program, mechanical room, kitchen, cafeteria, gymnasium, media center and connecting corridors
- Relocate administration to east wing adjacent to new main entry

**Architectural - Exterior**
- Replace roofing
- Clean all masonry
- Repoint, repair and replace damaged brick where required
- Replace perimeter and control joint sealants
- Preserve memorials and mosaics
- Replace existing soffits
- Replace window and door systems
OPTION 3B – ADDITION / RENOVATION

Site:

This option includes significant site renovations to improve the safety of students during arrival and dismissal. The site work in this option, includes constructing a large building addition on the south side of the existing building. The existing parking lots will be replaced with separate Bus and Visitor parking lots with separate entrances along Arundel on the Bay Road. The student drop-off area, for buses and parents, is located next to the main entrance and the Administration Offices.

Construction of the new bus parking and drop-off area will require the relocatable classrooms to be removed. The new entrance for the bus parking lot and drop-off will also provide fire access along the north side of the building. The new bus loop will provide stacking for 6 buses as required by the Educational Specification.

The new parent/visitor parking lot and service area will be constructed on the south side of the new building addition. The entrance to this parking facility will be off of Arundel on the Bay Road and separate from the bus loop. The new parking facility will also have a partial fire lane with a “T” style turnaround constructed off the southern side. The new parking facility will accommodate parking for 105 vehicles including 5 ADA accessible parking spaces. A small service and fire lane will be constructed on the south side of the new addition to provide added fire access coverage for the building. The total parking provided on-site will be 105 spaces which will meet the Educational Specifications requirement of 105 parking spaces.

A perimeter fire lane cannot be constructed around the entire building due to the location of the existing building and its proximity to the property line. The new dead end fire lanes will have appropriate turnaround space provided or will fall in the length category for not requiring a turnaround. Grades to the north of the existing building will be maintained for the most part in the construction of the play areas. Positive drainage away from the building and play areas will be directed into the storm drain system. Grades along the east side of the building will be revised to provide ADA accessibility from the Bus and Parent Drop-off areas, including pedestrian pathways from Arundel on the Bay Road. The south side of the new addition and parent parking lot will see the majority of the fill material required to maintain ADA design requirements within the parent parking lot. ADA ramps and retaining walls will be required to provide access to the multi-purpose field area. Grades along the west side of the building and new addition will largely be unchanged with the exception of what is required to construct the fire lane.

Prior to construction beginning for the new addition, the relocation of the public sanitary sewer pipes, manholes and a large diameter force main, including their respective easements to the south will be required. Existing sanitary sewer connections should be abandoned and a new connection made to the existing/relocated sewer main, but on the west side of the new addition, where the existing gravity sewer system drains westward. The existing 4-inch water service, located at the northeastern corner of the existing building will remain. A fire service water main and associated fire hydrants will be placed onsite to provide adequate fire protection to the renovated elementary school building. This new fire service line will be connected to the existing 12” water main in Arundel on the Bay Road.
OPTION 3B – ADDITION / RENOVATION

The majority of the existing storm drainage systems should be able to remain functional during the construction of the site improvements. A small diameter storm drain relocation will be required in the area of the proposed parent parking lot. Runoff from Arundel on the Bay Road currently drains through this storm drain pipe. This existing system can be connected to the future storm drain system that will be managing the runoff from within the parent parking lot. Future runoff from the rooftop and new bus loop will be directed into the future storm drain system serving the parent parking lot, discharging south of the multi-purpose field.

Environmental Site Design (ESD) will be utilized to the maximum extent possible. ESD facilities such as Rain Gardens, Micro-bioretention and Bio-swales will be utilized within the green spaces that are located near the parking bays, within the bus loop and near other paved surfaces. We anticipate the construction of 6-8 separate ESD facilities.

New outdoor play areas will also be constructed along the northern and southern portions of the site. One soft surface play area and one hard surface play area for grades 1-5 will be constructed to the north side of the building and fire lane. A smaller soft surface play area and hard surface play area will be constructed on the north side of the building, between the building and fire lane, for Kindergarten. A new multi-purpose field measuring 210'x360' with an integral softball field will be constructed to the south of the new building addition and parking lot area. The outdoor play areas will meet the Educational Specification required sizes. To achieve the construction of the multi-purpose field some cutting and filling will be done in conjunction with the parking facility grading. The site grading will require the import of suitable fill materials.

Structural:

ADDITION

Roof Structure

The typical structure will be comprised of galvanized, 1-1/2" deep, wide-ribbed steel deck supported by open-web, K-series steel joists, spanning between structural steel girders supported by steel columns located along the exterior and corridor walls. Joist spacing will vary between 5'-0" and 6'-0" on centers. Interior and exterior CMU walls will be non-load.

At the gymnasium, cafeteria, and kitchen areas, the structure will consist of 1-1/2" deep, 22 gauge wide-ribbed or acoustical steel deck, supported by long-span, open web steel joists spaced at 5'-0" on centers. Vertical support will be provided by 12" thick reinforced CMU bearing walls.

Mechanical equipment that cannot be placed within the building will be located on the roof, above the corridors or other areas as necessary, and will be supported by KCS-series steel joists.

The structure above the main central corridor will be comprised of 3" deep, galvanized steel deck, supported by structural steel tube portal frames. This system will extend continuously between the north and south canopied entrances.
OPTION 3B – ADDITION / RENOVATION

Double wythe 8” reinforced CMU fire walls, will be constructed between the north academic wing and main central corridor.

Floors

The typical ground level floor construction will be 5” thick concrete slab-on-grade. The slab will be thickened to 6” at heavily loaded floors such as mechanical rooms. The slab will be haunched to a thickness of 12” below masonry partition walls exceeding 6 inches in thickness. At locations where portions of the existing building will be demolished, the new slabs will be placed on compacted soil infill of the existing crawlspace.

Lateral Stability

Wind and seismic loads will be resisted by interior and exterior reinforced CMU shear walls and by ordinary moment resisting steel frames in the academic wing and main central corridor.

Foundation

Based on the original building drawings, it is anticipated that the foundation will be a shallow, spread footing system supported on natural soil or structural fill. New footings located adjacent to the existing crawlspace will require stepping to meet existing footing elevations.

EXISTING BUILDING RENOVATION

New mechanical rooftop units, serving the classrooms, will be supported by modified existing framing above the classroom corridors. New framing will be added as necessary.

Conversion of the multi-purpose room will require modifications of the existing wall openings. The stage floor structure will be removed and replaced with one of the two following options: Option 1 is to infill the crawlspace with structural fill and pour a 5” thick concrete slab-on-grade. Option 2 is to install a slab above the crawlspace comprised of 2” deep composite steel deck with 4-1/2” of concrete topping, supported by steel beams bearing on the crawl space walls. At the boiler room, a new 5” thick reinforced concrete slab on structural fill will be provided. These floors will match the existing floor elevation.

Miscellaneous structural modifications will be required for existing members at new roof, floor, and wall openings. At the proposed addition adjacent to the existing building, a new 8” reinforced CMU fire wall, supported by a spread footing foundation, will be constructed. Expansion joints will be provided where the new addition abuts the existing building.
OPTION 3B – ADDITION / RENOVATION

Mechanical:

General

The proposed addition/renovation concept involves a 28,000 SF addition to the existing school, as well as, a full renovation to the existing building. As part of this option, approximately 5,100 SF of the existing school will be demolished. The new addition will house the two classrooms, the cafeteria, kitchen, gymnasium, media center, music rooms, the main mechanical and electrical rooms, as well as, other miscellaneous support spaces. The existing building renovations include but are not limited to the relocation of the administration/health suite, relocation of the art rooms and upgrades to all the classrooms. Due to the age and condition of the existing mechanical equipment, as well as, the relocation of the main mechanical room, all mechanical systems are recommended to be replaced under this option.

Depending on swing space available in local schools, this option will likely be a phased-occupied project. The existing mechanical systems will need to remain in place while the new mechanical room and equipment is being installed. New HVAC and domestic water piping will likely be installed parallel to the existing piping in the crawl space to allow for a quick transition from the existing systems to the new systems. The new mechanical systems are described in greater detail below.

HVAC System Options

After discussions with the AACPS mechanical staff and considering the physical limitations in the existing building, two systems will be considered for the addition/renovation option during the design phase of the project. These two systems include:

c. **Option 1 – Two-pipe Fan Coil Units:** This option will include a chiller and boilers as the main cooling and heating sources for the building. Chilled and heating water will be circulated throughout the building to serve fan coil units (FCUs) in each classroom. The FCUs will be re-circulating units providing heating and cooling to each occupied space. Ventilation air will be provided through rooftop DOAS (dedicated outside air system) units with energy recovery wheels. These units will have DX cooling and hot water heat. The administration area, media center, gymnasium and cafeteria will be likely be equipped with an independent form of DX cooling as well to allow for summer operation without the chiller.

d. **Option 2 - Geothermal System:** The heating/cooling source equipment includes multiple heat pump types utilizing geothermal heat exchange (via vertical wells) as the heat rejection for the heating/cooling system. A condenser water loop will serve individual water-to-air heat pumps located in each classroom. The classrooms will also be served by dedicated outside air (DOAS) units to provide code required ventilation air. The DOAS units will likely be heat pumps which are tied into the condenser water loop and will be equipped with energy recovery wheels. It is anticipated that the administration area, media center, gymnasium, cafeteria, etc. will be de-coupled from the geothermal loop and provided with an independent heating / cooling source.
Heating System

Under both HVAC system options, the existing steam system will be demolished in its entirety and a new heating water boiler system will be provided. The fuel source for the boiler(s) will be determined during the design phase, however, natural gas fired condensing boilers are preferred. As mentioned in the existing conditions portion of this study, the current main fuel source for the existing building is a 10,000 gallon underground fuel oil tank. As part of this project, the design team will investigate the feasibility of bringing natural gas to the building. There is a BGE gas main at the intersection of Arundel on the Bay Road and New Church Road. This is approximately 170 feet from the edge of the school’s property. Natural gas is the preferred heating source due to efficiency, cost and maintenance advantages. The design team will work with BGE and AACPS to determine if the gas main has adequate pressure to serve the building and evaluate the costs of bringing the gas piping to the building.

For HVAC system option 1 (i.e. two pipe fan coil units), the heating plant will consist of high efficiency gas fired condensing boilers (if natural gas is available) with stainless steel heat exchangers. If natural gas proves to not be practical for this building, fuel oil or propane boilers will be considered. The boiler arrangement will be sized for the total heating load as well as to provide N+1 boiler capacity. Heating water supply temperatures will be in the range of 120 – 160 degrees F. Heating water will flow through a two-pipe dual temperature piping system to serve air handling equipment (see air distribution section below) throughout the building. Change over valves will be located in the main mechanical room to allow for heating water flow during the heating season and chilled water flow during the cooling season.

Two (2) dual temperature water pumps (primary and standby) will circulate heating water supply throughout the building. The pumps will be base mounted end suction type with inertia pads and vibration isolation to minimize vibration transmission to the building structure. The dual temperature water pumps will be controlled by variable frequency drives to maximize energy conservation.

For HVAC system option 2 (i.e. geothermal), the geothermal system will provide condenser water which will serve small independent water-to-air heat pump units. Ventilation air will be provided to the classrooms by dedicated outside air (DOAS) units which will also likely be served by the geothermal condenser water loop.

The administrative/health spaces, media center, gymnasium and cafeteria are anticipated to be decoupled from the condenser water loop. The heating source for these spaces, as well as, miscellaneous heaters throughout the building will likely be heating water from the boiler(s). The boilers may also be tied into the geothermal piping loop to ensure that loop temperatures do not fall below low limit setpoints.

The geothermal water system and heating water system will each be provided with two circulating pumps (primary and standby). The pumps will be base mounted end suction type with inertia pads and vibration isolation to minimize vibration transmission to the building structure. The pumps will be provided with variable frequency drives to maximize energy conservation. The pumps, boiler(s) and incoming geothermal piping will all be located in the main mechanical room.
OPTION 3B – ADDITION / RENOVATION

Under both options, the majority of the HVAC piping will be located in the crawl space due to limited space available above the ceilings.

Cooling System

For HVAC system option 1 (i.e. two pipe fan coil units), the cooling source will include an outdoor air cooled high efficiency chiller. The outdoor machine will utilize screw compressors and will be located in an enclosure on grade adjacent to the mechanical room. Glycol water will flow through the chiller for freeze protection purposes. In order to de-couple the glycol water from the main building distribution, a flat-plate heat exchanger and a set of two (2) glycol water pumps (primary and standby) will be provided. The glycol water pumps will circulate the glycol water through the “source” side of the heat exchanger and back to the chiller.

Two (2) dual temperature water pumps (primary and standby) will pump fresh water through the “system” side of the heat exchanger to produce chilled water which will be circulated to cooling coils within each air handling unit (see “Air Distribution System” description). The pumps will be base mounted end suction type with inertia pads and vibration isolation to minimize vibration transmission to the building structure. The dual temperature water pumps will be provided with variable frequency drives to maximize energy conservation. Change over valves will be located in the main mechanical room to allow for heating water flow during the heating season and chilled water flow during the cooling season.

The administrative/health spaces, media center, gymnasium and cafeteria will be provided with an independent cooling source to allow for operation when the chiller is de-energized. A variable refrigerant flow (VRF) system is anticipated in the administration area. Rooftop air handling units are anticipated to serve the other spaces. These rooftop air handling units will likely be provided with a chilled water coil, as well as, an independent DX coil.

For HVAC system option 2 (i.e. geothermal), the geothermal system will provide condenser water which will serve small independent water-to-air heat pump units. Ventilation air will be provided to the classrooms by dedicated outside air (DOAS) units which will also likely be served by the geothermal condenser water loop.

The administrative/health spaces, media center, gymnasium and cafeteria are anticipated to be decoupled from the condenser water loop. The cooling source for these spaces, will likely be in the form of air cooled DX units (i.e. VRF in the administration area and packaged rooftop units elsewhere).

Two circulating pumps (primary and standby) will be provided to circulate the geothermal water loop. The pumps will be base mounted end suction type with inertia pads and vibration isolation to minimize vibration transmission to the building structure. The pumps will be provided with variable frequency drives to maximize energy conservation.

Under both options, the majority of the HVAC piping will be located in the crawl space due to limited space available above the ceilings.
Air Distribution System

Whether system option 1 or 2 is selected, the air distribution systems will look very similar. Each classroom will be equipped with a dedicated terminal unit (either fan coil unit under option 1 or heat pump under option 2). As mentioned earlier in this study, there is very limited ceiling space available in the existing classrooms. In order to keep ceiling heights at a reasonable level, the terminal units will likely be located on the floor at the perimeter of the classroom (i.e. non-ducted type). Ducted terminal unit options (i.e above ceiling type or located in mechanical closets) can be considered if ceiling heights in the 8’-0” range are acceptable.

Re-circulating air handling units will provide conditioned and ventilated air to the gymnasium, cafeteria and media center. Under option 1, the air handling units will be connected to the chilled / heating water piping system and will likely have an independent DX cooling coil for scheduling flexibility. Under option 2, these units are anticipated to be de-coupled from the geothermal piping loop. Conditioned supply air will be distributed through low pressure ductwork to each space. In areas without a ceiling (i.e. exposed ductwork), double wall spiral / flat oval ductwork will be utilized. In areas with a ceiling, rectangular ductwork will be extended to louvered type supply air diffusers. The use of flexible ductwork will be limited to three (3) feet in length.

The administration area will be served by a VRF system, likely in the form of ceiling mounted cassette units in each space.

Dedicated outside air (DOAS) units will be provided to meet the ventilation needs of the classrooms and administration area. These units will be located on the roof and equipped with supply/exhaust fans, heating/cooling source (see sections above), filters, as well as access sections for maintenance accessibility to all coils, filters, etc. These units will also be equipped with energy recovery, likely in the form of an energy recovery wheel. The DOAS units will distribute tempered ventilation air directly to each space through low pressure ductwork.

Roof mounted, direct drive, exhaust fans will be provided to ventilate the toilet rooms and janitor’s closets within the facility. Electrical and telecommunications rooms will be provided with dedicated DX cooling units as required to maintain temperature requirements.

Control System

The existing pneumatic control system and associated components will be removed and replaced with a direct digital control (DDC) type system with electric actuation. Each control function and associated control point of all mechanical equipment shall be incorporated into the building temperature control system.

All new temperature control work shall be provided by EASI and will interface with the current AACPS open protocol Tridium front end system located at the Fort Smallwood facility.

Each learning space (classrooms, etc.) will be considered a temperature control zone and will be provided with independent temperature controls. The DOAS units will be provided without packaged controls. EASI will provide independent controls on the DOAS units so that it can be controlled and monitored from the central EMCS.
All major mechanical equipment items (DOAS units, air handling units, fan coil units, heat pumps, etc.), as well as, all temperature sensors, filter status, etc., will be capable of being controlled and/or monitored locally at the building and through the central EMCS.

**Plumbing**

The existing incoming domestic water service will be replaced with a new minimum 6” combination domestic/fire service. This service will likely enter the building in the new main mechanical room. The domestic water service will be provided with a reduced pressure backflow preventer assembly. A flow test will be performed to confirm that adequate pressure is available.

As mentioned above, the feasibility of bringing a new gas service to accommodate the heating and domestic hot water requirements of the building will be evaluated during the design phase. Connection will be made to the low pressure side of the gas meter to be provided by BGE.

Domestic hot water will be generated from a gas-fired water heater located in the main mechanical room. If gas is not available, fuel oil, propane or electric will be considered for the heating source. Domestic hot water distribution temperature will be set for 110°F (adjustable). The use of solar domestic hot water heating will be evaluated (i.e. energy savings benefits weighed against first cost) during the design phase of the project.

All of the existing plumbing fixtures will be replaced with low water use fixtures to maximize water conservation. Low flow fixtures are anticipated to include 1.28 gallon per flush (gpf) water closets, 0.125 gpf urinals as well as 0.5 gpm sinks and lavatories. In addition, manual operated flush valves and faucets are anticipated to be provided.

All new type L copper domestic water piping will be provided. In addition, all piping will be insulated in accordance with ASHRAE 90.1 and a hot water recirculation system will be provided, with a dedicated pump. All domestic water piping is anticipated to be located in the crawl space to conserve space above the ceilings.

All sanitary and vent piping is recommended to be replaced but could be evaluated for re-use if the budget requires. All waste and drainage piping will be cast-iron. PVC piping may be used below slab within the building perimeter and 10 feet outside building perimeter per AACPS design standards.

Roof drains and the associated storm water distribution system are recommended to be replaced. Storm water mains in the crawl space may be evaluated for re-use if the budget requires. A secondary storm water drainage system will be provided parallel to the primary system to meet the secondary drainage requirements. The secondary system will discharge through the exterior wall above grade at locations to be determined.
Fire Protection:

The existing building currently does not have a sprinkler system. Under this project a wet pipe fire protection sprinkler system will be provided for the existing building and the addition. As mentioned above, a new 6” combination fire/domestic water service is anticipated. The sprinkler system will be designed in accordance with NFPA and the local authority having jurisdiction, including a double-check backflow preventer at the incoming service.

Recessed type sprinkler heads will be utilized in all areas except storage rooms, mechanical rooms, etc. Where piping is exposed, upright heads will be provided.

A flow test will be performed during the design phase to determine the available pressure to the building. Calculations will then be performed to determine if a fire pump will be required.

Electrical:

General

The proposed addition/renovation concept involves a 28,000 SF addition to the existing school, as well as, a full renovation to the existing building. As part of this option, approximately 5,100 SF of the existing school will be demolished. The new addition will house the two classrooms, the cafeteria, kitchen, gymnasium, media center, music rooms, the main mechanical and electrical rooms, as well as, other miscellaneous support spaces. The existing building renovations include but are not limited to the relocation of the administration/health suite, relocation of the art rooms and upgrades to all the classrooms. Due to a combination of equipment age, capacity, proposed renovations and program modifications, it is recommended that all electrical systems be replaced under this option.

Electrical Service and Distribution – Main Building

Based on load information, the existing 1,200A, 208Y/120 volt service has a peak demand load of 233.7 kilowatts (BGE meter value (187 kW) X 1.25 per NEC Art. 220.87). Utilizing a 0.9 power factor, this equates to a peak demand load of 259.7 kVA or 720 amperes at 208Y/120 volts, three phase, four wire. Based on the existing peak loads, the existing service has inadequate capacity to serve the proposed addition and mechanical systems.

For these reasons, it is recommended a new 480Y/277 volt secondary service be provided. The new service would require the installation of a new BGE pad mounted transformer which will provide secondary service to a new 480Y/277 volt switchboard. We estimate the service entrance to be 2,000A at this time. The existing pad mounted BGE transformer located outside the building would be removed and replaced/upsized to new location on site. The new service will provide power to the entire building.

The 5 existing 100A, 208Y/120V circuit breakers supplying the modular classrooms would be removed.
A 480Y/277volt service entrance switchboard will be provided in the main electrical room of the proposed elementary school building to distribute power throughout the building. The switchboard will be provided with the following components:

- BGE approved CT cabinet.
- 2,000A main circuit breaker.
- Distribution section with group mounted molded case circuit breakers.
- Digital power monitoring device.
- Surge protective device (SPD)

The existing distribution system including panels, feeders, branch circuits, and devices will be removed and replaced due to proposed renovation and program modifications in this area. Additionally, existing branch circuits were installed during the original building construction, and are nearing the end of their useful life and should be replaced.

**Electrical Service and Distribution – Modular Classrooms**

The 5 existing 100A, 208Y/120V circuit breakers supplying the modular classrooms would be removed when the trailers are removed.

**Feeders and Branch Circuits**

All conductors/circuits will be installed as follows:

- Interior concealed branch circuit wiring located in dry locations will be installed in electrical metallic tubing (EMT). Liquid-tight flexible metal conduit will be used for final connections to vibrating equipment such as motors and transformers. Metal-clad (MC) cable will be allowed for final connections to light fixtures.
- Exposed interior branch circuits will be rigid galvanized steel where subject to physical damage and EMT elsewhere.
- All EMT fittings (where allowed) will be steel compression fittings with insulated throats.
- Wiring installed in exterior and wet locations will be installed in rigid metal conduit with liquid-tight flexible metal conduit used for final connections.
- Underground conductors will be installed in direct buried PVC conduit except as noted below.
- Underground service conductors and generator conductors will be installed in concrete encased PVC ductbanks.
- All interior conductors will be copper conductor with type THHN, THHW, or XHHW insulation.
- All exterior underground conductors will be copper with type RHW insulation.
- All feeders and branch circuits will be provided with a separate green insulated equipment grounding conductor. Conductor sizes #10 and smaller shall be solid; conductor sizes #8 and larger shall be stranded.
- Conduits will not be installed within concrete floor or below/within slab on grade unless absolutely necessary.
Grounding

A complete grounding electrode system and equipment grounding system will be provided in accordance with NFPA 70, National Electrical Code, and local codes and regulations. The grounding system will be specified to have a maximum overall resistance of 10 ohms to ground at the main ground bus.

Should a lightning protection system be provided, copper ground rods will be provided at each corner of the building and at 100-foot maximum intervals in between for the lightning protection system. This system will be bonded to the building grounding system in accordance with the National Electrical Code.

Distribution Equipment

The 480/277 volt panelboards will be provided to support large motor load and lighting throughout the school. Energy efficient dry type step down transformers will be used to step down the voltage from 480 volt to 208/120 volt for the 208/120 volt panelboards serving receptacles, food service equipment and small power loads. All panelboards will be provided with copper bus bars, equipment ground busses, and bolt-on, molded case circuit breakers.

Motors will be controlled using individual full voltage, combination motor starters and motor circuit protector disconnects. Localized disconnect switches will be provided for all motor-driven equipment. Variable Frequency Drives (VFD) will be provided for all motors that require adjustable speed operation. VFD’s will be required to meet harmonic limits as specified in IEEE 519.

Short Circuit and Arc Flash Calculations

A short circuit study will be performed based on the short circuit capacity available at the new service transformer. The maximum available short circuit capacity at the main service points will be calculated based on the available utility short circuit capacity and any notable contributions from motor loads.

Maryland Emergency Management Agency Requirements

The Maryland Emergency Management Agency (MEMA) has issued a waiver to remove AACPS from the Emergency Shelter Compliance Process. They determined that Hillsmere Elementary School is in close proximity to one or more designated shelters; therefore, the Anne Arundel County Office of Emergency Management does not recommend this site for an emergency shelter. See Appendix D.
Emergency Power

A 480/277 volt generator will be located outdoors in a sound attenuated weatherproof enclosure. The generator will be diesel powered with a sound attenuated enclosure and sub-base fuel tank capable of running the generator for 72 hours at full load. NOTE: AACPS personnel have requested to use a natural gas powered generator on previous projects; however, this preference will need to be coordinated with AACPS and with the Authority Having Jurisdiction (AHJ) for this project. The generator will be used to supply power to emergency and optional standby distribution systems located in the building. The generator will supply two (2) automatic transfer switches (ATS) located in the building, one for the emergency system and one for the optional standby system. Loss of normal power at either ATS will result in the automatic starting of the generator.

The following loads will be connected to the generator supplied emergency system and must be operational within ten (10) seconds after a power outage:

- Egress and exit lighting.
- Fire detection and alarm system (also provided with integral battery backup).
- Public Address System.
- Telephone System.
- Receptacles adjacent to fire and security panel.
- Generator auxiliary systems.
- HVAC split system(s) serving telecomm rooms.

AACPS personnel have requested additional equipment should be connected to the generator that will be connected to the generator supplied optional standby system:

- Kitchen refrigeration and freezer equipment.
- Student health suite.
- Sewage pump station (if applicable).
- Well (if applicable).

Lighting

The existing lights, branch circuits and control systems will be removed and replaced due to the extent of proposed renovations and program modifications in this area.

The lighting design for the building will be in accordance with the design requirements, AACPS requirements and usage of each area. Zonal cavity and/or point by point calculations will be performed for each space or representative space utilizing effective reflectances of ceiling, wall, floor, light loss factor and the co-efficient of utilization to maintain the recommended light level at the working surfaces. Coefficient of utilization will be obtained from the particular lighting fixture cuts after the final fixture selections are completed. IES and AACPS recommended footcandle levels will be maintained throughout the building.
OPTION 3B – ADDITION / RENOVATION

The majority of lighting within the building will be provided with 2’ x 4’ and 2’ x 2’ high efficiency LED volumetric fixtures with acrylic lenses. Industrial type LED fixtures will be utilized in electrical/mechanical equipment areas, and other infrastructure areas without ceilings such as storage rooms. Accent lighting using LED lamping will be provided in locations where specialty lighting is required. LED light fixtures in gymnasium shall be provided with cage and safety chain. High-abuse wall-mounted LED luminaires will be provided in stairwells.

Occupancy sensors using dual technology incorporating ultrasonic and infrared will be provided within individual rooms. Infrared occupancy sensors will be provided in transit areas such as corridors. Localized low voltage lighting controls will consist of multi-level switching for classrooms with the typical zoning being student desk area, daylight (lights along the window wall), corner light that is adjacent to both window and the teaching wall, and lights adjacent to teaching wall. Daylighting controls will be provided as required to meet energy conservation requirements. All lighting controls will be connected into a building wide central system.

Egress, exit and exit discharge lighting will be provided in accordance with NFPA Life Safety Codes. The egress and exit lights will be connected to emergency circuits with generator backup. Batteries will not be used in egress light fixtures.

Exterior lighting will be provided along the perimeter of the building using wall mounted LED lighting fixtures. Lighting fixtures located at points of exit discharge will be connected to the emergency generator for compliance with emergency lighting for exit discharge. Parking lot and roadways lights will be provided consisting of LED luminaires mounted on aluminum poles.

The lighting power densities will be based on the power budget density guidelines as defined by the current ASHRAE or IECC standards as applicable.

**Fire Alarm Systems**

A new addressable fire alarm system with voice evacuation will be provided.

Initiating devices will include manual stations, smoke detectors, carbon monoxide detectors (as applicable), thermal detectors, duct type smoke detectors, interface modules for sprinkler flow switches and OS&Y valve position switches. Indicating devices will include combination speaker/strobe devices and supplementary visual devices. Auxiliary devices will include control modules for remote signaling and control. All fire alarm circuits will be installed in conduit. A fire alarm annunciator panel with voice handset, speaker zone controls and control switches for mechanical systems will be provided at the main entrance.

The design will comply with the following codes: NFPA-72, NFPA-101, IBC, and Maryland Accessibility Code 05.02.02.
Lightning Protection System

Discussions with AACPS will be held to determine the need/preference for a lightning protection system. Currently, the existing building does not have a system in place. For the purposes of this study, it is assumed that a lightning protection system is preferred, therefore, an Underwriters Laboratories (UL) Master Label lightning protection system will be specified for the building.

Copper lightning protection components will be used throughout including all air terminals. All down leads will either be copper conductors installed in non-ferrous conduit or steel columns will be utilized in accordance with NFPA 780 where practical. The down leads or steel columns will be connected to the building’s grounding system as outlined in Grounding Section.

All grounding connections below grade will be exothermic welds.

IT / AV:

From a technology perspective, the differences in the level of effort among Addition / Renovation Option, Replacement Option 4, and Replacement Option 5 are very small and insignificant. All three options require the same new communications infrastructure (cable plant). The extensiveness of the MEP upgrades and the age of the existing communications infrastructure will require total replacement in the Addition / Renovation option to meet current AACPS standards. Likewise, all three options will require new classroom AV systems, telephone/intercom data networking and security systems.

Telecommunication Rooms

A standard sized (10’ x 10’) Telecommunication Room should be provided for every 70,000 square feet of floor space. These rooms should contain good environmental conditioning including air conditioning, emergency power-protected circuits, and good lighting. The main Telecommunication Equipment Room should be better sized for a more technology rich school and located near the media center. The final determination of the number and location of TR’s will be determined during the schematic design phase.

Structured Cabling System (Telephone and Data)

The school-wide computer network should be an implementation of 10/100/1000 Mbit Ethernet over Category 6 copper UTP cable and Gigabit Ethernet over multimode fiber, complying with the Institute of Electrical Engineers’ (IEEE) 802.3 standards for Ethernet. Backbone cabling between the telecommunications equipment room (TER/"head end") and all telecom rooms (TR’s) shall be a multimode/single-mode fiber optic cable (18 / 6 Strands). All horizontal cabling shall be terminated in Category 6 rack-mounted patch panels in the telecom rooms, and in communication network outlets (CNO’s) at the workstation. A major renovation of the school that included new systemic system upgrades would require replacement of the communications infrastructure systems. Wireless connectivity should be available throughout the building.
OPTION 3B – ADDITION / RENOVATION

Data outlets intended for owner provided wireless access points shall be cross-connected to owner provided inline powered switch ports. ESP will work with the client to refine the number of data drops in all types of instructional and non-instructional spaces to ensure that it complies with Anne Arundel County Public School standards and guidelines.

Video Distribution

AACPS is transitioning away from a coaxial based video distribution system and may not include a coaxial based video distribution system. The IP data network shall allow for video distribution via the Category 6 UTP and fiber distribution network. A small number of coaxial drops may be installed in strategic areas such as the main reception area, principal’s office and main conference space.

Classroom Technology

AACPS currently includes a Light Speed sound enhancement amplifier/mixer in all learning spaces with a wall mounted Epson Powerlite 685W ultra short throw projector. The purpose of the sound enhancement system in classrooms and laboratories is to equalize sound levels throughout the classroom to ensure that students hear the presentation, regardless of proximity to the speaker. The system allows a presenter’s voice to be amplified via a lanyard or a hand-held infrared microphone.

Security Systems

Closed Circuit Television should provide video surveillance of the school, internally and externally, 24 hours per day. The CCTV will utilize owner procured and installed IP based cameras that are connected to the data network through switching equipment in Telecom Rooms.

The Access Control and Intrusion Detection system should allow/prevent access, track movement throughout the facility and provide an alarm signal on and offsite in the event of an unauthorized entry. The systems should be integrated and be controllable on and offsite to allow for efficient system management. The system shall consist of motion detectors, door and window contacts, card readers, door controllers, power supplies and intelligent software all connected to alarm panels throughout the facility.
OPTION 4A – REPLACEMENT IN FIELD WITHOUT SWING SPACE

Overview:

The “Replacement in Field” places a newly constructed building over the existing playing field and promotes the use of the AACPS prototype model. The prototype layout presented in this option fits the needs of Hillsmere Elementary School staff and students while meeting the AACPS Education Specifications space and adjacency requirements and mandated area gross square footage. It also provides mechanical, electrical, plumbing, fire protection, AV/IT and security systems that follow State guidelines, meets current life safety, building codes, ADA accessibility requirements and addresses security concerns. During the construction period, the existing school will remain in use then demolished after the new building is fully occupied. A new site layout will include a bus loop, parent drop-off with direct access to the main entry and increased parking. Additionally, a new multipurpose field will be constructed in the location of the existing school building. The Hillsmere Elementary School Feasibility Study Team has indicated their preference for this option.

Statistics:

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>30 months</td>
</tr>
<tr>
<td>Square Footage</td>
<td>68,000 GSF</td>
</tr>
<tr>
<td>Total Estimated Construction Cost</td>
<td>$38,600,000</td>
</tr>
<tr>
<td>Estimated Life Cycle Cost</td>
<td>$95,800,000</td>
</tr>
</tbody>
</table>

Description:

This replacement option locates the newly constructed prototype building in the far east corner of the site with the main entrance facing Arundel on the Bay Road. Due to the site slope, a retaining wall has been placed along the Chesapeake Critical Area line and a significant volume of suitable fill material will need to be brought to the site in order to have a flat building pad for the new building. To keep the retaining wall at a minimum height and to minimize the amount of the fill soil, the building has been located as close as possible to the road while still maintaining adequate space for a bus lane. The new site layout also provides a safe separation of cars and buses entering the site. The bus drop-off is located in front of the building and has adequate space to accommodate six buses. For bus use, two curb cuts are required for this scheme as buses will have a separate entrance and exit. Cars will enter and exit the site at one location using an existing curb cut. The parking lot has 105 parking spaces and is configured to provide a generous lane for queuing. Both car drop-off and bus drop-off feed into the main entry lobby from a centralized location with visibility from the administration suite. A fire lane is accessed from the bus lane. The service area near the kitchen is located off the parking lot. A new multi-purpose field is located over the site of the existing building with soft and paved play areas located behind the building.
OPTION 4A – REPLACEMENT IN FIELD

The prototype model meets the specific area square foot required by the AACPS Education specification. This prototype layout includes a “U” shaped building with an open courtyard, a one story academic wing, and a 2-story academic wing. The main entrance and administration suite of the new building are located near the front of the site for maximum visibility and supervision. However, due to the closeness of the main entry to the road, the visibility of the queuing space from the administration office is limited. A main circulation corridor connects the large public use spaces with the academic wings. In the public use space, the gymnasium is adjacent to the cafeteria to allow for an operable wall to expand the spaces for large events. The media center is located in the center of the building across the main corridor from the cafeteria and gym with a view to the courtyard. The west end of the central corridor houses the music rooms which are across the hall from the platform for convenience during performances and away from teaching spaces for noise control. The art room and learning studio are also located at the west end of the main corridor.

Early childhood programs reside in the 1-story east academic wing adjacent to the administration suite. The 2-story west academic wing houses the 1st and partial 2nd grades on the first floor and 2nd to 5th grades on the second floor. Double doors have been located at both academic wings so these areas may be closed off from the main public corridor.
<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Site</strong></td>
<td></td>
</tr>
<tr>
<td>✓ Separate, safer, and more efficient bus and car access</td>
<td>✗ Site level differences require a retaining wall</td>
</tr>
<tr>
<td>✓ Does not require relocation of force main sanitary sewer piping system</td>
<td>✗ Reforestation required at new building/site</td>
</tr>
<tr>
<td>✓ Minimum impact on LDA-Critical areas</td>
<td>✗ Major re-routing of stormwater piping</td>
</tr>
<tr>
<td></td>
<td>✗ Not Net-Neutral site for soils / fill</td>
</tr>
<tr>
<td></td>
<td>✗ Three curb cuts required on Arundel on the Bay Road</td>
</tr>
<tr>
<td></td>
<td>✗ Bus traffic uses two curb cuts – one for entry and another for exit</td>
</tr>
<tr>
<td></td>
<td>✗ Bus queuing is very close to road</td>
</tr>
<tr>
<td><strong>Building</strong></td>
<td></td>
</tr>
<tr>
<td>✓ Existing building remains functional during replacement building construction</td>
<td>✗ Does not re-purpose existing building</td>
</tr>
<tr>
<td>✓ No construction phasing issues</td>
<td>✗ Main building entry is very close to road and not easily seen from car parking</td>
</tr>
<tr>
<td>✓ Minimal disturbance to staff and students</td>
<td>✗ Limited view of car queuing from Administrative spaces</td>
</tr>
<tr>
<td>✓ Building is sited away from houses</td>
<td>✗ Two level building</td>
</tr>
<tr>
<td>✓ Play space is far away from road</td>
<td>✗ Open courtyard</td>
</tr>
<tr>
<td>✓ A separate construction entrance easily maintained thus limiting cross traffic with school functions</td>
<td>✗ New building needs exterior ramp/stairs at egress locations at end of classroom wings</td>
</tr>
<tr>
<td></td>
<td>✗ Service area is visible upon site approach</td>
</tr>
<tr>
<td><strong>Systems</strong></td>
<td></td>
</tr>
<tr>
<td>✓ Building is sited closer to existing BGE gas main at intersection of Arundel on the Bay Road and New Church Road</td>
<td></td>
</tr>
<tr>
<td>✓ Design to include adequate ceiling space for MEP systems</td>
<td></td>
</tr>
</tbody>
</table>
OPTION 4A – REPLACEMENT IN FIELD

Site:

This option includes most site work of all of the other options in this study. The site work in this option includes the complete demolition of the existing building, existing paved parking areas, sidewalks and play areas. A new building, parking facility, separated parent drop-off, bus loop, service area, perimeter fire access lane and new outdoor play areas will be constructed. The new building will be constructed on the southeastern portion of the site.

The site work will include an "entrance only / exit only" along Arundel on the Bay Road for the bus loop. The bus loop will be located on the east side of the proposed building. A fire lane will be constructed along south side of the building, utilizing the Entrance and Exit for the bus loop for access to Arundel on the Bay Road. The new bus loop will provide stacking for 6 buses as required by the Educational Specification.

The new parent/visitor parking lot and service area will be constructed on the north side of the new building. The entrance to this parking facility will be off of Arundel on the Bay Road, north of the bus loop entrance. The new parking facility will also provide access to the service area. The new parking facility will accommodate parking for 105 vehicles including 5 ADA accessible parking spaces. The total parking provided on-site will be 105 spaces which will meet the Educational Specifications requirement of 105 parking spaces.

Grades will be challenging for this option. The new building location is found on a area with a 12-16 foot grade difference between the Arundel on the Bay Road right-of-way and the Critical Area – LDA line. A large amount of structural fill material will need to brought in to bring the building area up to proposed grade. Retaining walls will need to be utilized to limit the impact within the LDA – Critical Area.

Existing public sanitary sewer pipes, manholes and a large diameter force main will be able to remain in place. The sanitary sewer service for the new building will connect to the existing onsite sanitary sewer system. Public water service will be updated to serve the new building, connecting to the existing 12” water main in Arundel on the Bay Road. A new fire service water main and associated fire hydrants will be placed onsite to provide adequate fire protection to the renovated elementary school building. This new fire service line will be connected to the existing 12” water main in Arundel on the Bay Road.

The majority of the existing storm drainage systems will be removed to allow for construction of the site improvements. A small diameter storm drain relocation will be required in the area of the proposed parent parking lot. Runoff from Arundel on the Bay Road currently drains through this storm drain pipe. This existing system can be connected to the future storm drain system that will be managing the runoff from within the parent/visitor parking lot and bus loop. Future runoff from the rooftop will be directed into the future storm drain system serving the parent/visitor parking lot, discharging to the southwest of the soft and hard surface courts.
OPTION 4 – REPLACEMENT IN FIELD

New outdoor play areas will also be constructed along the western and northern portions of the site. Two soft surface play areas and two hard surface play areas for grades K-5 will be constructed to the west side of the building and fire lane. A new multi-purpose field measuring 210’ x 360’ with an integral softball field will be constructed to the north of the new building and parent/visitor parking lot area. The outdoor play areas will meet the Educational Specification required sizes. To achieve the construction of the multi-purpose field, some cutting and filling will be done in conjunction with the parking facility grading. The site grading will require the import of suitable fill materials for backfilling where old building foundations have been removed. Runoff in the area of the multi-purpose fields will be directed into the new storm drain system serving the parent / visitor parking lot.

Structural:

This option consists of a one-story building housing administrative offices, classrooms, gymnasium, cafeteria, kitchen and media center, and a two-story academic wing.

The roof structure at the gymnasium and cafeteria will consist of 1-1/2” deep, 22 gauge galvanized wide ribbed or acoustical steel deck supported by long-span open-web steel joists spaced at 5'-0" on centers. The steel joists will be supported by 12” reinforced CMU walls bearing on a spread footing foundation.

The roof structure at all other areas will consist of 1-1/2” deep, 22-gauge galvanized steel deck supported by open-web, K-series steel joists spaced at 5'-0" on centers. Joists will be supported by steel girders and columns.

The second floor structure of the two-story academic wing will consist of a 3” thick concrete slab on steel form deck, supported by K-series steel joists spaced at 2'-0" o. c., Joists will be supported by steel girders and columns. Floor framing and column locations will be driven by the architectural open-plan layout.

Rooftop mechanical units will be supported by roof framing or elevated structural steel platforms. If geotechnically feasible, the ground floor will consist of a 5” thick concrete slab-on-grade.

Lateral Stability

Wind and seismic loads will be resisted by interior and exterior reinforced CMU shear walls at the gymnasium and cafeteria, and by ordinary moment-resisting steel frames at the academic wing and other areas.

Foundation

Based on the existing building drawings, it is anticipated that the foundation will be a shallow spread footing system supported on natural soil or structural fill.
OPTION 4A – REPLACEMENT IN FIELD

Mechanical:

General

This option involves a replacement school located on the existing elementary school site. The location of the new building is on a field on the opposite side of the site as the existing building, which will allow the existing building to remain occupied during the construction process. The new building will be an approximately 68,000 SF, two story AACPS prototype design. The new building will include several classrooms, a gymnasium, cafeteria, kitchen, media center and other support spaces. The building floorplan is very similar to the second replacement option (i.e. option 5) which will be discussed later in this study.

HVAC System Options

After discussions with the AACPS mechanical staff, two systems will be considered for the addition/renovation option during the design phase of the project. These two systems include:

a. **Option 1 – Two-pipe Fan Coil Units:** This option will include a chiller and boilers as the main cooling and heating sources for the building. Chilled and heating water will be circulated throughout the building to serve fan coil units (FCUs) in each classroom. The FCUs will be re-circulating units providing heating and cooling to each occupied space. Ventilation air will be provided through rooftop DOAS (dedicated outside air system) units with energy recovery wheels. These units will have DX cooling and hot water heat. The administration area, media center, gymnasium and cafeteria will be likely be equipped with an independent form of DX cooling as well to allow for summer operation without the chiller.

a. **Option 2 - Geothermal System:** The heating/cooling source equipment includes multiple heat pump types utilizing geothermal heat exchange (via vertical wells) as the heat rejection for the heating/cooling system. A condenser water loop will serve individual water-to-air heat pumps located in each classroom. The classrooms will also be served by dedicated outside air (DOAS) units to provide code required ventilation air. The DOAS units will likely be heat pumps which are tied into the condenser water loop and will be equipped with energy recovery wheels. It is anticipated that the administration area, media center, gymnasium, cafeteria, etc. will be de-coupled from the geothermal loop and provided with an independent heating / cooling source.
OPTION 4 – REPLACEMENT IN FIELD

Heating System

Under both HVAC system options, a new heating water boiler system will be provided. The fuel source for the boiler(s) will be determined during the design phase, however, natural gas fired condensing boilers are preferred due to efficiency and footprint advantages. The existing building does not currently have a natural gas service, however, there is a BGE gas main at the intersection of Arundel on the Bay Road and New Church Road. This is approximately 170 feet from the edge of the school’s property. This replacement building option locates the school on the corner of the site closest to the BGE gas main which will help reduce BGE pipe lengths making the gas service more feasible from a cost and pressure standpoint. The design team will work with BGE and AACPS to determine if the gas main has adequate pressure to serve the building and evaluate the costs of bringing the gas piping to the building.

For HVAC system option 1 (i.e. two pipe fan coil units), the heating plant will consist of high efficiency gas fired condensing boilers (if natural gas is available) with stainless steel heat exchangers. If natural gas proves to not be practical for this building, fuel oil or propane boilers will be considered. The boiler arrangement will be sized for the total heating load as well as to provide N+1 boiler capacity. Heating water supply temperatures will be in the range of 120 – 160 degrees F. Heating water will flow through a two-pipe dual temperature piping system to serve air handling equipment (see air distribution section below) throughout the building. Change over valves will be located in the main mechanical room to allow for heating water flow during the heating season and chilled water flow during the cooling season.

Two (2) dual temperature water pumps (primary and standby) will circulate heating water supply throughout the building. The pumps will be base mounted end suction type with inertia pads and vibration isolation to minimize vibration transmission to the building structure. The dual temperature water pumps will be controlled by variable frequency drives to maximize energy conservation.

For HVAC system option 2 (i.e. geothermal), the geothermal system will provide condenser water which will serve small independent water-to-air heat pump units. Ventilation air will be provided to the classrooms by dedicated outside air (DOAS) units which will also likely be served by the geothermal condenser water loop.

The administrative/health spaces, media center, gymnasium and cafeteria are anticipated to be decoupled from the condenser water loop. The heating source for these spaces, as well as, miscellaneous heaters throughout the building will likely be heating water from the boiler(s). The boilers may also be tied into the geothermal piping loop to ensure that loop temperatures do not fall below low limit setpoints.

The geothermal water system and heating water system will each be provided with two circulating pumps (primary and standby). The pumps will be base mounted end suction type with inertia pads and vibration isolation to minimize vibration transmission to the building structure. The pumps will be provided with variable frequency drives to maximize energy conservation. The pumps, boiler(s) and incoming geothermal piping will all be located in the main mechanical room.
Cooling System

For HVAC system option 1 (i.e. two pipe fan coil units), the cooling source will include an outdoor air cooled high efficiency chiller. The outdoor machine will utilize screw compressors and will be located in an enclosure on grade adjacent to the mechanical room. Glycol water will flow through the chiller for freeze protection purposes. In order to de-couple the glycol water from the main building distribution, a flat-plate heat exchanger and a set of two (2) glycol water pumps (primary and standby) will be provided. The glycol water pumps will circulate the glycol water through the “source” side of the heat exchanger and back to the chiller.

Two (2) dual temperature water pumps (primary and standby) will pump fresh water through the “system” side of the heat exchanger to produce chilled water which will be circulated to cooling coils within each air handling unit (see “Air Distribution System” description). The pumps will be base mounted end suction type with inertia pads and vibration isolation to minimize vibration transmission to the building structure. The dual temperature water pumps will be provided with variable frequency drives to maximize energy conservation. Change over valves will be located in the main mechanical room to allow for heating water flow during the heating season and chilled water flow during the cooling season.

The administrative/health spaces, media center, gymnasium and cafeteria will be provided with an independent cooling source to allow for operation when the chiller is de-energized. A variable refrigerant flow (VRF) system is anticipated in the administration area. Rooftop air handling units are anticipated to serve the other spaces. These rooftop air handling units will likely be provided with a chilled water coil, as well as, an independent DX coil.

For HVAC system option 2 (i.e. geothermal), the geothermal system will provide condenser water which will serve small independent water-to-air heat pump units. Ventilation air will be provided to the classrooms by dedicated outside air (DOAS) units which will also likely be served by the geothermal condenser water loop.

The administrative/health spaces, media center, gymnasium and cafeteria are anticipated to be de-coupled from the condenser water loop. The cooling source for these spaces, will likely be in the form of air cooled DX units (i.e. VRF in the administration area and packaged rooftop units elsewhere).

Two circulating pumps (primary and standby) will be provided to circulate the geothermal water loop. The pumps will be base mounted end suction type with inertia pads and vibration isolation to minimize vibration transmission to the building structure. The pumps will be provided with variable frequency drives to maximize energy conservation.
Air Distribution System

Whether system option 1 or 2 is selected, the air distribution systems will look very similar. Each classroom will be equipped with a dedicated terminal unit (either fan coil unit under option 1 or heat pump under option 2). Both replacement building options will have more plenum space availability than the renovation/addition option, which will allow for multiple terminal unit types to be considered. Floor mounted units (as described in the renovation/addition option) are possible, however, ducted units may be preferred to help reduce noise levels and conserve floor space in the classrooms. Above ceiling ducted terminal units have been used on previous AACPS schools and will be considered on this project. Another option would be to utilize floor mounted vertical terminal units located in mechanical closets between classrooms. Ductwork would be extended from each unit above the ceilings into the classrooms. The final terminal unit type will be determined during the design phase in collaboration with AACPS facilities staff.

Re-circulating air handling units will provide conditioned and ventilated air to the gymnasium, cafeteria and media center. Under option 1, the air handling units will be connected to the chilled / heating water piping system and will likely have an independent DX cooling coil for scheduling flexibility. Under option 2, these units are anticipated to be de-coupled from the geothermal piping loop. Conditioned supply air will be distributed through low pressure ductwork to each space. In areas without a ceiling (i.e. exposed ductwork), double wall spiral / flat oval ductwork will be utilized. In areas with a ceiling, rectangular ductwork will be extended to louvered type supply air diffusers. The use of flexible ductwork will be limited to three (3) feet in length.

The administration area will be served by a VRF system, likely in the form of ceiling mounted cassette units in each space.

Dedicated outside air (DOAS) units will be provided to meet the ventilation needs of the classrooms and administration area. These units will be located on the roof and equipped with supply/exhaust fans, heating/cooling source (see sections above), filters, as well as access sections for maintenance accessibility to all coils, filters, etc. These units will also be equipped with energy recovery, likely in the form of an energy recovery wheel. The DOAS units will distribute tempered ventilation air directly to each space through low pressure ductwork.

Roof mounted, direct drive, exhaust fans will be provided to ventilate the toilet rooms and janitor’s closets within the facility. Electrical and telecommunications rooms will be provided with dedicated DX cooling units as required to maintain temperature requirements.

Control System

The school will be provided with a direct digital control (DDC) type system with electric actuation. Each control function and associated control point of all mechanical equipment shall be incorporated into the building temperature control system.

All temperature control work shall be provided by EASI and will interface with the current AACPS open protocol Tridium front end system located at the Fort Smallwood facility.
OPTION 4A – REPLACEMENT IN FIELD

Each learning space (classrooms, etc.) will be considered a temperature control zone and will be provided with independent temperature controls. The DOAS units will be provided without packaged controls. EASI will provide independent controls on the DOAS units so that it can be controlled and monitored from the central EMCS.

All major mechanical equipment items (DOAS units, air handling units, fan coil units, heat pumps, etc.), as well as, all temperature sensors, filter status, etc., will be capable of being controlled and/or monitored locally at the building and through the central EMCS.

**Plumbing**

A minimum 6” combination domestic/fire service will be extended to the new school. This service will enter the building in the main mechanical room or dedicated water room. The domestic water service will be provided with a reduced pressure backflow preventer assembly. A flow test will be performed to confirm that adequate pressure is available.

As mentioned above, the feasibility of bringing a new gas service to accommodate the heating and domestic hot water requirements of the building will be evaluated during the design phase. Connection will be made to the low pressure side of the gas meter to be provided by BGE.

Domestic hot water will be generated from a gas-fired water heater located in the main mechanical room. If gas is not available, fuel oil, propane or electric will be considered for the heating source. Domestic hot water distribution temperature will be set for 110°F (adjustable). The use of solar domestic hot water heating will be evaluated (i.e. energy savings benefits weighed against first cost) during the design phase of the project.

All plumbing fixtures will be low water use fixtures to maximize water conservation. Low flow fixtures are anticipated to include 1.28 gallon per flush (gpf) water closets, 0.125 gpf urinals as well as 0.5 gpm sinks and lavatories. In addition, manual operated flush valves and faucets are anticipated to be provided.

All domestic water piping will be type L copper. In addition, all piping will be insulated in accordance with the current energy code and a hot water recirculation system will be provided, with a dedicated pump.

All waste and drainage piping will be cast-iron. PVC piping may be used below slab within the building perimeter and 10 feet outside building perimeter per AACPS design standards.

Roof drains and the associated storm water distribution system will be provided. A secondary storm water drainage system will be provided parallel to the primary system to meet the secondary drainage requirements. The secondary system will discharge through the exterior wall above grade at locations to be determined.
**OPTION 4A – REPLACEMENT IN FIELD**

**Fire Protection:**

The replacement school will be served by a wet pipe fire protection sprinkler system. As mentioned above, a new 6” combination fire/domestic water service is anticipated. The sprinkler system will be designed in accordance with NFPA and the local authority having jurisdiction, including a double-check backflow preventer at the incoming service.

Recessed type sprinkler heads will be utilized in all areas except storage rooms, mechanical rooms, etc. Where piping is exposed, upright heads will be provided.

A flow test will be performed during the design phase to determine the available pressure to the building. Calculations will then be performed to determine if a fire pump will be required.

**Electrical:**

**General**

This option involves a replacement school located on the existing elementary school site. The location of the new building is on a field on the opposite side of the site as the existing building, which will allow the existing building to remain occupied during the construction process. The new building will be an approximately 68,000 SF, two story AACPS prototype design. The new building will include several classrooms, a gymnasium, cafeteria, kitchen, media center and other support spaces. The building floorplan is very similar to the second replacement option (i.e. option 5) which will be discussed later in this study.

The electrical systems will be designed in accordance with applicable local, state and federal codes/standards including the National Electric Code, NFPA 101, NFPA 72, as well as the requirements of Anne Arundel County Public Schools (AACPS).

**Electrical Service and Distribution**

The main service equipment will be served by a BGE owned, pad-mounted transformer through a concrete encased ductbank into a utility approved current transformer cabinet for utility metering. Empty raceways will be also extended from the pad-mounted transformer location for primary service by the utility company. These raceways will be concrete encased when installed beneath paved areas such as parking lots and roadways.

The new school will be served from a 480/277 volt secondary service originating from the BGE pad mounted transformer and will provide secondary service to a new 480/277 volt, three phase, four wire switchboard. We estimate the service entrance to be 2,000A at this time.
OPTION 4A – REPLACEMENT IN FIELD

A 480Y/277 volt service entrance switchboard will be provided in the main electrical room of the proposed elementary school building to distribute power throughout the building. The switchboard will be provided with the following components:

- BGE approved CT cabinet.
- 2,000A main circuit breaker.
- Distribution section with group mounted molded case circuit breakers.
- Digital power monitoring device.
- Surge protective device (SPD)

**Feeders and Branch Circuits**

All conductors/circuits will be installed as follows:

- Interior concealed branch circuit wiring located in dry locations will be installed in electrical metallic tubing (EMT). Liquid-tight flexible metal conduit will be used for final connections to vibrating equipment such as motors and transformers. Metal-clad (MC) cable will be allowed for final connections to light fixtures.
- Exposed interior branch circuits will be rigid galvanized steel where subject to physical damage and EMT elsewhere.
- All EMT fittings (where allowed) will be steel compression fittings with insulated throats.
- Wiring installed in exterior and wet locations will be installed in rigid metal conduit with liquid-tight flexible metal conduit used for final connections.
- Underground conductors will be installed in direct buried PVC conduit except as noted below.
- Underground service conductors and generator conductors will be installed in concrete encased PVC ductbanks.
- All interior conductors will be copper conductor with type THHN, THHW, or XHHW insulation.
- All exterior underground conductors will be copper with type RHW insulation.
- All feeders and branch circuits will be provided with a separate green insulated equipment grounding conductor. Conductor sizes #10 and smaller shall be solid; conductor sizes #8 and larger shall be stranded.
- Conduits will not be installed within concrete floor or below/within slab on grade unless absolutely necessary.

**Grounding**

A complete grounding electrode system and equipment grounding system will be provided in accordance with NFPA 70, National Electrical Code, and local codes and regulations. The grounding system will be specified to have a maximum overall resistance of 10 ohms to ground at the main ground bus.

Should a lightning protection system be provided, copper ground rods will be provided at each corner of the building and at 100-foot maximum intervals in between for the lightning protection system. This system will be bonded to the building grounding system in accordance with the National Electrical Code.
**Distribution Equipment**

The 480/277 volt panelboards will be provided to support large motor load and lighting throughout the school. Energy efficient dry type step down transformers will be used to step down the voltage from 480 volt to 208/120 volt for the 208/120 volt panelboards serving receptacles, food service equipment and small power loads. All panelboards will be provided with copper bus bars, equipment ground busses, and bolt-on, molded case circuit breakers.

Motors will be controlled using individual full voltage, combination motor starters and motor circuit protector disconnects. Localized disconnect switches will be provided for all motor-driven equipment. Variable Frequency Drives (VFD) will be provided for all motors that require adjustable speed operation. VFD’s will be required to meet harmonic limits as specified in IEEE 519.

**Short Circuit and Arc Flash Calculations**

A short circuit study will be performed based on the short circuit capacity available at the new service transformer. The maximum available short circuit capacity at the main service points will be calculated based on the available utility short circuit capacity and any notable contributions from motor loads.

**Maryland Emergency Management Agency Requirements**

The Maryland Emergency Management Agency (MEMA) has issued a waiver to remove AACPS from the Emergency Shelter Compliance Process. They determined that Hillsmere Elementary School is in close proximity to one or more designated shelters; therefore, the Anne Arundel County Office of Emergency Management does not recommend this site for an emergency shelter. See Appendix D.

**Emergency Power**

A 480/277 volt generator will be located outdoors in a sound attenuated weatherproof enclosure. The generator will be diesel powered with a sound attenuated enclosure and sub-base fuel tank capable of running the generator for 72 hours at full load. NOTE: AACPS personnel have requested to use a natural gas powered generator on previous projects; however, this preference will need to be coordinated with AACPS and with the Authority Having Jurisdiction (AHJ) for this project. The generator will be used to supply power to emergency and optional standby distribution systems located in the building. The generator will supply two (2) automatic transfer switches (ATS) located in the building, one for the emergency system and one for the optional standby system. Loss of normal power at either ATS will result in the automatic starting of the generator.
OPTION 4A – REPLACEMENT IN FIELD

The following loads will be connected to the generator supplied emergency system and must be operational within ten (10) seconds after a power outage:

- Egress and exit lighting.
- Fire detection and alarm system (also provided with integral battery backup).
- Public Address System.
- Telephone System.
- Receptacles adjacent to fire and security panel.
- Generator auxiliary systems.
- HVAC split system(s) serving telecomm rooms.

AACPS personnel have requested additional equipment should be connected to the generator that will be connected to the generator supplied optional standby system:

- Kitchen refrigeration and freezer equipment.
- Student health suite.
- Sewage pump station (if applicable).
- Well (if applicable).

Lighting

The lighting design for the building will be in accordance with the design requirements, AACPS requirements and usage of each area. Zonal cavity and/or point by point calculations will be performed for each space or representative space utilizing effective reflectances of ceiling, wall, floor, light loss factor and the co-efficient of utilization to maintain the recommended light level at the working surfaces. Coefficient of utilization will be obtained from the particular lighting fixture cuts after the final fixture selections are completed. IES and AACPS recommended footcandle levels will be maintained throughout the building.

The majority of lighting within the building will be provided with 2’ x 4’ and 2’ x 2’ high efficiency LED volumetric fixtures with acrylic lenses. Industrial type LED fixtures will be utilized in electrical/mechanical equipment areas, and other infrastructure areas without ceilings such as storage rooms. Accent lighting using LED lamping will be provided in locations where specialty lighting is required. LED light fixtures in gymnasium shall be provided with cage and safety chain. High-abuse wall-mounted LED luminaires will be provided in stairwells.

Occupancy sensors using dual technology incorporating ultrasonic and infrared will be provided within individual rooms. Infrared occupancy sensors will be provided in transit areas such as corridors. Localized low voltage lighting controls will consist of multi-level switching for classrooms with the typical zoning being student desk area, daylight (lights along the window wall), corner light that is adjacent to both window and the teaching wall, and lights adjacent to teaching wall. Daylighting controls will be provided as required to meet energy conservation requirements. All lighting controls will be connected into a building wide central system.
OPTION 4A – REPLACEMENT IN FIELD

Egress, exit and exit discharge lighting will be provided in accordance with NFPA Life Safety Codes. The egress and exit lights will be connected to emergency circuits with generator backup. Batteries will not be used in egress light fixtures.

Exterior lighting will be provided along the perimeter of the building using wall mounted LED lighting fixtures. Lighting fixtures located at points of exit discharge will be connected to the emergency generator for compliance with emergency lighting for exit discharge. Parking lot and roadways lights will be provided consisting of LED luminaires mounted on aluminum poles.

The lighting power densities will be based on the power budget density guidelines as defined by the current ASHRAE or IECC standards as applicable.

Fire Alarm Systems

A new addressable fire alarm system with voice evacuation will be provided.

Initiating devices will include manual stations, smoke detectors, carbon monoxide detectors (as applicable), thermal detectors, duct type smoke detectors, interface modules for sprinkler flow switches and OS&Y valve position switches. Indicating devices will include combination speaker/strobe devices and supplementary visual devices. Auxiliary devices will include control modules for remote signaling and control. All fire alarm circuits will be installed in conduit. A fire alarm annunciator panel with voice handset, speaker zone controls and control switches for mechanical systems will be provided at the main entrance.

The design will comply with the following codes: NFPA-72, NFPA-101, IBC, and Maryland Accessibility Code 05.02.02.

Lightning Protection System

Discussions with AACPS will be held to determine the need/preference for a lightning protection system. For the purposes of this study, it is assumed that a lightning protection system is preferred, therefore, an Underwriters Laboratories (UL) Master Label lightning protection system will be specified for the building.

Copper lightning protection components will be used throughout including all air terminals. All down leads will either be copper conductors installed in non-ferrous conduit or steel columns will be utilized in accordance with NFPA 780 where practical. The down leads or steel columns will be connected to the building’s grounding system as outlined in Grounding Section.

All grounding connections below grade will be exothermic welds.
OPTION 4A – REPLACEMENT IN FIELD

IT / AV:

From a technology perspective, the differences in the level of effort among Addition / Renovation Option, Replacement Option 4, and Replacement Option 5 are very small and insignificant. All three options require the same new communications infrastructure (cable plant). The extensiveness of the MEP upgrades and the age of the existing communications infrastructure will require total replacement in the Addition / Renovation option to meet current AACPS standards. Likewise, all three options will require new classroom AV systems, telephone/intercom data networking and security systems.

Telecommunication Rooms

A standard sized (10’ x 10’) Telecommunication Room should be provided for every 70,000 square feet of floor space. These rooms should contain good environmental conditioning including air conditioning, emergency power-protected circuits, and good lighting. The main Telecommunication Equipment Room should be better sized for a more technology rich school and located near the media center. The final determination of the number and location of TR’s will be determined during the schematic design phase.

Structured Cabling System (Telephone and Data)

The school-wide computer network should be an implementation of 10/100/1000 Mbit Ethernet over Category 6 copper UTP cable and Gigabit Ethernet over multimode fiber, complying with the Institute of Electrical Engineers’ (IEEE) 802.3 standards for Ethernet. Backbone cabling between the telecommunications equipment room (TER/“head end”) and all telecom rooms (TR’s) shall be a multimode/single-mode fiber optic cable (18 / 6 Strands). All horizontal cabling shall be terminated in Category 6 rack-mounted patch panels in the telecom rooms, and in communication network outlets (CNO’s) at the workstation. A major renovation of the school that included new systemic system upgrades would require replacement of the communications infrastructure systems. Wireless connectivity should be available throughout the building.

Data outlets intended for owner provided wireless access points shall be cross-connected to owner provided inline powered switch ports. ESP will work with the client to refine the number of data drops in all types of instructional and non-instructional spaces to ensure that it complies with Anne Arundel County Public School standards and guidelines.

Video Distribution

AACPS is transitioning away from a coaxial based video distribution system and may not include a coaxial based video distribution system. The IP data network shall allow for video distribution via the Category 6 UTP and fiber distribution network. A small number of coaxial drops may be installed in strategic areas such as the main reception area, principal’s office and main conference space.
Classroom Technology

AACPS currently includes a Light Speed sound enhancement amplifier/mixer in all learning spaces with a wall mounted Epson Powerlite 685W ultra short throw projector. The purpose of the sound enhancement system in classrooms and laboratories is to equalize sound levels throughout the classroom to ensure that students hear the presentation, regardless of proximity to the speaker. The system allows a presenter’s voice to be amplified via a lanyard or a hand-held infrared microphone.

Security Systems

Closed Circuit Television should provide video surveillance of the school, internally and externally, 24 hours per day. The CCTV will utilize owner procured and installed IP based cameras that are connected to the data network through switching equipment in Telecom Rooms.

The Access Control and Intrusion Detection system should allow/prevent access, track movement throughout the facility and provide an alarm signal on and offsite in the event of an unauthorized entry. The systems should be integrated and be controllable on and offsite to allow for efficient system management. The system shall consist of motion detectors, door and window contacts, card readers, door controllers, power supplies and intelligent software all connected to alarm panels throughout the facility.
OPTION 4B – REPLACEMENT OVER EXISTING BUILDING WITH SWING SPACE

Overview:

This replacement option places the newly constructed building generally within the existing building footprint and uses the same prototype layout as Option 4A. As noted in Option 4A, this layout fits the needs of Hillsmere Elementary School staff and students while meeting the AACPS Education Specifications space and adjacency requirements and mandated area gross square footage. It also provides mechanical, electrical, plumbing, fire protection, AV/IT and security systems that follow State guidelines, meets current life safety, building codes, ADA accessibility requirements and addresses security concerns. A new site layout will include a bus loop, parent drop-off with direct access to the main entry and increased parking. Additionally, a new multipurpose field will be constructed near its existing location and will require a minimal retaining wall to maintain mandatory site grades. The construction period will include the demolition of the existing school and will require Hillsmere staff and students to relocate to an off-site school(s) for the entire construction period.

Statistics:

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>30 months</td>
</tr>
<tr>
<td>Square Footage</td>
<td>68,000 GSF</td>
</tr>
<tr>
<td>Total Estimated Construction Cost</td>
<td>$41,900,000</td>
</tr>
<tr>
<td>Estimated Life Cycle Cost</td>
<td>$99,300,000</td>
</tr>
</tbody>
</table>

Description:

This replacement option orients the main entry of the newly constructed prototype building facing Arundel on the Bay Road. Although this is the same building prototype as presented in Option 4, it is has been mirrored, placing the public use space in the southern portion of the building. The new site layout provides a safe separation of cars and buses entering the site. The bus drop-off is located in front of the building and has adequate space to accommodate six buses. For bus use, two curb cuts (one existing and one new) are required for this scheme as buses will have a separate entrance and exit. Cars will enter and exit the site at one location requiring a new curb cut. The parking lot has 105 parking spaces and is configured to provide a generous lane for queuing. Both car drop-off and bus drop-off feed into the main entry lobby from a centralized location. A fire lane is accessed from both the bus lane and parking lot. The service area near the kitchen is located off the parking lot. A new multi-purpose field is located near the existing field and requires a low retaining wall to maintain a 5% maximum grade from the building to the field. ADA compliant ramps have been provided for field access. Soft and paved play areas are located adjacent to the 2-story academic wing.
OPTION 4B – REPLACEMENT OVER EXISTING BUILDING

The prototype model meets the specific area square foot required by the AACPS Education specification. This prototype layout includes a “U” shaped building with an open courtyard, a one story academic wing, and a 2-story academic wing. The main entrance and administration suite of the new building are located near the front of the site for maximum visibility and supervision. A main circulation corridor connects the large public use spaces with the academic wings. In the public use space, the gymnasium is adjacent to the cafeteria to allow for an operable wall to expand the spaces for large events. The media center is located in the center of the building across the main corridor from the cafeteria and gym with a view to the courtyard. The west end of the central corridor houses the music rooms which are across the hall from the platform for convenience during performances and away from teaching spaces for noise control. The art room and learning studio are also located at the west end of the main corridor.

Early childhood programs reside in the 1-story east academic wing adjacent to the administration suite. The 2-story west academic wing houses the 1st and partial 2nd grades on the first floor and 2nd to 5th grades on the second floor. Double doors have been located at both academic wings so these areas may be closed off from the main public corridor.
### OPTION 4B – REPLACEMENT OVER EXISTING BUILDING

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Site</strong></td>
<td></td>
</tr>
<tr>
<td>✓ Separate, safer, and more efficient bus and car access</td>
<td>✗ Site level differences require a retaining wall</td>
</tr>
<tr>
<td>✓ Does not require relocation of force main sanitary sewer piping system</td>
<td>✗ Reforestation required at new parking lot/field</td>
</tr>
<tr>
<td>✓ Minimum re-routing of stormwater piping system</td>
<td>✗ Three curb cuts required on Arundel on the Bay Road</td>
</tr>
<tr>
<td>✓ Least amount of site work</td>
<td>✗ Bus traffic uses two curb cuts – one for entry and another for exit</td>
</tr>
<tr>
<td>✓ Least amount of retaining wall required</td>
<td>✗ Bus queuing is close to road</td>
</tr>
<tr>
<td></td>
<td>✗ Curb cuts for buses and cars are close to each other</td>
</tr>
<tr>
<td><strong>Building</strong></td>
<td></td>
</tr>
<tr>
<td>✓ Main building entry is located far from road and relatively centralized on site</td>
<td>✗ Does not re-purpose existing building</td>
</tr>
<tr>
<td>✓ No construction phasing issues</td>
<td>✗ New building construction relies on school scheduling for demolition of existing building</td>
</tr>
<tr>
<td>✓ Clear Administrative viewing of car queuing (drop-off and pick-up)</td>
<td>✗ Requires class relocation to swing space during construction</td>
</tr>
<tr>
<td>✓ New building does not require exterior ramp/stairs at egress locations</td>
<td>✗ Main building entry is very close to road and not easily seen from car parking</td>
</tr>
<tr>
<td></td>
<td>✗ Limited view of car queuing from Administrative spaces</td>
</tr>
<tr>
<td></td>
<td>✗ Two level building</td>
</tr>
<tr>
<td></td>
<td>✗ Open courtyard</td>
</tr>
<tr>
<td></td>
<td>✗ New school building is close to houses</td>
</tr>
<tr>
<td></td>
<td>✗ Service area is visible upon site approach</td>
</tr>
<tr>
<td><strong>Systems</strong></td>
<td></td>
</tr>
<tr>
<td>✓ Design to include adequate ceiling space for MEP systems</td>
<td></td>
</tr>
</tbody>
</table>
OPTION 4B – REPLACEMENT OVER EXISTING BUILDING
OPTION 4B - REPLACEMENT OVER EXISTING BUILDING

Site:

The site work in this option includes the complete demolition of the existing building, existing paved parking areas, sidewalks and play areas. A new building, parking facilities, separated parent drop-off, bus loop, service area, perimeter fire access lane and new outdoor play areas will be constructed. The new building will be constructed in the same general location as the existing building.

The site work will include an “entrance only / exit only” along Arundel on the Bay Road for the bus loop. The bus loop drop-off area will be located on the east side of the proposed building. A fire lane will be constructed along north side of the building, utilizing the Entrance and Exit for the bus loop for access to Arundel on the Bay Road. This new entrance creates a convenient construction entrance. The new bus loop will provide stacking for 6 buses as required by the Educational Specification.

The new parent/visitor parking lot and service area will be constructed on the south side of the new building. The entrance to this parking facility will be off of Arundel on the Bay Road and separate from the bus loop. The new parking facility will also have a partial fire lane with a “T” style turnaround constructed off the southern side. The new parking facility will accommodate parking for 105 vehicles including 5 ADA accessible parking spaces. Small service and fire lanes will be constructed on the south side of the new building to provide added fire access coverage for the building. The total parking provided on-site will be 105 spaces which will meet the Educational Specifications requirement of 105 parking spaces.

Grades to the north of the existing building will be maintained for the most part in the construction of the play areas. Positive drainage away from the building and play areas will be directed into the storm drain system. Grades along the east side of the building will be revised to provide ADA accessibility from the Bus and Parent Dropoff areas, including pedestrian pathways from Arundel on the Bay Road. The south side of the new building and parent parking lot will see the majority of the fill material required to maintain ADA design requirements within the parent parking lot. ADA ramps and retaining walls will be required to provide access to the multi-purpose field area. Grades along the west side of the new building will largely be unchanged with the exception of what is required to construct the fire lane.

Existing public sanitary sewer pipes, manholes and a large diameter force main will be able to remain in place. The sanitary sewer service for the new building will connect to the existing onsite sanitary sewer system. Public water service will be updated to serve the new building, connecting to the existing 12” water main in Arundel on the Bay Road. A new fire service water main and associated fire hydrants will be placed onsite to provide adequate fire protection to the renovated elementary school building. This new fire service line will be connected to the existing 12” water main in Arundel on the Bay Road.
OPTION 4B - REPLACEMENT OVER EXISTING BUILDING

The majority of the existing storm drainage systems will be removed to allow for construction of the site improvements. A small diameter storm drain relocation will be required in the area of the proposed parent parking lot. Runoff from Arundel on the Bay Road currently drains through this storm drain pipe. This existing system can be connected to the future storm drain system that will be managing the runoff from within the parent parking lot. Future runoff from the rooftop and new bus loop will be directed into the future storm drain system serving the parent parking lot, discharging south of the multi-purpose field.

Environmental Site Design (ESD) will be utilized to the maximum extent possible. ESD facilities such as Rain Gardens, Micro-bioretention and Bio-swales will be utilized within the green spaces that are located near the parking bays, within the bus loop and near other paved surfaces. We anticipate the construction of 8-10 separate ESD facilities.

New outdoor play areas will also be constructed along the northern and southern portions of the site. Two soft surface play areas and two hard surface play areas for grades K-5 will be constructed to the north side of the building and fire lane. A new multi-purpose field measuring 210’x360’ with an integral softball field will be constructed to the south of the new building and parking lot area. The outdoor play areas will meet the Educational Specification required sizes. To achieve the construction of the multi-purpose field and softball field some cutting and filling will be done in conjunction with the parking facility grading. The site grading will require the import of suitable fill materials.

Structural:
This option consists of a one-story building housing administrative offices, classrooms, gymnasium, cafeteria, kitchen and media center, and a two-story academic wing.

The roof structure at the gymnasium and cafeteria will consist of 1-1/2” deep, 22 gauge galvanized wide ribbed or acoustical steel deck supported by long-span open-web steel joists spaced at 5’-0” on centers. The steel joists will be supported by 12” reinforced CMU walls bearing on a spread footing foundation.

The roof structure at all other areas will consist of 1-1/2” deep, 22-gauge galvanized steel deck supported by open-web, K-series steel joists spaced at 5’-0” on centers. Joists will be supported by steel girders and columns.

The second floor structure of the two-story classroom wing will consist of a 3” thick concrete slab on steel form deck, supported by K-series steel joists spaced at 2’-0” o. c., Joists will be supported by steel girders and columns. Floor framing and column locations will be driven by the architectural open-plan layout.

Rooftop mechanical units will be supported by roof framing or elevated structural steel platforms. If geotechnically feasible, the ground floor will consist of a 5” thick concrete slab-on-grade.

Lateral Stability
Wind and seismic loads will be resisted by interior and exterior reinforced CMU shear walls at the gymnasium and cafeteria, and by ordinary moment-resisting steel frames at the academic wing and other areas.
OPTION 4B - REPLACEMENT OVER EXISTING BUILDING

Foundation

Based on the existing building drawings, it is anticipated that the foundation will be a shallow spread footing system supported on natural soil or structural fill. Majority of the new building will be constructed within the footprint of the existing building with a crawl space. It is assumed that the existing crawl space area will be filled with a borrowed structural fill, which will be confirmed by a geotechnical engineer.

Mechanical:

General

This option involves a replacement school located where the existing building currently sits on site. During demolition and construction, school staff and students will be relocated to swing space at an adjacent school. The new building will be an approximately 68,000 SF, two story AACPS prototype design. The new building will include several classrooms, a gymnasium, cafeteria, kitchen, media center and other support spaces. The building floor plan is very similar to the first replacement option (i.e. option 4) discussed earlier in this study.

HVAC System Options

After discussions with the AACPS mechanical staff, two systems will be considered for the addition/renovation option during the design phase of the project. These two systems include:

a. **Option 1 – Two-pipe Fan Coil Units:** This option will include a chiller and boilers as the main cooling and heating sources for the building. Chilled and heating water will be circulated throughout the building to serve fan coil units (FCUs) in each classroom. The FCUs will be recirculating units providing heating and cooling to each occupied space. Ventilation air will be provided through rooftop DOAS (dedicated outside air system) units with energy recovery wheels. These units will have DX cooling and hot water heat. The administration area, media center, gymnasium and cafeteria will be likely equipped with an independent form of DX cooling as well to allow for summer operation without the chiller.

b. **Option 2 - Geothermal System:** The heating/cooling source equipment includes multiple heat pump types utilizing geothermal heat exchange (via vertical wells) as the heat rejection for the heating/cooling system. A condenser water loop will serve individual water-to-air heat pumps located in each classroom. The classrooms will also be served by dedicated outside air (DOAS) units to provide code required ventilation air. The DOAS units will likely be heat pumps which are tied into the condenser water loop and will be equipped with energy recovery wheels. It is anticipated that the administration area, media center, gymnasium, cafeteria, etc. will be de-coupled from the geothermal loop and provided with an independent heating / cooling source.
OPTION 4B - REPLACEMENT OVER EXISTING BUILDING

Heating System

Under both HVAC system options, a new heating water boiler system will be provided. The fuel source for the boiler(s) will be determined during the design phase, however, natural gas fired condensing boilers are preferred due to efficiency and footprint advantages. The existing building does not currently have a natural gas service, however, there is a BGE gas main at the intersection of Arundel on the Bay Road and New Church Road. This is approximately 170 feet from the edge of the school’s property. The design team will work with BGE and AACPS to determine if the gas main has adequate pressure to serve the building and evaluate the costs of bringing the gas piping to the building.

For HVAC system option 1 (i.e. two pipe fan coil units), the heating plant will consist of high efficiency gas fired condensing boilers (if natural gas is available) with stainless steel heat exchangers. If natural gas proves to not be practical for this building, fuel oil or propane boilers will be considered. The boiler arrangement will be sized for the total heating load as well as to provide N+1 boiler capacity. Heating water supply temperatures will be in the range of 120 – 160 degrees F. Heating water will flow through a two-pipe dual temperature piping system to serve air handling equipment (see air distribution section below) throughout the building. Change over valves will be located in the main mechanical room to allow for heating water flow during the heating season and chilled water flow during the cooling season.

Two (2) dual temperature water pumps (primary and standby) will circulate heating water supply throughout the building. The pumps will be base mounted end suction type with inertia pads and vibration isolation to minimize vibration transmission to the building structure. The dual temperature water pumps will be controlled by variable frequency drives to maximize energy conservation.

For HVAC system option 2 (i.e. geothermal), the geothermal system will provide condenser water which will serve small independent water-to-air heat pump units. Ventilation air will be provided to the classrooms by dedicated outside air (DOAS) units which will also likely be served by the geothermal condenser water loop.

The administrative/health spaces, media center, gymnasium and cafeteria are anticipated to be decoupled from the condenser water loop. The heating source for these spaces, as well as, miscellaneous heaters throughout the building will likely be heating water from the boiler(s). The boilers may also be tied into the geothermal piping loop to ensure that loop temperatures do not fall below low limit setpoints.

The geothermal water system and heating water system will each be provided with two circulating pumps (primary and standby). The pumps will be base mounted end suction type with inertia pads and vibration isolation to minimize vibration transmission to the building structure. The pumps will be provided with variable frequency drives to maximize energy conservation. The pumps, boiler(s) and incoming geothermal piping will all be located in the main mechanical room.
OPTION 4B - REPLACEMENT OVER EXISTING BUILDING

Cooling System

For HVAC system option 1 (i.e. two pipe fan coil units), the cooling source will include an outdoor air cooled high efficiency chiller. The outdoor machine will utilize screw compressors and will be located in an enclosure on grade adjacent to the mechanical room. Glycol water will flow through the chiller for freeze protection purposes. In order to de-couple the glycol water from the main building distribution, a flat-plate heat exchanger and a set of two (2) glycol water pumps (primary and standby) will be provided. The glycol water pumps will circulate the glycol water through the “source” side of the heat exchanger and back to the chiller.

Two (2) dual temperature water pumps (primary and standby) will pump fresh water through the “system” side of the heat exchanger to produce chilled water which will be circulated to cooling coils within each air handling unit (see “Air Distribution System” description). The pumps will be base mounted end suction type with inertia pads and vibration isolation to minimize vibration transmission to the building structure. The dual temperature water pumps will be provided with variable frequency drives to maximize energy conservation. Change over valves will be located in the main mechanical room to allow for heating water flow during the heating season and chilled water flow during the cooling season.

The administrative/health spaces, media center, gymnasium and cafeteria will be provided with an independent cooling source to allow for operation when the chiller is de-energized. A variable refrigerant flow (VRF) system is anticipated in the administration area. Rooftop air handling units are anticipated to serve the other spaces. These rooftop air handling units will likely be provided with a chilled water coil, as well as, an independent DX coil.

For HVAC system option 2 (i.e. geothermal), the geothermal system will provide condenser water which will serve small independent water-to-air heat pump units. Ventilation air will be provided to the classrooms by dedicated outside air (DOAS) units which will also likely be served by the geothermal condenser water loop.

The administrative/health spaces, media center, gymnasium and cafeteria are anticipated to be decoupled from the condenser water loop. The cooling source for these spaces, will likely be in the form of air cooled DX units (i.e. VRF in the administration area and packaged rooftop units elsewhere).

Two circulating pumps (primary and standby) will be provided to circulate the geothermal water loop. The pumps will be base mounted end suction type with inertia pads and vibration isolation to minimize vibration transmission to the building structure. The pumps will be provided with variable frequency drives to maximize energy conservation.
Air Distribution System

Whether system option 1 or 2 is selected, the air distribution systems will look very similar. Each classroom will be equipped with a dedicated terminal unit (either fan coil unit under option 1 or heat pump under option 2). Both replacement building options will have more plenum space availability than the renovation/addition option, which will allow for multiple terminal unit types to be considered. Floor mounted units (as described in the renovation/addition option) are possible, however, ducted units may be preferred to help reduce noise levels and conserve floor space in the classrooms. Above ceiling ducted terminal units have been used on previous AACPS schools and will be considered on this project. Another option would be to utilize floor mounted vertical terminal units located in mechanical closets between classrooms. Ductwork would be extended from each unit above the ceilings into the classrooms. The final terminal unit type will be determined during the design phase in collaboration with AACPS facilities staff.

Re-circulating air handling units will provide conditioned and ventilated air to the gymnasium, cafeteria and media center. Under option 1, the air handling units will be connected to the chilled / heating water piping system and will likely have an independent DX cooling coil for scheduling flexibility. Under option 2, these units are anticipated to be de-coupled from the geothermal piping loop. Conditioned supply air will be distributed through low pressure ductwork to each space. In areas without a ceiling (i.e. exposed ductwork), double wall spiral / flat oval ductwork will be utilized. In areas with a ceiling, rectangular ductwork will be extended to louvered type supply air diffusers. The use of flexible ductwork will be limited to three (3) feet in length.

The administration area will be served by a VRF system, likely in the form of ceiling mounted cassette units in each space.

Dedicated outside air (DOAS) units will be provided to meet the ventilation needs of the classrooms and administration area. These units will be located on the roof and equipped with supply/exhaust fans, heating/cooling source (see sections above), filters, as well as access sections for maintenance accessibility to all coils, filters, etc. These units will also be equipped with energy recovery, likely in the form of an energy recovery wheel. The DOAS units will distribute tempered ventilation air directly to each space through low pressure ductwork.

Roof mounted, direct drive, exhaust fans will be provided to ventilate the toilet rooms and janitor’s closets within the facility. Electrical and telecommunications rooms will be provided with dedicated DX cooling units as required to maintain temperature requirements.

Control System

The school will be provided with a direct digital control (DDC) type system with electric actuation. Each control function and associated control point of all mechanical equipment shall be incorporated into the building temperature control system.

All temperature control work shall be provided by EASI and will interface with the current AACPS open protocol Tridium front end system located at the Fort Smallwood facility.
OPTION 4B - REPLACEMENT OVER EXISTING BUILDING

Each learning space (classrooms, etc.) will be considered a temperature control zone and will be provided with independent temperature controls. The DOAS units will be provided without packaged controls. EASI will provide independent controls on the DOAS units so that it can be controlled and monitored from the central EMCS.

All major mechanical equipment items (DOAS units, air handling units, fan coil units, heat pumps, etc.), as well as, all temperature sensors, filter status, etc., will be capable of being controlled and/or monitored locally at the building and through the central EMCS.

**Plumbing**

A minimum 6” combination domestic/fire service will be extended to the new school. This service will enter the building in the main mechanical room or dedicated water room. The domestic water service will be provided with a reduced pressure backflow preventer assembly. A flow test will be performed to confirm that adequate pressure is available.

As mentioned above, the feasibility of bringing a new gas service to accommodate the heating and domestic hot water requirements of the building will be evaluated during the design phase. Connection will be made to the low pressure side of the gas meter to be provided by BGE.

Domestic hot water will be generated from a gas-fired water heater located in the main mechanical room. If gas is not available, fuel oil, propane or electric will be considered for the heating source. Domestic hot water distribution temperature will be set for 110ºF (adjustable). The use of solar domestic hot water heating will be evaluated (i.e. energy savings benefits weighed against first cost) during the design phase of the project.

All plumbing fixtures will be low water use fixtures to maximize water conservation. Low flow fixtures are anticipated to include 1.28 gallon per flush (gpf) water closets, 0.125 gpf urinals as well as 0.5 gpm sinks and lavatories. In addition, manual operated flush valves and faucets are anticipated to be provided.

All domestic water piping will be type L copper. In addition, all piping will be insulated in accordance with the current energy code and a hot water recirculation system will be provided, with a dedicated pump.

All waste and drainage piping will be cast-iron. PVC piping may be used below slab within the building perimeter and 10 feet outside building perimeter per AACPS design standards.

Roof drains and the associated storm water distribution system will be provided. A secondary storm water drainage system will be provided parallel to the primary system to meet the secondary drainage requirements. The secondary system will discharge through the exterior wall above grade at locations to be determined.
OPTION 4B - REPLACEMENT OVER EXISTING BUILDING

**Fire Protection:**

The replacement school will be served by a wet pipe fire protection sprinkler system. As mentioned above, a new 6” combination fire/domestic water service is anticipated. The sprinkler system will be designed in accordance with NFPA and the local authority having jurisdiction, including a double-check backflow preventer at the incoming service.

Recessed type sprinkler heads will be utilized in all areas except storage rooms, mechanical rooms, etc. Where piping is exposed, upright heads will be provided.

A flow test will be performed during the design phase to determine the available pressure to the building. Calculations will then be performed to determine if a fire pump will be required.

**Electrical:**

**General**

This option involves a replacement school located where the existing building currently sits on site. During demolition and construction, school staff and students will be relocated to swing space at an adjacent school. The new building will be an approximately 68,000 SF, two story AACPS prototype design. The new building will include several classrooms, a gymnasium, cafeteria, kitchen, media center and other support spaces. The building floor plan is very similar to the first replacement option (i.e. option 4) discussed earlier in this study.

The electrical systems will be designed in accordance with applicable local, state and federal codes/standards including the National Electric Code, NFPA 101, NFPA 72, as well as the requirements of Anne Arundel County Public Schools (AACPS).

**Electrical Service and Distribution**

The main service equipment will be served by a BGE owned, pad-mounted transformer through a concrete encased ductbank into a utility approved current transformer cabinet for utility metering. Empty raceways will be also extended from the pad-mounted transformer location for primary service by the utility company. These raceways will be concrete encased when installed beneath paved areas such as parking lots and roadways.

The new school will be served from a 480/277 volt secondary service originating from the BGE pad mounted transformer and will provide secondary service to a new 480/277 volt, three phase, four wire switchboard. We estimate the service entrance to be 2000A at this time.
OPTION 4B - REPLACEMENT OVER EXISTING BUILDING

A 480Y/277volt service entrance switchboard will be provided in the main electrical room of the proposed elementary school building to distribute power throughout the building. The switchboard will be provided with the following components:

- BGE approved CT cabinet.
- 2,000A main circuit breaker.
- Distribution section with group mounted molded case circuit breakers.
- Digital power monitoring device.
- Surge protective device (SPD)

Feeders and Branch Circuits

All conductors/circuits will be installed as follows:

- Interior concealed branch circuit wiring located in dry locations will be installed in electrical metallic tubing (EMT). Liquid-tight flexible metal conduit will be used for final connections to vibrating equipment such as motors and transformers. Metal-clad (MC) cable will be allowed for final connections to light fixtures.
- Exposed interior branch circuits will be rigid galvanized steel where subject to physical damage and EMT elsewhere.
- All EMT fittings (where allowed) will be steel compression fittings with insulated throats.
- Wiring installed in exterior and wet locations will be installed in rigid metal conduit with liquid-tight flexible metal conduit used for final connections.
- Underground conductors will be installed in direct buried PVC conduit except as noted below.
- Underground service conductors and generator conductors will be installed in concrete encased PVC ductbanks.
- All interior conductors will be copper conductor with type THHN, THHW, or XHHW insulation.
- All exterior underground conductors will be copper with type RHW insulation.
- All feeders and branch circuits will be provided with a separate green insulated equipment grounding conductor. Conductor sizes #10 and smaller shall be solid; conductor sizes #8 and larger shall be stranded.
- Conduits will not be installed within concrete floor or below/within slab on grade unless absolutely necessary.

Grounding

A complete grounding electrode system and equipment grounding system will be provided in accordance with NFPA 70, National Electrical Code, and local codes and regulations. The grounding system will be specified to have a maximum overall resistance of 10 ohms to ground at the main ground bus.
OPTION 4B - REPLACEMENT OVER EXISTING BUILDING

Should a lightning protection system be provided, copper ground rods will be provided at each corner of the building and at 100-foot maximum intervals in between for the lightning protection system. This system will be bonded to the building grounding system in accordance with the National Electrical Code.

Distribution Equipment

The 480/277 volt panelboards will be provided to support large motor load and lighting throughout the school. Energy efficient dry type step down transformers will be used to step down the voltage from 480 volt to 208/120 volt for the 208/120 volt panelboards serving receptacles, food service equipment and small power loads. All panelboards will be provided with copper bus bars, equipment ground busses, and bolt-on, molded case circuit breakers.

Motors will be controlled using individual full voltage, combination motor starters and motor circuit protector disconnects. Localized disconnect switches will be provided for all motor-driven equipment. Variable Frequency Drives (VFD) will be provided for all motors that require adjustable speed operation. VFD’s will be required to meet harmonic limits as specified in IEEE 519.

Short Circuit and Arc Flash Calculations

A short circuit study will be performed based on the short circuit capacity available at the new service transformer. The maximum available short circuit capacity at the main service points will be calculated based on the available utility short circuit capacity and any notable contributions from motor loads.

Maryland Emergency Management Agency Requirements

The Maryland Emergency Management Agency (MEMA) has issued a waiver to remove AACPS from the Emergency Shelter Compliance Process. They determined that Hillsmere Elementary School is in close proximity to one or more designated shelters; therefore, the Anne Arundel County Office of Emergency Management does not recommend this site for an emergency shelter. See Appendix D.

Emergency Power

A 480/277 volt generator will be located outdoors in a sound attenuated weatherproof enclosure. The generator will be diesel powered with a sound attenuated enclosure and sub-base fuel tank capable of running the generator for 72 hours at full load. NOTE: AACPS personnel have requested to use a natural gas powered generator on previous projects; however, this preference will need to be coordinated with AACPS and with the Authority Having Jurisdiction (AHJ) for this project. The generator will be used to supply power to emergency and optional standby distribution systems located in the building. The generator will supply two (2) automatic transfer switches (ATS) located in the building, one for the emergency system and one for the optional standby system. Loss of normal power at either ATS will result in the automatic starting of the generator.
OPTION 4B - REPLACEMENT OVER EXISTING BUILDING

The following loads will be connected to the generator supplied emergency system and must be operational within ten (10) seconds after a power outage:

- Egress and exit lighting.
- Fire detection and alarm system (also provided with integral battery backup).
- Public Address System.
- Telephone System.
- Receptacles adjacent to fire and security panel.
- Generator auxiliary systems.
- HVAC split system(s) serving telecomm rooms.

AACPS personnel have requested additional equipment should be connected to the generator that will be connected to the generator supplied optional standby system:

- Kitchen refrigeration and freezer equipment.
- Student health suite.
- Sewage pump station (if applicable).
- Well (if applicable).

Lighting

The lighting design for the building will be in accordance with the design requirements, AACPS requirements and usage of each area. Zonal cavity and/or point by point calculations will be performed for each space or representative space utilizing effective reflectances of ceiling, wall, floor, light loss factor and the co-efficient of utilization to maintain the recommended light level at the working surfaces. Coefficient of utilization will be obtained from the particular lighting fixture cuts after the final fixture selections are completed. IES and AACPS recommended footcandle levels will be maintained throughout the building.

The majority of lighting within the building will be provided with 2’ x 4’ and 2’ x 2’ high efficiency LED volumetric fixtures with acrylic lenses. Industrial type LED fixtures will be utilized in electrical/mechanical equipment areas, and other infrastructure areas without ceilings such as storage rooms. Accent lighting using LED lamping will be provided in locations where specialty lighting is required. LED light fixtures in gymnasium shall be provided with cage and safety chain. High-abuse wall-mounted LED luminaires will be provided in stairwells.

Occupancy sensors using dual technology incorporating ultrasonic and infrared will be provided within individual rooms. Infrared occupancy sensors will be provided in transit areas such as corridors. Localized low voltage lighting controls will consist of multi-level switching for classrooms with the typical zoning being student desk area, daylight (lights along the window wall), corner light that is adjacent to both window and the teaching wall, and lights adjacent to teaching wall. Daylighting controls will be provided as required to meet energy conservation requirements. All lighting controls will be connected into a building wide central system.
OPTION 4B - REPLACEMENT OVER EXISTING BUILDING

Egress, exit and exit discharge lighting will be provided in accordance with NFPA Life Safety Codes. The egress and exit lights will be connected to emergency circuits with generator backup. Batteries will not be used in egress light fixtures.

Exterior lighting will be provided along the perimeter of the building using wall mounted LED lighting fixtures. Lighting fixtures located at points of exit discharge will be connected to the emergency generator for compliance with emergency lighting for exit discharge. Parking lot and roadways lights will be provided consisting of LED luminaires mounted on aluminum poles.

The lighting power densities will be based on the power budget density guidelines as defined by the current ASHRAE or IECC standards as applicable.

**Fire Alarm Systems**

A new addressable fire alarm system with voice evacuation will be provided.

Initiating devices will include manual stations, smoke detectors, carbon monoxide detectors (as applicable), thermal detectors, duct type smoke detectors, interface modules for sprinkler flow switches and OS&Y valve position switches. Indicating devices will include combination speaker/strobe devices and supplementary visual devices. Auxiliary devices will include control modules for remote signaling and control. All fire alarm circuits will be installed in conduit. A fire alarm annunciator panel with voice handset, speaker zone controls and control switches for mechanical systems will be provided at the main entrance.

The design will comply with the following codes: NFPA-72, NFPA-101, IBC, and Maryland Accessibility Code 05.02.02.

**Lightning Protection System**

Discussions with AACPS will be held to determine the need/preference for a lightning protection system. For the purposes of this study, it is assumed that a lightning protection system is preferred, therefore, an Underwriters Laboratories (UL) Master Label lightning protection system will be specified for the building.

Copper lightning protection components will be used throughout including all air terminals. All down leads will either be copper conductors installed in non-ferrous conduit or steel columns will be utilized in accordance with NFPA 780 where practical. The down leads or steel columns will be connected to the building’s grounding system as outlined in Grounding Section.

All grounding connections below grade will be exothermic welds.
OPTION 4B - REPLACEMENT OVER EXISTING BUILDING

IT / AV:

From a technology perspective, the differences in the level of effort among Addition / Renovation Option, Replacement Option 4, and Replacement Option 5 are very small and insignificant. All three options require the same new communications infrastructure (cable plant). The extensiveness of the MEP upgrades and the age of the existing communications infrastructure will require total replacement in the Addition / Renovation option to meet current AACPS standards. Likewise, all three options will require new classroom AV systems, telephone/intercom data networking and security systems.

EVALUATIONS/RECOMMENDATIONS

Telecommunication Rooms

A standard sized (10’ x 10’) Telecommunication Room should be provided for every 70,000 square feet of floor space. These rooms should contain good environmental conditioning including air conditioning, emergency power-protected circuits, and good lighting. The main Telecommunication Equipment Room should be better sized for a more technology rich school and located near the media center. The final determination of the number and location of TR’s will be determined during the schematic design phase.

Structured Cabling System (Telephone and Data)

The school-wide computer network should be an implementation of 10/100/1000 Mbit Ethernet over Category 6 copper UTP cable and Gigabit Ethernet over multimode fiber, complying with the Institute of Electrical Engineers’ (IEEE) 802.3 standards for Ethernet. Backbone cabling between the telecommunications equipment room (TER/”head end”) and all telecom rooms (TR’s) shall be a multimode/single-mode fiber optic cable (18 / 6 Strands). All horizontal cabling shall be terminated in Category 6 rack-mounted patch panels in the telecom rooms, and in communication network outlets (CNO’s) at the workstation. A major renovation of the school that included new systemic system upgrades would require replacement of the communications infrastructure systems. Wireless connectivity should be available throughout the building.

Data outlets intended for owner provided wireless access points shall be cross-connected to owner provided inline powered switch ports. ESP will work with the client to refine the number of data drops in all types of instructional and non-instructional spaces to ensure that it complies with Anne Arundel County Public School standards and guidelines.

Video Distribution

AACPS is transitioning away from a coaxial based video distribution system and may not include a coaxial based video distribution system. The IP data network shall allow for video distribution via the Category 6 UTP and fiber distribution network. A small number of coaxial drops may be installed in strategic areas such as the main reception area, principal’s office and main conference space.
OPTION 4B - REPLACEMENT OVER EXISTING BUILDING

Classroom Technology

AACPS currently includes a Light Speed sound enhancement amplifier/mixer in all learning spaces with a wall mounted Epson Powerlite 685W ultra short throw projector. The purpose of the sound enhancement system in classrooms and laboratories is to equalize sound levels throughout the classroom to ensure that students hear the presentation, regardless of proximity to the speaker. The system allows a presenter’s voice to be amplified via a lanyard or a hand-held infrared microphone.

Security Systems

Closed Circuit Television should provide video surveillance of the school, internally and externally, 24 hours per day. The CCTV will utilize owner procured and installed IP based cameras that are connected to the data network through switching equipment in Telecom Rooms.

The Access Control and Intrusion Detection system should allow/prevent access, track movement throughout the facility and provide an alarm signal on and offsite in the event of an unauthorized entry. The systems should be integrated and be controllable on and offsite to allow for efficient system management. The system shall consist of motion detectors, door and window contacts, card readers, door controllers, power supplies and intelligent software all connected to alarm panels throughout the facility.
### DIRECT COMPARISON OF KEY ISSUES

<table>
<thead>
<tr>
<th>Description</th>
<th>Option 3A Addition / Renovation Without Swing Space</th>
<th>Option 3B Addition / Renovation With Swing Space</th>
<th>Option 4A Replacement in Field Without Swing Space</th>
<th>Option 4B Replacement Over Existing Building - With Swing Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building</td>
<td>Remains functional during building addition / renovation with phasing. Classes moved to re-locatables in phases.</td>
<td>Building not utilized during construction. Staff and students relocated to off-site school(s) during construction.</td>
<td>Remains functional during building replacement construction</td>
<td>Building not re-purposed; New building construction relies on school scheduling for demolition of existing building</td>
</tr>
<tr>
<td>Construction impact to students and staff</td>
<td>Moderate</td>
<td>Major; classes need to be moved off-site during demolition and construction</td>
<td>Minimal</td>
<td>Major; classes need to be moved to relocatables or off-site during demolition and construction</td>
</tr>
<tr>
<td>Construction Phasing</td>
<td>More time for construction with addition work separated from existing building phased renovation</td>
<td>Relies on school scheduling for existing building interior renovation demolition.</td>
<td>Minimal</td>
<td>Relies on school scheduling for demolition of existing building</td>
</tr>
<tr>
<td>Renovation of spaces</td>
<td>Yes, potential for unforeseen issues which could cause scheduling delays and increased costs</td>
<td>Yes, potential for unforeseen issues which could cause scheduling delays and increased costs</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Building area efficiency</td>
<td>Less efficient than new construction</td>
<td>Less efficient than new construction</td>
<td>Efficient</td>
<td>Efficient</td>
</tr>
<tr>
<td>Courtyard</td>
<td>Closed</td>
<td>Open</td>
<td>Open</td>
<td>Open</td>
</tr>
<tr>
<td>Play space proximity to roadways</td>
<td>Separate – needs fencing</td>
<td>Separate – needs fencing</td>
<td>Distant</td>
<td>Separate – needs fencing</td>
</tr>
<tr>
<td>Building on site</td>
<td>Centralized; Entry distant from road</td>
<td>Centralized; Entry distant from road</td>
<td>Offset; Entry close to road</td>
<td>Centralized; Entry adequate distance</td>
</tr>
<tr>
<td>Building sited near houses</td>
<td>Close</td>
<td>Close</td>
<td>Distance</td>
<td>Close</td>
</tr>
<tr>
<td>Building levels</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Memorials and Mosaics</td>
<td>Preserved</td>
<td>Preserved as appropriate</td>
<td>Preserved as appropriate</td>
<td>Preserved as appropriate</td>
</tr>
<tr>
<td>Building entry</td>
<td>Strong sense of arrival</td>
<td>Strong sense of arrival</td>
<td>Slightly obscured entry from car parking</td>
<td>Slightly obscured entry from car parking</td>
</tr>
<tr>
<td>Administrative visibility to car queuing</td>
<td>Excellent, wide view of queuing</td>
<td>Excellent, wide view of queuing</td>
<td>Limited view of queuing</td>
<td>Good view of queuing</td>
</tr>
<tr>
<td>Exterior ramp / stairs required at egress doors due to sloped site</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Building energy efficiency</td>
<td>Existing building inefficient; Addition efficient</td>
<td>Existing building inefficient; Addition efficient</td>
<td>Efficient</td>
<td>Efficient</td>
</tr>
<tr>
<td>Service area</td>
<td>Not visible upon site approach</td>
<td>Not visible upon site approach</td>
<td>Visible upon site approach</td>
<td>Visible upon site approach</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Description</th>
<th>Option 3A Addition / Renovation Without Swing Space</th>
<th>Option 3B Addition / Renovation With Swing Space</th>
<th>Option 4A Replacement in Field Without Swing Space</th>
<th>Option 4B Replacement Over Existing Building - With Swing Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site</td>
<td>Site Reforestation required</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Site level differences require a retaining wall</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Earthwork required</td>
<td>Least quantity</td>
<td>Least quantity</td>
<td>Largest quantity; Not Net-Neutral site for soils / fills</td>
</tr>
<tr>
<td>Impact on LDA-Critical area</td>
<td>Yes – Multi-purpose field</td>
<td>Yes – Multi-purpose field</td>
<td>None</td>
<td>Yes – Multi-purpose field</td>
</tr>
<tr>
<td>Quantity of curb cuts on Arundel on the Bay Road</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Curb cuts for bus traffic</td>
<td>serves entry and exit</td>
<td>serves entry and exit</td>
<td>uses two curb cuts – one for entry and another for exit</td>
<td>uses two curb cuts – one for entry and another for exit</td>
</tr>
<tr>
<td>Separation of bus and car traffic</td>
<td>well separated</td>
<td>well separated</td>
<td>well separated</td>
<td>Close to each other</td>
</tr>
<tr>
<td>Bus queuing is far from Arundel on the Bay Rd</td>
<td>Bus queuing is far from Arundel on the Bay Rd</td>
<td>Bus queuing is very close to Arundel on the Bay Rd</td>
<td>Bus queuing is close to Arundel on the Bay Rd</td>
<td></td>
</tr>
<tr>
<td>Minimal re-routing of stormwater piping</td>
<td>Minimal re-routing of stormwater piping</td>
<td>Major re-routing of stormwater piping</td>
<td>Minimal re-routing of stormwater piping</td>
<td></td>
</tr>
<tr>
<td>Requires relocation of force main sanitary sewer piping</td>
<td>Requires relocation of force main sanitary sewer piping</td>
<td>Does NOT require relocation of force main sanitary sewer piping</td>
<td>Does NOT require relocation of force main sanitary sewer piping</td>
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<tr>
<td>Systems</td>
<td>Relocate existing force main sanitary/sewer piping system</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Re-route stormwater piping system</td>
<td>Minimal</td>
<td>Minimal</td>
<td>Yes</td>
<td>Minimal</td>
</tr>
<tr>
<td>Construction phasing issues</td>
<td>Additional cost and complexity to keep existing MEP systems operational during phased renovation of existing spaces</td>
<td>None</td>
<td>None</td>
<td>None</td>
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<tr>
<td>Ceiling clearance issues for MEP renovations</td>
<td>Extremely limited</td>
<td>Extremely limited</td>
<td>Design to include adequate clearances</td>
<td>Design to include adequate clearances</td>
</tr>
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</table>
## 5. Cost Estimates

### COST ESTIMATE SUMMARY

<table>
<thead>
<tr>
<th></th>
<th>Do Nothing (Option 1)</th>
<th>Patch &amp; Paint (Option 2)</th>
<th>Renovation + Addition w/o Swing (Option 3A)</th>
<th>Renovation + Addition w/ Swing (Option 3B)</th>
<th>Replacement @ Field w/o Swing (Option 4A)</th>
<th>Replacement @ Exist Footprint w/ Swing (Option 4B)</th>
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# LIFE CYCLE COST ANALYSIS – 40 YEAR

## Option 1 – Do Nothing

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<td><strong>II. Maintenance &amp; Operations</strong></td>
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<td><strong>III. Capital Renewal</strong></td>
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## Option 2 – Paint and Patch

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## Option 3A – Renovation / Addition without Swing Space

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### Option 3B – Renovation / Addition with Swing Space

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<td>II. Maintenance &amp; Operations</td>
</tr>
<tr>
<td>Uniform Present Value of O&amp;M Life Cycle Expenditures</td>
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<tr>
<td>Uniform Present Value of Utilities Life Cycle Expenditures</td>
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<tr>
<td>Uniform Present Value of Environmental Health &amp; Safety Expenditures</td>
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<td>III. Capital Renewal</td>
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### Option 4A – Replacement in Field without Swing Space

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<tr>
<td>II. Maintenance &amp; Operations</td>
</tr>
<tr>
<td>Uniform Present Value of O&amp;M Life Cycle Expenditures</td>
</tr>
<tr>
<td>Uniform Present Value of Utilities Life Cycle Expenditures</td>
</tr>
<tr>
<td>Uniform Present Value of Environmental Health &amp; Safety Expenditures</td>
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<tr>
<td>III. Capital Renewal</td>
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<td>Present Value Capital Maintenance Repairs and Replacement</td>
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### Option 4B – Replacement over Ex Building with Swing Space

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<tr>
<td>II. Maintenance &amp; Operations</td>
</tr>
<tr>
<td>Uniform Present Value of O&amp;M Life Cycle Expenditures</td>
</tr>
<tr>
<td>Uniform Present Value of Utilities Life Cycle Expenditures</td>
</tr>
<tr>
<td>Uniform Present Value of Environmental Health &amp; Safety Expenditures</td>
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<tr>
<td>III. Capital Renewal</td>
</tr>
<tr>
<td>Present Value Capital Maintenance Repairs and Replacement</td>
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Appendices
## APPENDIX A – AACPS EDUCATIONAL SPECS + AREA SUMMARIES

### 1.00.00 ADMINISTRATION

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<thead>
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<th>PROGRAM SPACE</th>
<th>ED. SPEC.</th>
<th>EXISTING #1 &amp; #2</th>
<th>OPTION #3A + 3B</th>
<th>OPTION #4A</th>
<th>OPTION #4B</th>
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<th>OPTION #4A</th>
<th>OPTION #4B</th>
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### 3.00.00 CORE INSTRUCTIONAL PROGRAMS

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ED. SPEC. REVISED 07/2019
### 4.00.00 SPECIALIZED INSTRUCTIONAL PROGRAMS

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#### 4.02.00 Library Media Center

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#### 4.03.00 Music

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#### 5.00.00 BUILDING OPERATIONS

#### 5.01.00 Custodial

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**Hillsmere Elementary School**  
Annapolis, Maryland  
Feasibility Study  
Gaudreau, Inc. Architects | Planners  
Page 151

**Revised 07/2019**
## Feasibility Study
### Hillsmere Elementary School
#### Annapolis, Maryland

**Gaudreau, Inc. Architects | Planners**

### OPTIONS #1 & #2

<table>
<thead>
<tr>
<th>PROGRAM SPACE</th>
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<td>Subtotal (SF)</td>
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<td>1,080</td>
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<td>150</td>
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<td>5.06.00 Circulation (part of efficiency adjustment)</td>
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<td>5.06.01 Entrance Vestibule</td>
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<td>5.06.02 Classroom Corridors</td>
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<td>5.06.03 Public Corridors</td>
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<td>Building Operations Subtotal</td>
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<td>10,380</td>
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### Net square footage subtotal
- 49,485
- 34,288
- 18,965
- 18,485

### Efficiency adjustment (new facility)
- 18,557
- 11,597
- 18,735
- 18,515

### GROSS SQUARE FOOTAGE
- 68,042
- 46,885
- 68,700
- 68,000

### State Rated Capacity

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<td>Kindergarten</td>
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<td>Pre-Kindergarten</td>
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<td>26</td>
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<td>ECI</td>
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<tr>
<td>Special Education</td>
<td>1</td>
<td>10</td>
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</table>

### Site Items
- Buildings: 6
- Parking: 106

### Notes
- Net Square Foot (NSF): Area calculated using the interior dimensions of all activity areas
- Efficiency Adjustment: Multiplier to account for non-program spaces such as corridor and stair
- Gross Square Footage (GSF) = Product of Above

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**ED. SPEC.**
**REVISED 07/2019**

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APPENDIX B - SUSTAINABLE DESIGN

OVERVIEW

If this project moves forward as a replacement school, the design will consider several strategies to achieve a "green building". Projects of this scope offer significant opportunities for meeting LEED (Leadership in Energy and Environmental Design) Certification Credit requirements, through design, commissioning, and construction practices. To achieve a certified rating under LEED, a plan will be developed that will incorporate many environmental design elements that significantly reduce or eliminate the building’s impact on the environment, while providing an inviting, friendly and comfortable place for faculty, staff, students and community users of the facility. The sustainable design features, systems, and materials may include the following:

SITE

- An erosion control plan during construction to prevent storm water runoff and wind erosion.
- A stormwater management plan that reduces discharge rate and quantity of storm water discharge.
- Water efficient landscaping or native species.
- Landscaped shading for at least 50% of the site hardscape, using trees and other shade devices.
- Reserved parking for carpools and for fuel efficient and low-emitting vehicles.

BUILDING

- Provide low-flow toilets, sinks and urinal fixtures to increase water efficiency.
- Involve building commissioning agent throughout the design and construction process to verify building systems and involve a construction cost estimator to maximize use of “Green” systems.
- Specifications encouraging the use of locally manufactured building materials.
- Specifications encouraging the use of high-recycled content materials including steel, acoustical ceiling panels, drywall and concrete.
- Consideration for replacing large quantities of Portland cement with either fly ash or ground granulated blast furnace slag (ggbfs) in concrete in site-cast concrete. Both fly ash and ggbfs are by-products of steel production. Utilization of slag cement or fly ash in concrete lessens the burden on landfills, reduces emissions, and ultimately conserves energy.
- Specifications encouraging the use of certified wood.
- Recycle demolition and construction debris, redirecting from landfills to manufacturing process, reuse on site, or other construction sites.
- Specifications encouraging the use of low-emitting materials to protect indoor air quality for occupants such as low VOC carpet and paint.
- Consider use of large windows in new construction and where possible in existing construction to provide views of the outdoors, while also allowing for natural daylighting and winter solar heating.
- Use double-glazed "low E" glass and/or shading devices on windows to enhance the energy efficiency of the building.
- Use of operable windows for natural ventilation and individual control, particularly near workstations.
- Building orientation for new construction to maximize natural daylighting and solar control.
- Maximize daylighting opportunities for building occupants.
- Minimize light pollution from the building and site by specifying building exterior and site lighting with lower foot-candle output and more stringent cutoff to reduce light spill onto neighboring properties.
- Use of LED lighting for interior and exterior fixtures. Providing lighting controls in compliance with energy codes and ASHRAE 90.1.
- Design acoustical performance to reduce background noise levels in classrooms to a 35-40 DB level.
- Use of approved roofing assembly with a highly reflective topcoat with a thermal R-value of 30 or greater to reduce the heat island effect.
- Design of exterior walls to have a thermal R-value of 20 or greater.
- Design building as an integral part of the community by providing for its use for non-school functions and events.
- Reduce potable water demand by specifying low water use showers, dishwashers, ice machines and clothes washers.
- Provide a dedicated area for the collection, separation, and storage of materials for recycling.
- Energy efficiency including – but not limited to – solar and geothermal.
- A study to evaluate the plausibility of using solar effectively.
- Use on an Energy Management System (EMS) to monitor and efficiently control the major building systems and their energy consumption.
- Monitoring and control of temperature throughout the building with the use of sensors.
- Storage for chemical products, such as cleaning, printing, and copying supplies, is contained in isolated or ventilated rooms.

CONCLUSION

LEED (Leadership in Energy and Environmental Design) Green Building Rating System® is one method of tracking and measuring the “greenness” of a building. LEED is a national rating system and accreditation tool for developing high-performance, sustainable buildings. Buildings are awarded points and achieve different levels of certification based on project procedures and design elements. There are four levels of LEED certification: Certified, Silver, Gold, and Platinum. The level achieved is based on the total number of points earned across eight categories: Location & Transportation, Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, Indoor Environmental Quality, Innovation, and Regional Priority. AACPS has established a goal for LEED Silver Certification for all Hillsmere Elementary School replacement options and to meet all applicable 2015 IECC criteria for the Addition / Renovation option.
APPENDIX C - BUILDING SECURITY AND SITE SAFETY

Building Security and Site Safety strategies are based on “Crime Prevention through Environmental Design” (CPTED). These strategies include:

NATURAL SURVEILLANCE

A design concept directed primarily at keeping intruders easily observable. Promoted by features that maximize visibility of people, parking areas and building entrances, both primary and secondary, such as doors and windows that look out onto the streets and parking lots, pedestrian-friendly sidewalks and vehicular circulation components, adequate nighttime building perimeter and site lighting.

TERRITORIAL REINFORCEMENT

A Physical design can create or extend a sphere of influence. Users then develop a sense of territorial control while potential offenders, perceiving this control, are discouraged. Promoted by features that define property lines and distinguish private spaces from public spaces using landscaping plantings, pavement designs, gateway treatments, and CPTED fences.

NATURAL ACCESS CONTROL

A design concept directed primarily at decreasing crime opportunities by denying access to crime targets and creating in offenders a perception of risk. Gained by designing streets, sidewalks, building entrances and neighborhood gateways to clearly indicate public routes and discouraging access to private areas with structural elements.

TARGET HARDENING

Accomplished by features that prohibit entry or access; window locks, dead bolts for doors, interior hinges, window treatments such as louver blinds, secure vestibules between exterior and interior of school forcing visitors to enter the main office to “sign-in” prior to entering school corridors and classrooms.
September 6, 2019

Mr. Robert Gorrell, Executive Director
Public School Construction Program
200 W. Baltimore Street
Baltimore, MD 21201

Dear Mr. Gorrell,

This letter is in support of Anne Arundel County Public Schools formal request for a waiver from the Emergency Shelter Compliance Process for the following projects included in the Anne Arundel County’s FY2020 Capital Improvement Program (CIP):

- Quarterfield Elementary School – Renovation/Addition or Replacement School
- Hillsmere Elementary School – Renovation/Addition or Replacement School
- Rippling Woods Elementary School – Renovation/Addition or Replacement School
- Arundel Middle School – Addition

Each of the above schools are in close proximity to one or more designated shelters, shown below. Therefore, the Anne Arundel County Office of Emergency Management does not recommend these sites for an emergency shelter.

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<th>Distance from Meade High School</th>
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<th>Distance from Annapolis High School</th>
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<td>Arundel Middle</td>
<td>5.2 Miles</td>
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</table>

Christina L. Cornwall
Deputy Director, Office of Emergency Management
Anne Arundel County, Maryland

7480 Baltimore Annapolis Boulevard
Glen Burnie, Maryland 21061
Telephone: 410-222-0600
www.AACounty.org/OEM

End of Report