Scope Study Update

HOMESTEAD/WAKEFIELD ELEMENTARY SCHOOL

HARFORD COUNTY PUBLIC SCHOOLS
February 22, 2021

BANTA CAMPBELL ARCHITECTS, INC.

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410-290-9006

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HOMESTEAD WAKEFIELD ELEMENTARY SCHOOL

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PROJECT INTRODUCTION AND BACKGROUND

The Banta Campbell Architects, Inc. Design Team was engaged by Harford County Public Schools as a component of the Flo-Analytics Enrollment Balancing process. The primary task for the BCA Design Team is to update the previous Homestead Wakefield Elementary School Scope Study along with a fresh look at conceptual scope solutions and student capacities.

The previous HWES Scope Study was completed in 2009. No significant improvements have been made to the facilities since that time. The existing building conditions remain essentially the same with an additional eleven years of age and wear and tear accumulated. Deficiencies identified in the previous Scope Study remain and are not reiterated in the same detail with this update.

In the same period there have been three updates to the various Building Codes that apply to the facility. Storm Water regulations and approach have also changed significantly with two updates. Educational Curriculum needs have changed as have IAC Guidelines. Needs for computer and technology have changed. Individual student laptops and more Wi-Fi connectivity significantly change the infrastructure necessary for technology. Interactive flat monitor panels are replacing previous smartboards with projectors.

The previous Scope Study recommended demolition of the Homestead and Kindergarten Buildings. The recommended option was a Modernization/Addition of the Wakefield Building with a capacity of 1,029. The project received Planning approval for FY 2012 which was rescinded due to local funding constraints. The project remained a priority and with review and approval of the Updated Scope Study will proceed to requesting Planning approval in the FY22 CIP.

Now is a great opportunity to revisit the previous scope study with new input and fresh approach to further the process toward a real and viable project.

ARCHITECTURAL ASSESSMENT

Homestead Wakefield Elementary School Campus

Site Property approximately 11.54 acres at 900 South Main Street.
Access from MacPhail Road and Idlewild Street
Buildings total approximately 115,458 square feet.
Wakefield Building: constructed in 1958 with Media Center addition in 1996.
Homestead Building: constructed in 1966 with Media Center addition in 1998.
Kindergarten Building: constructed in 1968.

State Rated Capacity: 920 Students. 2019 Enrollment: 1,034 (112%)

There are inherent challenges and inefficiencies with a three-building campus and an approximate forty-foot grade change between the Wakefield and Homestead buildings. There are necessary redundancies with Administration, Health, Media, Student Services and Food Services spaces. The buildings have been well maintained. Faculty and staff have been creative in making the best use of spaces that are not ideal for current educational curriculum.

- Separate buildings present difficulties at arrival and dismissal times with busses and cars having to access both building groups.
- Traffic issues with busses and cars crossing paths at arrival and dismissal times.

- Exits from individual classrooms present security issues with so many points of entrance/exit throughout the facility.
- The buildings are not fire sprinklered which is not compliant with current code requirements.
- Most of the toilet facilities are not ADA compliant.
- Portions of each building are not ADA accessible by path or width of opening requirements.
- Specialty education spaces like Art, Vocal Music, an Instrumental Music are lacking or substandard.
- Storage of all kinds is lacking.
- The building structural systems are sound. Water infiltration over the years has caused damage in portions exterior walls, roofs, and basement walls.

Specific existing condition narratives related to Site/Civil, Structural, Mechanical, Electrical Plumbing and Fire Protection are included as specific items later in the report.

APPROACH AND EXECUTIVE SUMMARY

The current approach builds from the research and findings of the previous HWES Scope Study. Major factors and goals include:

- The Wakefield Building is best suited for Modernization/Addition of the existing buildings on campus. Though the building is now sixty-three years old and overall life of the structure must be considered.
- The Wakefield upper portion of the site is best suited for construction whether Modernization/Addition or New Build.
- The separate Kindergarten building will be demolished, there is no practical re-use or connection to new construction.
- A single building solution removes redundancies of multiple buildings.
- Construction on the Wakefield portion of the site will allow continued use of the Homestead Building along with appropriate quantity of modular classrooms. This allows construction primarily in a single phase and avoids a lengthy partially occupied and phased construction of an existing building.
- After building construction the Homestead Building will be demolished and that portion of the site will be developed with playfields for school and Parks and Recreation use.
- Improve traffic circulation, parking, and bus drop-off areas. Separate bus and car traffic as much as is feasible given site constraints.

CONCEPTUAL DESIGN OPTIONS

The Design Team explored several organizational options of Modernization/Addition and Replacement. We developed each concept at 811, 988 and 1,129 student capacity levels. This approach allows comparison between a more standard nominal 800 student capacity with a nominal 1,100 student capacity similar to the recently completed Youth's Benefit Elementary School. The capacity level concepts are also factored into the findings of the current Enrollment Balancing process with Flo-Analytics. Their recommendation is the 1,129 student capacity.

Primary differences between capacity levels are the number of classrooms per grade, Pre-K spaces and specific Special Needs Classrooms. Core area elements such as Administration, Support

Services, Art, Music, Physical Education, and Food Services are essentially the same across all capacity levels. Red Pump Elementary and Youth's Benefit Elementary Schools provided a basis for the space needs developed. This is demonstrated with the Program Space Analysis after this section.

The three options presented graphically in this report received the most favorable comments and responses. Each were updated per review comments received during the process. The graphic representations are all at the 1,129 student capacity level. Square footage area will be less at the lower capacities but no significant changes in site layout.

Conceptual Options that are not presented graphically with the report are described below:

Modernization/Addition Option – Build North partially down the hill.
Approximately 120,000 square feet.

- The goal of this concept was to use construction of the building to help ease access to the lower field area by having a partial two-story configuration below the main level.
- Two organizations were explored with this concept. Both used approximately 85% of the existing facility. Modernization encompasses essentially stripping the building to foundation, structure, and roof. New perimeter envelope. All new systems, and services to be incorporated.
- Both used the Gymnasium as the primary element to be at a lower level. Music and Art spaces were also located at the lower level.
- This concept would need extensive retaining structures – both interior and exterior to address issues of building down the hill. There is also a BG&E easement and overhead electric lines along the existing service drive of the Wakefield Building that would need to be relocated. Both the retaining structures and easement relocation add significant costs and do not address issues as well as other options considered.

Replacement Option – Modified Cruciform Organization
Approximately 115,000 square feet

- This option replaces the existing Wakefield building.
- The plan organization incorporated core Gymnasium, Cafeteria, Media, and services in a core flanked by two classroom wings. One wing is two story with 3rd-5th grades on the upper level.
- The site is organized with car parking with closest access from MacPhail Road, bus parking toward the back of the site.
- "Tot lots" and a flat play area are available directly adjacent to the building. Larger playfields are located on the lower Homestead portion of the site.
- Though this scheme met programmatic needs and adjacencies the Committee favored the presented options more.

The following pages include program information, three most viable building concept options and facility condition narratives that support and helped develop the findings of this Homestead Wakefield Scope Study Update Report.

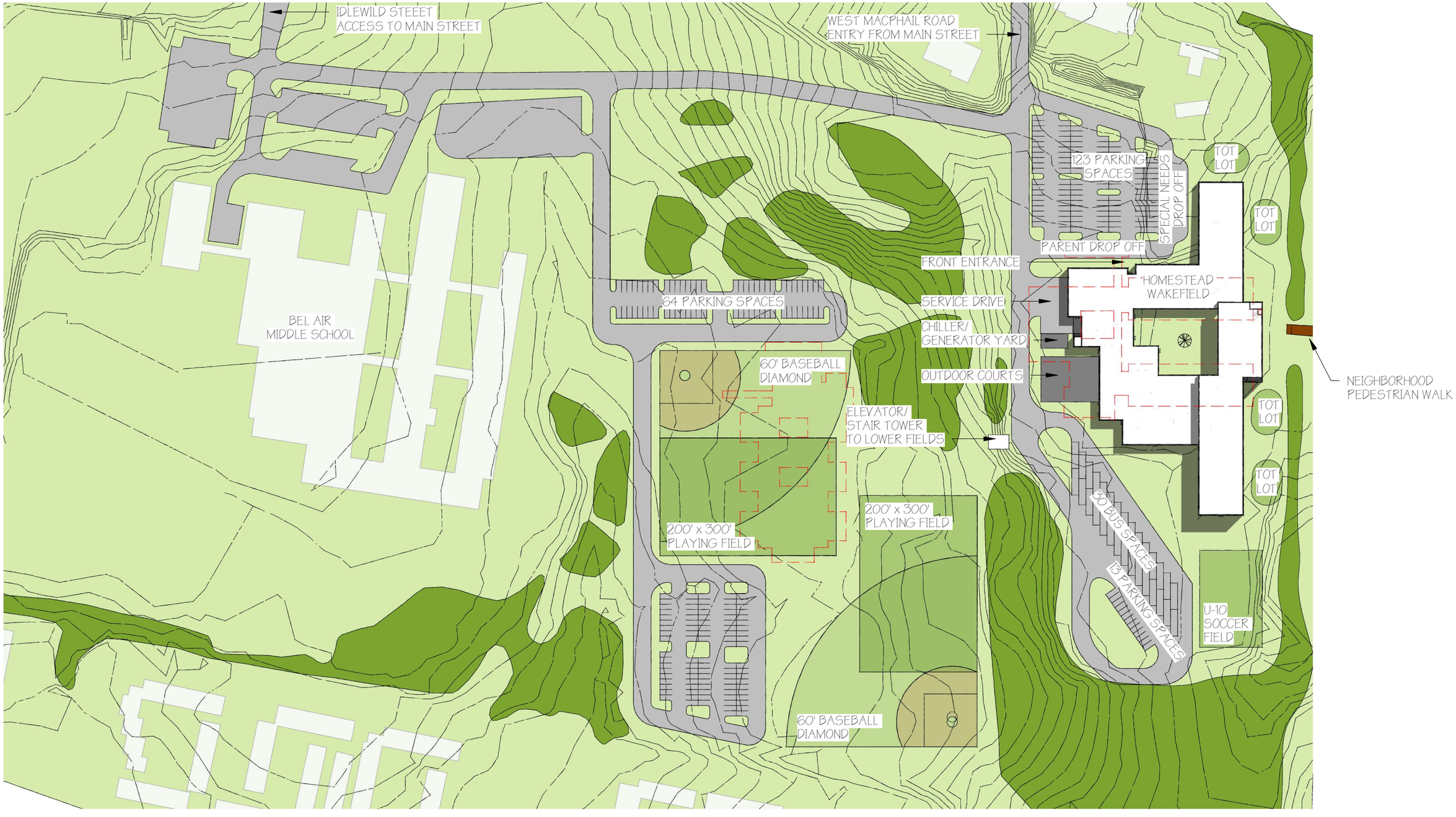
Homestead Wakefield Elementary School

Program Space Analysis with Proposed State Rated Capacity

	EDUCATIONAL PROGRAM SPACE NEEDS						
Activity/Program	**State Rated Capacity**	**Size Each**	**Number Each**	**State Rated Capacity**	**Area**	**Total**	**Comments**
EDUCATIONAL PROGRAM AREAS - 811 STUDENT CAPACITY OPTION							
Pre-Kindergarten - including Toilet	20	1,000	2	40	2,000		
Kindergarten - including Toilet	22	1,100	5	110	5,500		
Primary Grades 1-3 - including Toilet	23	850	15	345	12,750		
Intermedicate Grades 4-5	23	800	10	230	8,000		
Flex Classrooms	23	800	2	46	1,600		
Special Needs Classrooms - including Toilet	10	800	4	40	3,200		
Subtotal				**811**	**33,050**	**33,050**	Classroom Areas
EDUCATIONAL PROGRAM AREAS - 988 STUDENT CAPACITY OPTION							
Pre-Kindergarten - including Toilet	20	1,000	4	80	4,000		
Kindergarten - including Toilet	22	1,100	6	132	6,600		
Primary Grades 1-3 - including Toilet	23	850	18	414	15,300		
Intermedicate Grades 4-5	23	800	12	276	9,600		
Flex Classrooms	23	800	2	46	1,600		
Special Needs Classrooms - including Toilet	10	800	4	40	3,200		
Subtotal				**988**	**40,300**	**40,300**	Classroom Areas
EDUCATIONAL PROGRAM AREAS - 1,129 STUDENT CAPACITY OPTION							**RECOMMENDED OPTION**
Pre-Kindergarten - including Toilet	20	1,000	2	40	2,000		
Kindergarten - including Toilet	22	1,100	8	176	8,800		
Primary Grades 1-3 - including Toilet	23	850	21	483	17,850		
Intermedicate Grades 4-5	23	800	14	322	11,200		
Pre-K/Kinder Flex Classroom	22	1,000	1	22	1,000		
Flex Classrooms	23	800	2	46	1,600		
Special Needs Classrooms - including Toilet	10	800	4	40	3,200		
Subtotal				**1,129**	**45,650**	**45,650**	Classroom Areas
CORE PROGRAM AREAS - ALL OPTIONS							
ART							
Art Classroom		900	2		1,800		One provided w/811 Option
Storage/Work		200	2		400		
Kiln Room		60	1		60		
Subtotal					**2,260**	**2,260**	
MUSIC							
Instrumental Music		1,100	1		1,100		
Equipment Storage - with Instrum. Music		80	1		80		
Vocal Music		800	3		2,400		One provided w/811 Option, Two provided w/988 Option
Subtotal					**3,580**	**3,580**	
PHYSICAL EDUCATION							
Gymnasium/Multi-Purpose		6,000	1		6,000		Middle School Size
Office		200	1		200		
Staff Toilet/Shower		200	1		200		With Office
Storage - Indoor		500	1		500		
Storage - Outdoor		500	1		500		
Stage		1,000	1		1,000		
Subtotal					**8,400**	**8,400**	
SPECIALIST'S AREA							
Enrichment		600	1		600		
Math		600	1		600		

	EDUCATIONAL PROGRAM SPACE NEEDS						
Activity/Program	**State Rated Capacity**	**Size Each**	**Number Each**	**State Rated Capacity**	**Area**	**Total**	**Comments**
Reading Resource		740	2		1,480		
Reading Storage		200	1		200		
Subtotal					**2,880**	**2,880**	
SPECIAL NEEDS EDUCATION							
Special Ed Resource		300	1		300		
Resource Testing Room		100	1		100		
Occupational/Physical Therapy		200	2		400		
Subtotal					**800**	**800**	
MEDIA CENTER							
Circulation/Reading Room/Instructional Areas		2,700	1		2,700		
Office/Work Space		750	1		750		
File Server/CDC		200	1		200		
Storage		500	1		500		
TV Studio		500	1		500		
Subtotal					**4,650**	**4,650**	
TEACHER PLANNING							
Pre-K/Kindergarten including Toilet		700	1		700		
Primary		700	1		700		
Intermediate		700	1		700		
Special Education		700	1		700		
Subtotal					**2,800**	**2,800**	
FOOD SERVICES							
Cafeteria		5,250	1		5,250		
Kitchen		1,540	1		1,540		
Dishwash		150	1		150		
Trash		100	1		100		
Office		100	1		100		
Storage- Dry		200	1		200		
Refergerator/Freezer		300	1		300		
Locker/Toilet		100	1		100		
Storage (Chair/Table)		250	1		250		
After School Storage		150	1		150		
Subtotal					**8,140**	**8,140**	
FACULTY LOUNGE/PLANNING							
Faculty Lounge		600	1		600		
Volunteer Work Room/PTA Stor.		600	1		600		
Subtotal					**1,200**	**1,200**	
ADMINISTRATION							
Reception/Secretary		650	1		650		
Principal - including Toilet		300	1		300		
Assistant Principal		200	1		200		
Workroom		300	1		300		
Storage (withVault)		150	1		150		
Conference Room		300	1		300		
Subtotal					**1,900**	**1,900**	
STUDENT SERVICES SUITE							
Instructional Facilitator		150	1		150		
Mentor Office		150	1		150		
Counselor Office		300	1		300		
Psychologist Office		300	1		300		
Itinerant Teaching/Diagnostic Area		200	1		200		
Reception/Conference		200	1		200		
Speech Room		250	1		250		
Subtotal					**1,550**	**1,550**	
HEALTH SUITE							
Waiting/Reception		100	1		100		

	EDUCATIONAL PROGRAM SPACE NEEDS						
Activity/Program	**State Rated Capacity**	**Size Each**	**Number Each**	**State Rated Capacity**	**Area**	**Total**	**Comments**
Office		150	1		150		
Exam/Treatment Room		150	2		300		
Rest Areas		100	2		200		
Toilet		60	2		120		
Subtotal					**870**	**870**	
CUSTODIAL SERVICES							
Office		250	1		250		
Outdoor Maintenance		250	1		250		
Subtotal					**500**	**500**	
TOTAL NET PROGRAM AREA						**85,180**	**1,129 CAPACITY OPTION**



HARFORD COUNTY PUBLIC SCHOOLS

REPLACEMENT - OPTION 3 - OVERALL SITE PLAN

HOMESTEAD- WAKEFIELD FEASABILITY STUDY

02/05/2021

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OPTION 1 MODERIZATION/ADDITION

Site Notes

- Bus parking drop off and visitor parking is located at the eastern part of the site with closest access to MacPhail Road.
- Parent drop-off and parking located to the west behind the building – allows car stacking.
- Special Needs drop-off pull off near Special Needs Classrooms.
- "Tot" lot play areas per grade group adjacent to the building and near their instructional areas.
- Large flat play area is adjacent to the school, larger play fields are at the lower Homestead portion of the site.
- Service access to Kitchen and Mechanical areas from existing service drive.

Building Notes

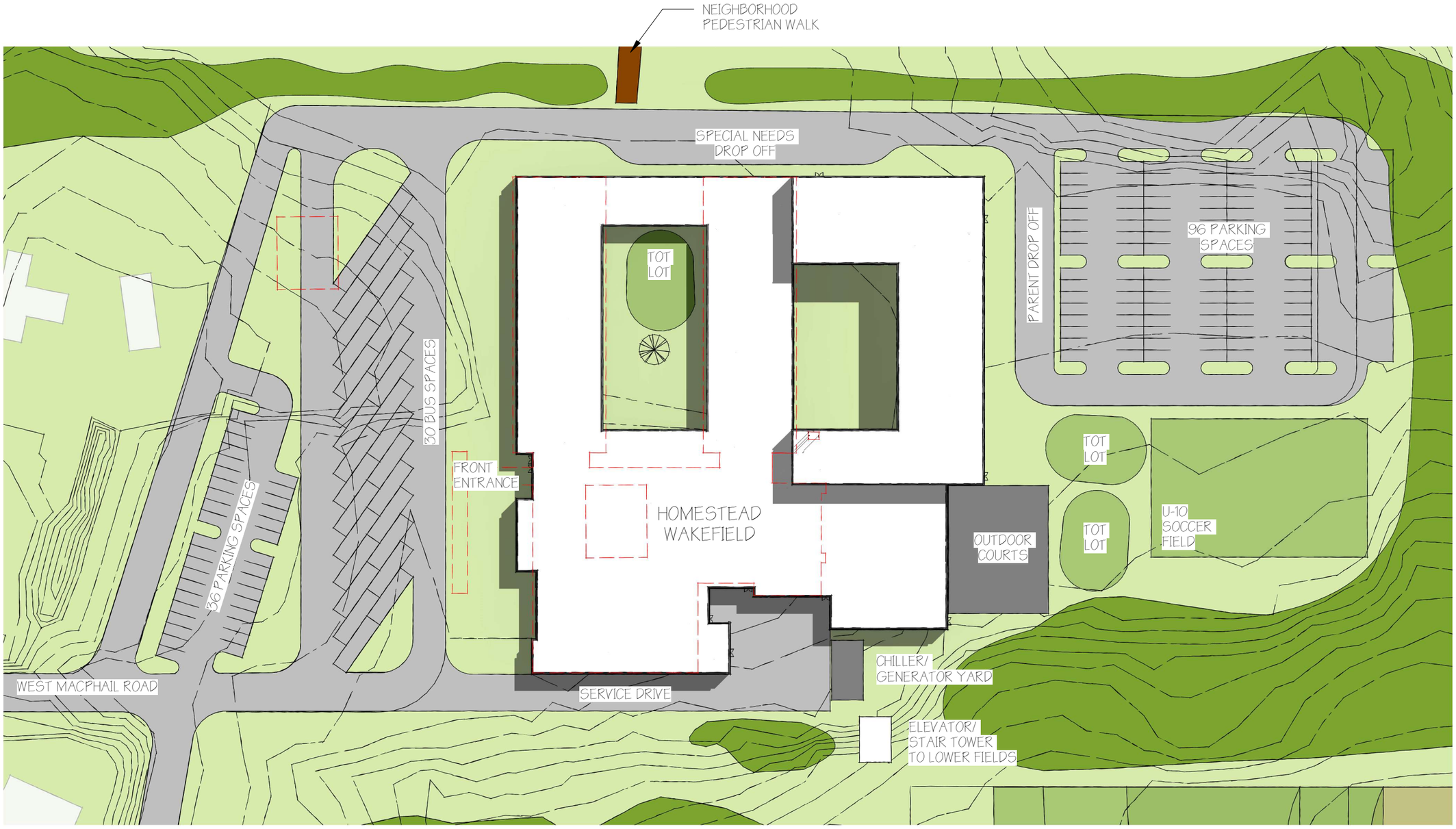
- "Modernization" encompasses essentially stripping the building to foundation, structure, and roof.
- New/upgraded perimeter envelope – energy efficient.
- New infrastructure including water, electricity, HVAC, fire sprinkler, fire alarm, and lighting.
- Administration has view of bus drop-off, control of main entry with secure vestibule.
- Addition connects existing classroom wings to form a courtyard- existing oak tree kept.
- Partial two-story addition creates a second courtyard, grades 4-5 on the upper level.

Gross Building Area	126,100 SF
Net Program Area	85,180 SF

Approximate Project Construction Costs	$46,092,442

Comments

- Facility layout is well suited to secure portions of the building for after-hours activities.
- Students can access play area without crossing traffic lanes.
- New traffic access is adjacent to houses along the southern property line.
- Preference for bus loop at rear of property- physically will not fit with this option.
- Pedestrian path from Chatham must cross traffic lane to access school.



HARFORD COUNTY
PUBLIC SCHOOLS

MODERNIZATION / ADDITION - OPTION 1 - SITE PLAN

HOMESTEAD- WAKEFIELD FEASABILITY STUDY

0' 10' 25' 50' 100' 200'

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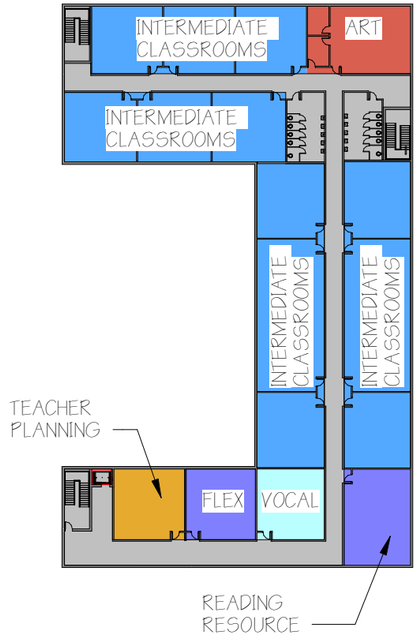
FIRST FLOOR



SECOND FLOOR

COLOR LEGEND

- PRE-K / SPECIAL NEEDS CLASSROOMS
- KINDERGARTEN CLASSROOMS
- PRIMARY CLASSROOMS
- INTERMEDIATE CLASSROOMS
- ART
- MUSIC
- PHYSICAL EDUCATION
- SPECIALIST AREAS
- MEDIA CENTER
- FOOD SERVICES
- ADMINISTRATION / TEACHER PLANNING
- HEALTH SUITE / STUDENT SERVICES
- CORRIDOR / RESTROOM / MECHANICAL

OPTION 2 REPLACEMENT

Site Notes

- Parent drop-off and parking is located at the eastern part of the site with closest access to MacPhail Road.
- Bus parking/drop-off and parking located to the west behind the building –helps reduce crossing of busses and cars.
- Special Needs drop-off pull off near Special Needs Classrooms.
- "Tot" lot play areas per grade group adjacent to the building and near their instructional areas.
- Large flat play area is adjacent to the school, larger play fields are at the lower Homestead portion of the site.

Building Notes

- New construction energy efficient, ADA accessible and Code compliant.
- Administration has view of parent drop-off, control of main entry with secure vestibule.
- Two classroom wings are organized around central core of Administration, Cafeteria, Gymnasium.
- Two story classroom wing includes 3rd-5th grades on upper level.

Gross Building Area	114,600 SF
Net Program Area	85,180 SF

Approximate Project Construction Costs	$44,733,722

Comments

- Two-story compact plan maximizes daylight to regularly occupied instructional areas.
- Facility layout is suited to secure portions of the building for after-hours activities.
- Students can access play area without crossing traffic lanes.
- New traffic access is adjacent to houses along the southern property line.
- Walk distance from bus loop to school entries is not ideal.
- Pedestrian path from Chatham must cross traffic lane to access school.

0' 10' 25' 50' 100' 200'

HARFORD COUNTY PUBLIC SCHOOLS

REPLACEMENT - OPTION 2 - SITE PLAN

HOMESTEAD- WAKEFIELD FEASABILITY STUDY

02/05/2021

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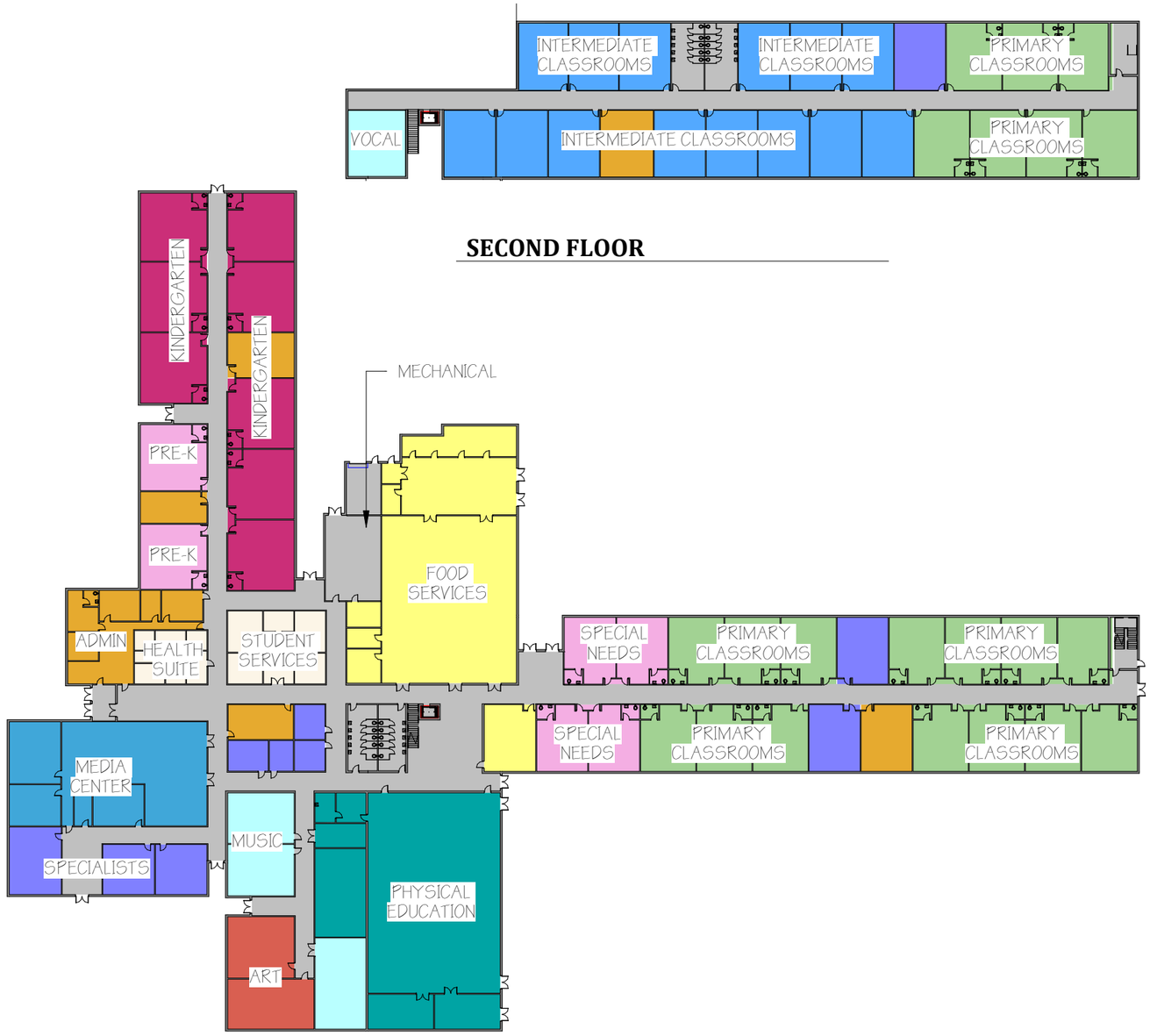

SECOND FLOOR

FIRST FLOOR

COLOR LEGEND

- PRE-K / SPECIAL NEEDS CLASSROOMS
- KINDERGARTEN CLASSROOMS
- PRIMARY CLASSROOMS
- INTERMEDIATE CLASSROOMS
- ART
- MUSIC
- PHYSICAL EDUCATION
- SPECIALIST AREAS
- MEDIA CENTER
- FOOD SERVICES
- ADMINISTRATION / TEACHER PLANNING
- HEALTH SUITE / STUDENT SERVICES
- CORRIDOR / RESTROOM / MECHANICAL

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HARFORD COUNTY PUBLIC SCHOOLS

REPLACEMENT - OPTION 2 - FLOOR PLANS

HOMESTEAD- WAKEFIELD FEASABILITY STUDY

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OPTION 3 REPLACEMENT – RECOMMENDED OPTION

Site Notes

- Parent drop-off and parking is located at the eastern part of the site with closest access to MacPhail Road.
- Bus parking/drop-off and parking located to the west behind the building –helps reduce crossing of busses and cars.
- Special Needs drop-off pull off near Special Needs Classrooms.
- Primary access drive is located to the north of the school.
- "Tot" lot play areas per grade group adjacent to the building and near their instructional areas.
- Large flat play area is adjacent to the school, larger play fields are at the lower Homestead portion of the site.

Building Notes

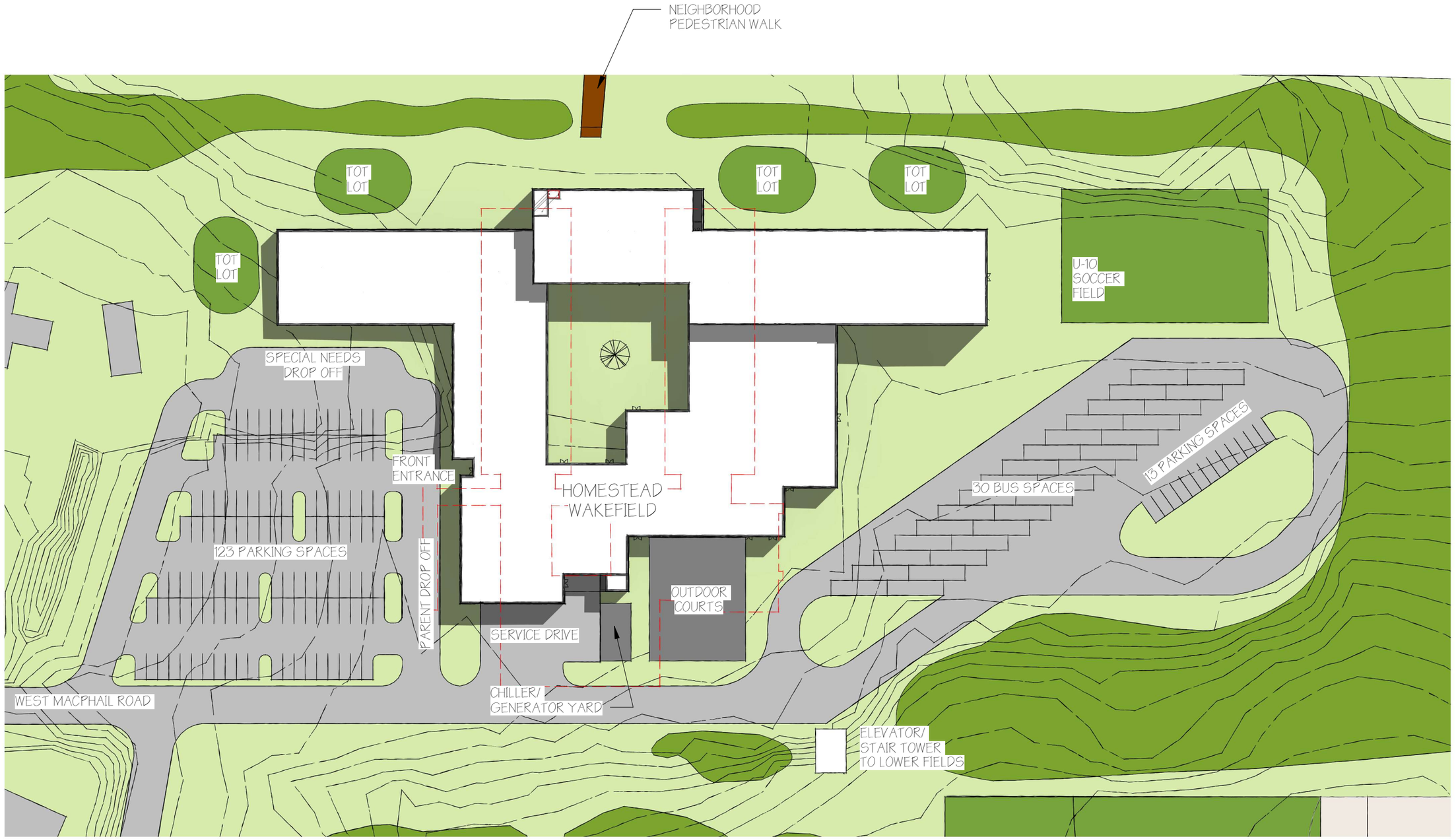
- New construction energy efficient, ADA accessible and Code compliant.
- Administration has view of parent drop-off, control of main entry with secure vestibule.
- Layout organized around a courtyard which preserves existing large oak tree.
- Two story classroom wing includes 3rd-5th grades on upper level.

Gross Building Area	119,600 SF
Net Program Area	85,180 SF

Approximate Project Construction Costs	$46,438,722

Comments

- This option was developed in response to Committee review and comments of the previous options.
- Two-story compact plan maximizes daylight to regularly occupied instructional areas.
- Facility layout is well suited to secure portions of the building for after-hours activities.
- Tot lots are adjacent to residences at the south property in lieu of traffic lane.
- Pedestrian path from Chatham is maintained without crossing traffic lanes.
- Students will have to access larger play areas by crossing the bus drive. This can be controlled after initial arrival.
- This option best addresses educational program adjacency goals.



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HARFORD COUNTY
PUBLIC SCHOOLS

REPLACEMENT - OPTION 3 - SITE PLAN

HOMESTEAD- WAKEFIELD FEASABILITY STUDY

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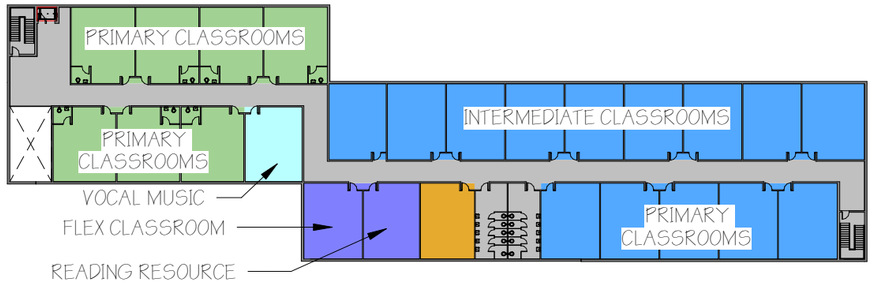

SECOND FLOOR

FIRST FLOOR

COLOR LEGEND

- PRE-K / SPECIAL NEEDS CLASSROOMS
- KINDERGARTEN CLASSROOMS
- PRIMARY CLASSROOMS
- INTERMEDIATE CLASSROOMS
- ART
- MUSIC
- PHYSICAL EDUCATION
- SPECIALIST AREAS
- MEDIA CENTER
- FOOD SERVICES
- ADMINISTRATION / TEACHER PLANNING
- HEALTH SUITE / STUDENT SERVICES
- CORRIDOR / RESTROOM / MECHANICAL

0' 10' 25' 50' 100'

HARFORD COUNTY PUBLIC SCHOOLS

REPLACEMENT - OPTION 3 - FLOOR PLANS

HOMESTEAD- WAKEFIELD FEASABILITY STUDY

BCA Banta Campbell ARCHITECTS, INC.

SQUARE FOOT COST ESTIMATES

OPTION 1 MODERNIZATION/ADDITION

Gross Building Area	126,100 SF		
Net Program Area	85,180 SF		
Site Work	$400,000/Acre x 11.54 Acres	$4,616,000	
Mass Demolition	57,213 SF x $9/SF	$514,917	
Renovation Demolition	58,245 SF x $6/SF	$349,470	
Renovation Construction	58,245 SF x $300/SF	$17,473,500	
New Construction	67,855 SF x $341/SF	$23,138,555	
Total Project		**$46,092,442**	($365/SF)

OPTION 2 REPLACEMENT

Gross Building Area	114,600 SF		
Net Program Area	85,180 SF		
Site Work	$400,000/Acre x 11.54 Acres	$4,616,000	
Mass Demolition	115,458 SF x $9/SF	$1,039,122	
New Construction	114,600 SF x $341/SF	$39,078,600	
Total Project		**$44,733,722**	($390/SF)

OPTION 3 REPLACEMENT – RECOMMENDED OPTION

Gross Building Area	119,600 SF		
Net Program Area	85,180 SF		
Site Work	$400,000/Acre x 11.54 Acres	$4,616,000	
Mass Demolition	115,458 SF x $9/SF	$1,039,122	
New Construction	119,600 SF x $341/SF	$40,783,600	
Total Project		**$46,438,722**	($388/SF)

***Please note, all estimated provided above are based on the recommended State Rated Capacity of 1,129 students.*

CONCLUSION AND RECOMMENDATION

Several factors contributed to the HWES Scope Study Committee and Superintendent recommendation.

SINGLE FACILITY EFFICIENCIES

- The Homestead Wakefield Elementary Replacement School will be most efficient as a single building facility – educationally, security and system functions.
- Construction at the Wakefield portion of the site allows continued use of the Homestead Building and Modular Classrooms during construction avoiding a phased occupied construction sequence.
- Operational Efficiencies will include a single kitchen, nurse, media center, main office and central facility plant.

CAPACITY ISSUES

As part of this project, FLO Analytics has partnered with Banta Campbell Architects to update the Scope Study for the Homestead/Wakefield Elementary School Project. Homestead/Wakefield Elementary School is over capacity and forecasted to increase in enrollment over the next few years. This school is also located within the County's growth envelope. FLO Analytics evaluated three potential State Rated Capacities (SRC), 811, 988, and 1,129 for the Homestead/Wakefield Elementary School. The evaluation looked at the options along with the capacities and enrollments of the surrounding elementary schools. At the Board of Education's discretion, based on the forecasted growth in this area, increasing needs for special education and pre-kindergarten programs, the recommended SRC for the Homestead/Wakefield Elementary School Replacement project is 1,129 students.

REPLACEMENT VS MODERNIZATION/ADDITION

- The existing Wakefield Building is 63 years old. The building has endured water infiltration and damage at perimeter walls, foundation, and crawl space; all of which will need repair.
- Existing facilities are not fully up to date with modern, energy efficient systems or high tech teaching aids.
- Any increase in area of the Wakefield Building requires upgrade/replacement of all existing systems including those that had been recently upgraded.
- Difference in cost of less than 1% between options merits the Replacement option and building a new facility for the next fifty years.

Recommendation - Option #3, with a gross square footage of 119,600 and SRC of 1,129.

This option is to completely replace the Homestead/Wakefield Elementary School on the site of the Wakefield building and demolish the existing facilities. The recommended option provides the best overall value considering cost, energy efficiency, life cycle, and providing the most efficient educational facility.

SCHEDULE TIMELINE

Submit for State Planning approval ..... October 2020

HCPS School Board approval of updated Scope Study ..... February 22, 2021

Educational Specification approved by HCPS School Board ..... June 2021

Educational Specification to MSDE ..... June 2021

Construction Manager Selection approved by HCPS School Board ..... June 2021

Schematic Design approved by Harford County Public Schools Board August 2021

Schematic Design Submission the IAC ..... August 2021

Design Development Submission to the IAC ..... October 2021

Construction Documents Submission to IAC ..... February 2022

Advertise for Bids ..... April 2022

Bids Received ..... May 2022

Board of Education Approves Award
of Construction Contract ..... May 2022

Approval of Contract Award Form 303.3 Submission to IAC ..... June 2022

Construction Notice to Proceed ..... June 2022

Complete Construction ..... August 2024

CODE CONSIDERATIONS

The following current codes are applicable to this project:

Building Codes:	2018 International Building Code Harford County Local Amendments Bill 15-009
	2018 International Mechanical Code
	2018 International Energy Conservation Code
	2018 International Existing Building Code
	2017 National Electric Code Harford County Local Amendments Bill 14-005
	2018 International Plumbing Code Harford County Local Amendments Bill 15-007
	2018 International Fuel Gas Code
Fire Code:	2018 NFPA 101 Life Safety Code
Accessibility Code:	Maryland Accessibility Code COMAR 09.12.53 1991 ADA Americans with Disabilities Act

CIVIL ENGINEERING NARRATIVE

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EXISTING SITE CONDITIONS

CIVIL ENGINEERING AND LANDSCAPE ARCHITECTURE REPORT – SITE RESOURCES, INC.

1.1 SITE DESCRIPTION

Homestead Wakefield Elementary School is located at 900 South Main Street (Maryland Route 924) in the Town of Bel Air, Maryland. The 11.53± acre site is owned by the Harford County Board of Education (BOE) and is located at the intersection of South Main Street and West Macphail Road in central Harford County. There are three (3) separate buildings on the campus; the Wakefield school, the Homestead school, and a remote kindergarten building. Per recorded Maryland Real Property data, the site is Parcel 224 located on Tax Map 49 and is recorded among the land records of Harford County, Maryland in Liber 459 at Folio 238. The site is bounded by Bel Air Middle School to the northwest, South Main Street to the northeast, and residential properties to the southwest and southeast. The Homestead school is located nearest to Bel Air Middle School while the Wakefield school and remote kindergarten buildings are located further south.

Wakefield School Building

Homestead School Building

The Wakefield and Homestead school buildings were built in 1958 and 1966, respectively. Renovations and additions were made to both school's media centers in the mid 1990s. In 1968, a remote kindergarten building was constructed near the Wakefield school building.

The site is comprised of three school buildings, paved driveways and parking areas, four (4) hard court play surfaces, multi-purpose athletic fields including one (1) softball field and two (2) small baseball fields, and six (6) playgrounds.

There is a masonry site wall located near the loading dock are of the Wakefield school. This wall is in fair condition, however, there is some minor cracking that will likely require maintenance or replacement. There is also a timber site wall located between the hard surface play courts and the southeast side of the Homestead building. This wall is also in fair condition and may require maintenance or replacement.


Masonry Site Wall


Timber Site Wall

1.2 SITE CIRCULATION AND PARKING

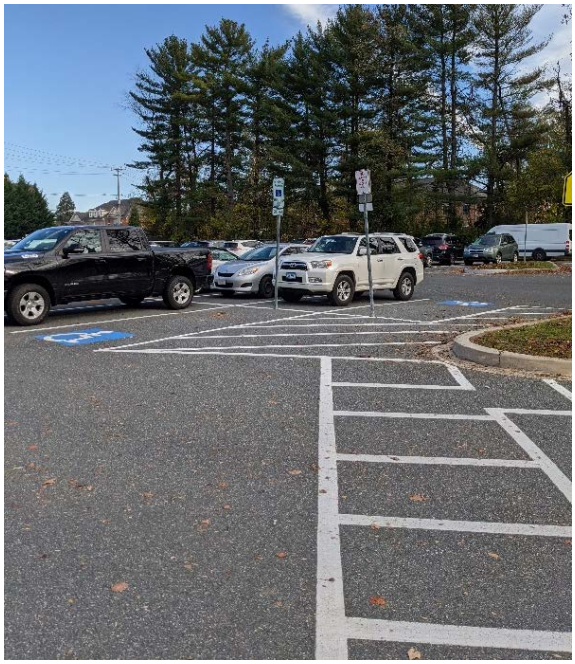
On the northwest side of the site, a 27 foot paved driveway serves as the main vehicular access point to the school property from the intersection of Maryland Route 924 and Macphail Road. The intersection of Maryland Route 924 and Idlewild Street serves as a secondary vehicular access point to the schools as there is a 27 foot access drive that connects Idlewild Street to the main driveway to the elementary schools. This access drive is also shared with Bel Air Middle School and provides overflow parallel parking.

Driveway loops are provided in front of the main entrances to both the Homestead and Wakefield schools where students are dropped off by both buses and parents. On the northeast side of the Homestead school building there are 49 marked parking spaces including three (3) marked handicap accessible spaces. According to the current Code of Maryland Regulations (COMAR), parking lots with a total of 26 to 50 parking spaces are required to have a minimum of two (2) handicap accessible spaces including one (1) van accessible space.

On the northeast side of the Wakefield school building there are 76 marked parking spaces including four (4) handicap accessible spaces. According to the current Code of Maryland Regulations (COMAR), parking lots with a total of 76 to 100 parking spaces are required to have a minimum of four (4) handicap accessible spaces including one (1) van accessible space. The quantities of accessible spaces in both existing parking lots meet the above requirements; however, the spaces are not currently up to code. For instance, some spaces do not have access aisles. Additionally, bollards are recommended for the handicap parking signs to prevent damage.

The asphalt paving is in poor condition in some areas throughout the site and may require replacement. There is cracking and pavement failure in the larger areas of asphalt such as parking lots and major deterioration in areas of asphalt walks. Replacing asphalt walks with concrete is recommended. Additionally, there are areas of curb and gutter that are in poor condition and may require replacement.

Pedestrian access is provided to the site from the adjacent neighborhoods via paved or gravel walks leading to play areas as well as the school buildings. Many of these walks may not be compliant with current ADA standards and will require updates to ensure accessibility to all site features. Several walks throughout the site are in poor condition and will likely require replacement to maintain safe and adequate pedestrian access.


Wakefield Parking


Homestead Parking

1.3 ZONING INFORMATION

The parcel is located in the Town of Bel Air and zoned R-3, High Density Residential.

BULK ZONING REGULATIONS

Minimum lot size	15,000 square feet
Maximum height	40 feet
Minimum width at front building restriction line	100 feet
Minimum set back from adjacent residential lot	10 feet
Minimum setbacks for principal structures:	
Front lot line	30 feet
Rear lot line	40 feet
Side lot lines	20 feet

The existing schools seem to meet the above Bulk Zoning Regulations.

PARKING REQUIREMENTS

- Vehicular Parking: 1 per 10 seats in main assembly room or 1 per 10 classroom seats, whichever is greater.
- Bicycle parking: Bicycle parking facilities shall be provided for all nonresidential parking areas designed for 25 or more vehicles. This shall include at least one bicycle rack.

For school uses located within the R3 district a Special Exception is required and further discussion with the Town of Bel Air is necessary to determine if a Board of Appeals process will be required for any proposed improvements. Compliance with the conditions of approval outlined in Article XII Section 165-93 of the Town of Bel Air Zoning Code is required for any development. These conditions may include but are not limited to:

a) Prohibition against outside signs or advertising structures, except professional or directional signs.
b) Limitation of signs as to size, type, color, location or illumination.
c) Specification of the amount, direction and location of outdoor lighting.
d) Number and location of off-street parking and loading space.
e) Requirements related to the building construction, design and materials, including, but not limited to, roof design, building connection and disconnection with other units, location of exits, doors and windows and cleaning or painting of building.
f) Requirements related to paving, shrubbery, landscaping, ornamental or screening fences, walls and hedges.
g) Specification of permitted hours of operation.
h) Prohibition of structural changes.
i) Requirements related to the control and elimination of smoke, dust, gas, noise or vibration caused by the use.
j) Requirements for termination of a use, based on a lapse of time, as permitted by law.
k) Specification of required improvements to ingress and egress.
l) Specification of required improvements to street frontage.
m) Requirements of specific fire and safety improvement.
n) Requirements for improvements to intersections adjacent to the proposed development.

The Board of Appeals process in the Town of Bel Air for a Special Exception requires a Concept Committee meeting and a Public Hearing before the Board of Appeals. A Board of Appeals application, fee per the latest fee schedule, annotated checklist addressing all applicable requirements, list of all adjoining property owners, justification narrative, and Site Plan are required to be submitted at least four (4) weeks prior to the scheduled public hearing. The Board of Appeals will review the Site Plan and grant approval with conditions (if any) for the use within approximately three to four months.

1.4 SITE SOILS

According to information provided by the USDA-NRCS Wen Soil Survey, six (6) soil types exist on the property including:

AdB – Aldino Silt Loam, (3-8% slopes), Moderate Erodibility

NeB2 – Neshaminy Silt Loam (3-8% slopes), Moderate Erodibility

WaA – Watchung Silt Loam (0-3% slopes), Severely Hydric

AsB – Aldino Very Stony Silt (0-8% slopes), Moderately Hydric

CcC2 – Chester Silt Loam (8-15% slopes), Moderate Erodibility

CcB2 – Chester Silt Loam (3-8% slopes), Moderate Erodibility

Hydrologic soil groups are rated "A" through "D" indicating a range of good to poor infiltration properties. "A" type soils have the best infiltration while soils rated as "D" have the worst. Hydrologic soil group classifications are important variables used when stormwater engineers determine the types of environmentally-sensitive design (ESD) alternatives that are practical for a given site. The majority of this site falls within the "B" and "C" hydrologic soil groups. This means the overall site has moderate to poor infiltration rates and any SWM practice will likely require underdrains pending a geotechnical study. Geotechnical borings are the best technique for documenting existing subsurface conditions because they more precisely identify soil types, infiltration rates, water table levels, and geologic anomalies. A thorough geotechnical study is recommended for any proposed development.

1.5 SITE TOPOGRAPHY

The Homestead Wakefield Elementary School property generally drains from east to west. The topography of the site contains relatively flat areas in the athletic fields and play areas and steeply sloped forested areas. The elevations within the school property ranges between 318 to 380 feet above sea level. The high points of the site are located at the eastern property line near East Macphail Road and at the southern-most property corner adjacent to the Wakefield Meadows subdivision. The low point is along the western corner of the site.

1.6 UTILITIES

The Maryland American Water Company provides water services for both the Homestead and the Wakefield school buildings. Per Water Contract No. 6512, a 16" water line runs between the two schools in a 25' drainage and utility easement from Maryland Route 924 to Maryland Route 24. Sheet 3 of Water Contract No. 6512 seems to suggest that a separate 6" water service that runs in West Macphail Road serves both the Wakefield and the Homestead Schools. This 6" water service connects to an 8" water service that runs in the public right of way of Maryland Route 924.

A water main extends west from the intersection of Maryland Route 924 and Macphail Road that provides water and fire service to the elementary schools. This water main branches off the Harford County owned water main that runs along South Main Street. It is assumed that the existing water meter for both school buildings are provided within the buildings. Two fire hydrants are provided on the north and west sides of the Wakefield School as well as two on the northwest and northeast sides of the Homestead School. There is also an additional fire hydrant located southeast of the existing hard surface courts that are southeast of the

Homestead building. This fire hydrant is located within an existing 35' drainage and utility easement for the existing water line and fire hydrant.

Gas mains, fiber optic, overhead electric lines, and utility poles exist on site. Existing utilities may need to be relocated or upgraded depending on the proposed layout of the site. An existing 15' BGE easement for overhead wires runs parallel to the existing 35' drainage and utility easement noted above. Additionally, some low hanging overhead wires may need to be relocated for construction purposes. Per BGE drawing 11G121, there is an underground electric service that runs in West Macphail Road that serves both the Homestead and Wakefield school buildings.

An existing, public 8" terracotta sanitary sewer main serving the Wakefield school runs through the athletic field southwest of the Wakefield building. It runs off-site and wraps around the southwest property line until it eventually runs to the northeast between the Homestead building and Bel Air Middle in an existing 50 foot sanitary easement. An existing 6" terracotta sanitary sewer serving the Homestead building exits the building on the northeast side and then runs to the northwest towards the public main. The public main then runs to a lift station and force main that runs to the northeast. Video inspection of these terracotta sanitary sewer lines is recommended to confirm the condition. Replacement or upgrade to PVC pipe during construction may be required to ensure the functionality of the sewer.

The existing school buildings are guttered with leaders feeding into the existing storm drain system. The surrounding parking lots and paved athletic courts drain to inlets, which also feed into the existing storm drain system. There are several locations where overland flow drains to a concrete or PVC culvert pipe under a walkway; however, many of these locations do not provide adequate cover over the pipes. Regrading of these areas is recommended in order to remove these culvert pipes and allow overland drainage to safely flow away from walkways and toward nearby inlets or swales. A 30 inch to 36 inch RCP storm drain collects runoff from speculated off-site wetlands along the north property line and runs through the site in between Homestead Elementary School and Bel Air Middle School collecting the on-site drainage before it outfalls near the western corner of the site. This existing storm drain main may require relocation or maintenance and repair. It is essential that this system be videoed for maintenance issues to determine whether it is viable to remain in place, and analyze adequate capacity. This system runs within a 50 foot drainage and utility easement. The athletic fields drain overland to this same location, which eventually flows into Plumtree Run to the west of the site.


Typical Culvert Pipe lacking cover


Conveyance of Overland Flow

1.7 STORM WATER MANAGEMENT (SWM)

The current MD stormwater management regulations were not required at the time these schools were built and the renovations and additions have not been extensive enough to require installation of quality or quantity SWM. However, per Harford County SWM drawing number 180596, a bioretention retrofit was installed in between the Wakefield and Homestead schools just southeast of the existing basketball courts in 2018 to solve an erosion problem per record documentation received from Harford County Department of Public Works (DPW). This facility currently collects drainage from approximately seven (7) acres of area surrounding and within the Wakefield Elementary School property. A preliminary meeting with Harford County DPW will be required in order to confirm the extent of treatment provided by this existing SWM facility. Any significant renovations or development of this site will require quality and quantity management in order to meet the new regulations adopted by the State of Maryland in 2009.

The site is divided between two watersheds: Bynum Run / James Run and Winters Run and is subsequently divided into two main points of investigation (POIs). The majority of the site drains to the Winters Run watershed on the west side of the site (POI 1). A small portion of the site behind the Wakefield and remote kindergarten buildings drains to the southeast towards the Bynum Run / James Run watershed (POI 2). Environmental Site Design (ESD) practices must be implemented to the maximum extent practicable (MEP) to provide sufficient water quality and recharge provisions. This ESD methodology encourages the use of small-

scale stormwater practices and nonstructural techniques, conserving natural drainage patterns, and minimizing impacts of land development on water resources. Micro-scale practices will be provided for each POI as necessary to meet water quality requirements.

SWM will be provided on site to comply with the "Stormwater Management Act of 2007" (Act) and the Maryland Stormwater Management Guidelines for State and Federal Projects, February 2015.

The SWM design must include the following aspects:

- Water quality control (WQv) to limit pollutants in stormwater runoff. Impervious surfaces located within the project site will require treatment
- Groundwater recharge volume to approximate existing hydrologic conditions
- Channel Protection volume storage to prevent deterioration of downstream channels and erosion
- Manage the ten-year peak discharge to pre-developed conditions

Existing Stormwater Management Facility

1.8 FLOODPLAINS, WETLANDS, AND WATERWAYS

There is no 100-year floodplain on site delineated on FEMA FIRM map 24025C0163E or FEMA FIRM map 24025C0164E. An existing ephemeral stream on the northern most corner of the site collects drainage from neighboring properties. The onsite storm drainage system then conveys that water along with the site drainage to a perennial stream located on the western side of the site. This stream eventually flows into the main branch of Plumtree Run off-site. Additionally, the on-site athletic fields and courts behind Homestead Elementary drain overland to this perennial stream into Plumtree Run.

End Wall Outfall into Plumtree Run

1.9 LANDSCAPE, TREES AND FOREST CONSERVATION

The school site is surrounded by wooded areas. These wooded areas contain both large and small diameter trees with areas of moderately thick understory. American Beech, Tulip Poplar, and Red Maple are some of the tree species. Mitigation will be required for any impact within the critical root zone of a specimen tree (30" or larger) during construction.

There are no State or Federal records of rare, threatened or endangered species within the boundaries of the project site per the Maryland Natural Heritage Program report.

The proposed development will likely require a Forest Stand Delineation Plan, Forest Conservation Plan and potentially an Environmental Impact Assessment Report if the proposed development impacts any environmentally sensitive areas onsite.

Every development within the Town of Bel Air shall provide sufficient screening when the Planning Commission determines that there is a need to shield neighboring properties from any adverse external effects of a development or to shield the development from negative impacts of adjacent uses (Article VIII Section 165-67 of the Town of Bel Air Zoning Code). Specific screening requirements for the proposed development shall be determined during the design process.


Potential Specimen Oak Tree in existing courtyard


Wooded area located between the school buildings

1.10 PLAY STRUCTURES / ATHLETIC FIELDS / ATHLETIC COURTS

Wakefield building has a total of three (3) and Homestead building has a total of two (2) playgrounds that are located closer to the buildings. Playground equipment and surrounding chain link fence appear to be very old and in poor condition. The playground surfacing is engineered wood fiber and both the surfacing and timber edging needs to be replaced to meet the National Recreation and Park Association (NRPA) and ADA requirements.

There are two baseball fields located on the south side of the site but have no direct pedestrian pathway connection to the school entrances. One softball field is located on the south side and is accessible from West Macphail Road. Metal bleachers are in good condition; however, they are not currently ADA accessible.

Two basketball courts on the southeast side of the Homestead building has asphalt surfacing and chain link fence. The courts appear to be in decent condition and relatively new; however, there is not an accessible route to the courts.


Wakefield Playground


Homestead Playground

1.11 SITE SECURITY

Site lighting is a primary security consideration, and for this property, there is a limited amount of site lighting throughout the site. Mainly provided within the parking areas. It is recommended that site lighting be provided throughout the site to increase visibility and site security. Security cameras are visibly mounted on multiple locations on the school buildings. It is recommended these cameras be maintained or a new security system installed as part of the proposed development.


Site Lighting


Security Cameras

1.12 SITE SIGNAGE

A large masonry monument sign is provided at the main vehicular entrance to both schools. Signage directs vehicular traffic to the designated bus and parent drop-off driveway loop at the Wakefield School. There are various parking signs designating specific times of day where parking is not permitted. There are several signs throughout the site that prohibit skateboarding and roller blading on the school property. A large sign is provided directing vehicular traffic to the locations of the Wakefield Building, the Homestead Building, and Bel Air Middle School. Some of the existing signage may require replacement due to poor condition. In addition to maintaining or replacing the existing site signage, additional signage will be required to designate handicapped accessible routes to the building and related facilities.

Main Entrance Signage

Signage Requiring Replacement

Wakefield Drop-off Loop Signage

Building Location Signage

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PROPOSED SITE CONDITIONS

CIVIL ENGINEERING AND LANDSCAPE ARCHITECTURE REPORT – SITE RESOURCES, INC

1.1 SITE DESCRIPTION

The proposed option is to replace the existing Homestead and Wakefield school buildings with a single two-story building. The proposed school will be in the same location as the existing Wakefield school. A large overflow parking lot will be provided in the location of the existing Homestead school.

A multi-purpose athletic field, outdoor courts, outdoor classroom areas, and four tot lots will be provided adjacent to the school. A service drive with utility connections to the building will be provided northwest of the school. Two (2) additional multi-purpose athletic fields and two (2) ball diamonds will be located adjacent to the large overflow parking lot. A retaining wall will likely be required along a portion of the drive aisle to the bus parking lot.

1.2 SITE CIRCULATION AND PARKING

The primary vehicular access point to the school grounds will continue to utilize the 27 foot paved main driveway from the intersection of Maryland Route 924 and West Macphail Road. The 27 foot access drive connecting Idlewild Street to the main driveway will continue to provide secondary access to the new school as well as the overflow parking lot and athletic fields.

A parking lot with approximately 123 parking spaces will be provided north of, and directly adjacent to, the school and will incorporate a parent drop-off and a special needs drop-off loop wrapping around the parking lot. An additional parking lot will be provided southwest of and directly adjacent to the school, which will include a bus loop, 13 parking spaces, and 30 bus parking spaces. According to the current Code of Maryland Regulations (COMAR), parking lots with a total of 101 to 150 parking spaces are required to have a minimum of five (5) handicap accessible spaces including two (2) van accessible spaces. The required amount of accessible spaces and accessible routes will be provided as part of the proposed design.

Pedestrian access will be primarily via a neighborhood path from the adjacent neighborhoods to the rear of the school where the tot lot and outdoor classroom areas are proposed. 10’ wide paved walks are recommended adjacent to all drop-off areas with paved walks leading to the school entrances. Specialty paving plaza areas are recommended at the main entrances to the school. The design team suggests proposing paved walks to wrap around the school connecting the front of the school to all outdoor spaces. A 5’ paved “nature trail” wrapping around the outer perimeter of the parking lots and school is also recommended to amplify the outdoor learning environment for the students.

1.3 ZONING INFORMATION

The proposed new school appears to comply with previously noted Bulk Zoning Regulations. The parking lots as proposed meet vehicular parking requirements mandated by the Town of Bel Air. Bicycle parking facilities will be provided on site to meet the Town of Bel Air bicycle parking requirements. A concept meeting with the Town of Bel Air will be held at the project onset to determine if any Special Exception or Board of Appeals processes are required. It is recommended that an experienced land development attorney be hired to guide the special exception or Board of Appeals process.

1.4 SITE TOPOGRAPHY

The Homestead Wakefield Elementary School property will continue to generally drain from east to west. The topography of the site will remain approximately the same in the proposed conditions. A retaining wall will be required to make up grade west of the drive leading into the bus parking lot. The high points of the site will remain at the eastern property line near East Macphail Road and at the southern-most property corner adjacent to the Wakefield Meadows subdivision. The site low point will remain along the western corner of the site. The site will be graded to maintain or reduce drainage offsite, in particular any portion of the site draining to existing residential properties.

1.5 UTILITIES

The project's plumbing engineer will review the proposed building water flow demand to determine if a water service and meter upgrade is required. If the existing assumed 6" service and meter is adequate per the plumbing engineer's calculations, then it is possible no upgrades will be required. However, since both schools are being consolidated into one building, it is probable a meter and water service upgrade will be required. It is possible a water service upgrade can come directly from the existing 16" water line immediately west of the existing Wakefield Building. Alternatively, the onsite 6" service would require upsizing out to the existing 8" water main in MD route 924. Further coordination with the Town of Bel Air and potentially Harford County Water and Sewer will be required to confirm capacity and connection location for upgrading the onsite water service. Existing fire hydrants will need to be maintained or relocated in order to provide adequate fire service for the building. The proposed design for fire hydrants and fire access roads will be reviewed by the local fire department and the Town of Bel Air for comment and acceptance.

There are existing gas mains, fiber optic, overhead electric lines, and utility poles on site that will service the proposed building. Some low hanging overhead wires may need to be relocated for construction purposes and may either require pole heightening or relocation. The project's electrical engineer will coordinate with Baltimore Gas & Electric as necessary during design. The gas, electric and water service will enter the building in the area of the proposed service drive just off West Macphail Road where these services connect to the current building. A sanitary grease trap, two (2) generators, and a transformer will also be provided in the area

of the service drive. The sanitary service will come from the building in the service drive area and turn south toward the bus parking lot to tie into the existing 8" sanitary sewer service that outfalls to the south. Video inspection of these existing, terracotta sanitary sewer lines is recommended to confirm the condition. Replacement or upgrade to PVC pipe during construction may be required. The project's plumbing engineer will confirm whether the existing 8" sanitary service size is adequate or if an upgrade is required.

The proposed school will have roof drain leaders that drain to several micro stormwater management facilities. The parking areas and other paved areas will drain to inlets that will also drain directly to micro stormwater management facilities. The overflow parking lot on the lower portion of the site will also drain to several micro stormwater management facilities. Once treated, drainage from the entire site will eventually outfall in the western corner of the site towards Plumtree Run as it does in the existing conditions. The existing 30 inch to 36 inch RCP that collects runoff from speculated off-site wetlands will remain and may require maintenance and repair. This storm drain system should be video inspected to determine whether it will require maintenance, repair, or replacement.

1.6 STORMWATER MANAGEMENT (SWM)

Per the latest SWM regulations set forth by the Maryland Department of the Environment and Harford County, SWM treatment must be provided via micro SWM facilities onsite. It is estimated that 15-16 such micro facilities located throughout the site will be required to meet the SWM regulations. An existing bioretention retrofit between the existing Wakefield and Homestead schools currently collects drainage from approximately seven (7) acres of area surrounding and within the Wakefield Elementary School property. A preliminary meeting with the Town of Bel Air and Harford County DPW will be required in an effort to confirm the extent of treatment provided by this existing SWM facility and how it may potentially offset the amount of proposed SWM facilities required.

Current SWM regulations require that proposed developments provide management of the ten-year storm event peak discharge as compared to existing conditions. If the project overall results in the removal of existing impervious area such as pavement and building, this requirement may be accomplished within the proposed micro SWM facilities alone. However, if there is an increase in overall impervious area, it is highly probable an onsite SWM quantity facility such as an underground detention chamber or SWM pond will be required.

1.7 FLOODPLAINS, WETLANDS, AND WATERWAYS

The existing ephemeral stream on the northern most corner of the site that collects drainage from neighboring properties will remain undisturbed by the proposed development. The onsite storm drain system that conveys this drainage along with on-site drainage to the perennial stream located on the western side of the site will also remain pending video inspection confirms the adequacy and soundness of the storm drain system. Some

storm drains adjacent to the existing Homestead school may be removed or relocated as necessary with the development of the proposed overflow parking lot and field areas. The stream will continue to flow into the main branch of Plumtree Run off-site as it does in the existing conditions.

1.8 LANDSCAPE, TREES AND FOREST CONSERVATION

The existing wooded areas throughout the site will be preserved and protected where possible. Any trees to remain that are adjacent to site construction activities should be assessed by a licensed arborist to determine the health, survivability and recommended mitigation practices. This especially applies to the existing large oak tree to remain in the proposed courtyard area. Mitigation in the form of reforestation planting will be required for such impacts to the critical root zones of specimen trees (30" or larger).

The proposed development will require a Forest Stand Delineation Plan and Forest Conservation Plan. The proposed development does not appear to be impacting any environmentally sensitive areas onsite that would necessitate an Environmental Impact Assessment Report; however, this requirement will be determined by the Town of Bel Air's planning department during design.

Proposed plantings will be provided to match the existing conditions and those indigenous to the area. A landscape plan will be provided and will meet current Town of Bel Air regulations for planting count and screening requirements. Similarly, SWM facilities will have a separate planting plan reviewed and approved by the Town of Bel Air and Harford County SWM. In general, plant material will be selected and arranged to augment adjacent native ecosystems while providing aesthetic complement to the building and outdoor spaces. The design team recommends utilization of plant material to complement educational programing elements such as ecology, pollination and stormwater management.

1.9 PLAY STRUCTURES / ATHLETIC FIELDS / ATHLETIC COURTS

A total of four (4) tot lots are proposed for the new school. All of these areas will be along the back of the school nearest to the neighborhood path leading to Chatham Road. Tot lots will be designed to meet the National Recreation and Park Association (NRPA) and applicable universal accessibility requirements. Integrating outdoor classroom areas near the tot lots is recommended. One (1) multi-purpose athletic field is proposed adjacent to the school on the upper portion of the site. One (1) outdoor court area is also proposed adjacent to the school near the service drive. Additionally, two (2) multi-purpose athletic fields and two (2) softball diamonds are proposed on the lower portion of the site adjacent to the large overflow parking lot. Paved accessible paths will be provided to all tot lots, outdoor classrooms, and athletic fields.

1.10 SITE SECURITY

Site lighting is a primary security consideration and is recommended throughout the site to promote visibility and site security. It is suggested light poles be installed at 25' intervals along desired paths. Installing security cameras around the building is also recommended to promote site security.

1.11 SITE SIGNAGE

The existing masonry monument sign adjacent to the main vehicular entrance may remain, however, site design and construction may require its replacement . Updated and relocated signage will be required to direct vehicular traffic to the designated bus and parent drop-off areas. Signage will also be required to prohibit skateboarding and roller blading on the school premise. Additional signage will be required to designate handicapped accessible routes to the building and related facilities. Opportunities for outdoor classroom and SWM facility educational signage will be explored during the design process.

STRUCTURAL ENGINEERING CONDITIONS NARRATIVE

Harford County Public Schools
Homestead/Wakefield Elementary Schools
Belair, Maryland
Conditions Survey/ Feasibility Study
December 2020

Homestead Elementary School

The school was constructed in the late 1960's and has one addition which was constructed in the late 1990's. The original school and the addition are single story buildings generally framed with open web steel joists and wide flange beams that are supported primarily on masonry bearing walls. The superstructure of the building is supported on reinforced concrete footings.

Structural Systems Description

The original school was constructed per drawings S1-S6 dated September 29, 1964 prepared by Van Rensselaer P. Saxe Structural Engineers. The addition was constructed per drawings S1-S6 dated May 27, 1997 prepared by Frederick Ward and Associates.

The foundation plans for the original school indicate that the structure is supported on reinforced concrete footings that were designed for a bearing capacity of 6000 psf. The foundation plan for the addition indicate that the structure is supported on reinforced concrete footings designed for a bearing capacity of 2500 psf.

The first floor of the original school is composed generally of 5" thick slab on grade reinforced with welded wire. There are some areas such as the corridors, the kitchen, and the stage where the first floor is framed with "dox" planks or one way reinforced concrete slabs which are supported on masonry bearing walls. Below the corridors, the structural drawings indicate that there is a mechanical crawl space that extends from the main mechanical room to the rest of the building. The first floor of the addition is composed of a 5" thick slab on grade reinforced with welded wire.

The roof framing in general at the original school is generally composed of 3" thick insulating roof planks supported by open web steel "H" series joists and beams typically spaced at 4'-0" on center that are supported by steel beam girders and masonry bearing walls. The roof framing at the addition is composed of a 1.5" metal roof deck supported by open web "K" series joists and beams that are supported by steel beam girders and masonry bearing walls.

The exterior and interior building walls at the original building are composed of 4" brick and 8" hollow masonry and of 8" hollow masonry, respectively. The exterior and exterior walls at the addition are composed of 4" brick + 2" airspace + 8" reinforced masonry and 8" reinforced masonry, respectively.

Existing Design Loads

The existing structural drawings indicate that the existing building was designed for the following live loads:

Roof	30 psf
Classrooms	60 psf
Corridors	100 psf
Slabs on Grade	100 psf

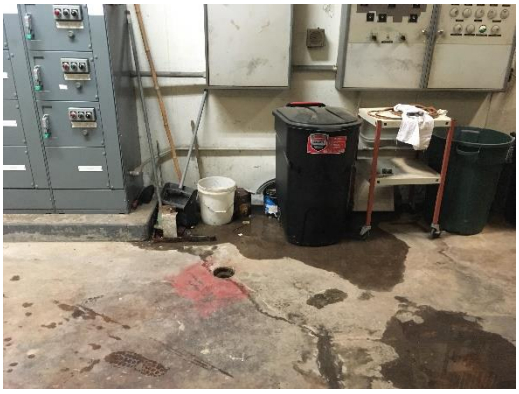
Site Observations and Existing Conditions

A structural condition survey was conducted by Columbia Engineering, Inc. the 13th of November 2020. The survey performed was a limited visual observation of exposed to view structural components as well as a visual observation of the exterior building walls.
The following are observations noted during our visual inspections:

INTERIOR

Only a few roof faming members were exposed to view. The ones that were visually inspected were found to be in good condition and to be in general compliance to the information shown in the structural drawings. The following are items that were noted during the inspection:

- Water infiltration was noted at the north, east and west walls of the main mechanical room. Water was ponding at several section of the slab. Water was also ponding along the equipment pad that support electrical equipment. The water that ponds on the slab has rusted the ends to the stair stringers in the room.



- Settlement of the paving stones at the interior courtyards. This is not structural issue, but the settlement of the paving stones could create tripping hazards.

EXTERIOR

The exterior walls were visually inspected and found to be in relatively good structural conditions. However, minor cracking was noted and a few walls and typically at the all the piers of the entrance canopy. Some loose bricks were noted. Also, there are signs of moisture especially along the upper sections of most walls, there are some damaged and eroded brick joints, and exposed rusting reinforcing at some of the damaged brick joints.
The caulk joints along the precast facia on top of the walls are typically open due to a failure of the caulk material. The following are examples of the items that were noted during the inspection:

- Cracked masonry at the walls of the boiler stack. These propagate from the corners of the steel access doors. The cracks are probably due to a combination of minor settlement and thermal expansion.

- Cracked piers at the entrance canopy. All the canopy piers have similar cracks. Some of these cracks appear to have been repaired and caulked but the cracks have re-open. There is the possibility that water is getting into the piers which is freezing and cracking the masonry.

- There are a couple of loose bricks over top of piers at the cafeteria. This is probably due to thermal expansion of the steel memebers that bear on the masonry piers.

- Typically, there are signs of moisture along the upper sections of most of the exterior walls. The cause of the moisture is unknow, but it could be from water spilling over from the roof.

- Damaged and eroded brick joints was noted especially at the top sections of the wall where there is evidence of moisture. The constant moisture has probably softened and has caused the joints to deteriorate.

- Some joints have exposed horizontal reinforcing that has begun to rust. This is probably due to the moisture issue. The rusting action causes the reinforcing to expand and crack the mortar in the joints.

- Cracked, damaged and open caulk joints at the vertical joints between the panels and at the bottom of the panels. The caulk appears to have reached its useful life.

Recommended Repairs

The damage observed during the inspection is mostly due to water infiltration and long term exposure to the elements. The damage has not caused major structural issues but if left unattended will lead to expensive structural repairs.

The following are recommended repairs:

- The source of the water infiltration at the main mechanical room need to be determined and addressed as soon as possible. There is the possibility that the existing waterproofing against the basement walls has been compromised or it has exceeded its expected life. If this is the case, then a new waterproofing membrane will need to be installed along the exterior walls.
- The stair stringers that have been damaged by the water ponding at the boiler room must be repaired as soon as possible.
- The cause of the ongoing settlement at the courtyards must be determined and addressed. All pavers that have settled should be reset.

- The cracks at the exterior walls should be repaired by standard repointing methods.
- The cause of the cracks at the entrance piers needs to be determined and addressed as soon as possible. Once this has been done, the cracks should be repaired by routing and sealing these.
- All loose bricks should be repositioned and mortared back into the walls.
- The cause of the moisture along the exterior walls needs to be determined and addressed. Once this is done, the brick should be cleaned, and all the joints should be inspected and repaired as noted.
- All damaged brick joints should be repaired.
- All exposed horizontal reinforcing should be removed, and the affected joints should be then tuck pointed with new mortar.
- All caulk joints along the exterior walls should be cleaned to remove all the old and damaged caulk and then all joints should be then re-caulked with new elastomeric sealant.

Wakefield Elementary School

The school was constructed in the late 1950's and has one addition which was constructed in the late 1990's. The building is a single story building. The original school is divided into an administrative wing and two classroom wings. The administrative wing is located at the north of the building and it contains offices, the main entrance and reception area, the multipurpose room, the kitchen, an interior courtyard, the media center, and the main mechanical room. The administrative area and the classrooms are generally framed with open web steel joists and wide flange beams spaced typically at 4'-0" on center that are supported on steel girders and columns along the exterior and on a combination of steel girders and masonry bearing walls along the interior.
The addition was constructed in the western side of the interior courtyard and is framed with open web joists typically spaced at 4'-0" on center supported by beam and columns.
The superstructure of the original building and the addition are supported on reinforced concrete footings.

Structural Systems Description

The original school was constructed per drawings S1-S5 dated April 15, 1957 prepared by Van Rensselaer P. Saxe Structural Engineers. The addition was constructed per drawings S1-S3 dated January16, 1996 prepared by Frederick Ward and Associates.

The foundation plans for the original school indicate that the structure is supported on reinforced concrete footings that were designed for a bearing capacity of 5000 psf. The foundation plan for the addition indicate that the structure is supported on reinforced concrete footings designed for a bearing capacity of 2500 psf.

The first floor of the original school is composed generally of 5" thick slab on grade reinforced with welded wire. There are some areas such as the corridors, the kitchen, and the stage where the first floor is framed with "dox" planks or one way reinforced concrete slabs which are supported on masonry bearing walls. Below the corridors, the structural drawings indicate that these is a mechanical crawl space that extends from the main mechanical room to the rest of the building. The first floor of the addition is composed of a 5" thick slab on grade reinforced with welded wire.

The roof framing in general at the administrative wing and the classroom wings is composed of 2" thick poured gypsum over a ½" gypsum formboard that span to bulb tees which in turn are supported by open web steel "SJ" series joists and beams that are supported by steel beam girders, tubular columns and masonry bearing walls.
The roof framing at the multipurpose room is composed of 2" poured gypsum over a 1" acoustical formboard that spans to bulb tees which are in turn supported on 12" and 8" deep wide flange beams. The roof beams are supported by 4 rigid frames that span east/west and clear span the floor below.
The roof framing at the addition is composed of a 1.5" metal roof deck supported by open web "K" series joists that are supported by steel beam girders, tubular columns and masonry piers.

The building walls at the original building are typically composed of 8" hollow masonry except at the multipurpose room where these are composed of 4" exterior brick + 8" hollow cmu + 4" interior

masonry. The walls at the addition are composed of 8" hollow masonry. The walls at the classroom wings are typically aluminum curtain wall and these do not appear to be original.

Existing Design Loads

The existing structural drawings indicate that the existing building was designed for the following live loads:

Roof	30 psf
Classrooms	60 psf
Corridors	75 psf
Offices	50 psf
Kitchen	60 psf
Toilets	50 psf
Library	50 psf
Cafeteria	100 psf
Multipurpose room	100 psf

Site Observations and Existing Conditions

A structural condition survey was conducted by Columbia Engineering, Inc. the 13th of November 2020. The survey performed was a limited visual observation of exposed to view structural components as well as a visual observation of the exterior building walls. Below are observations noted during our visual inspections:

INTERIOR

Only a few roof faming members were exposed to view. The ones that were visually inspected were found to be in good condition and to be in general compliance to the information shown in the structural drawings. The following are items that were noted during the inspection:

- Dried soil residue was noted against the north wall of the main mechanical room, at the upper mechanical rooms and especially at the room that provides access to the mechanical crawl space. The soil inside the crawl space was found to be wet, saturated and there were signs of water infiltration into the crawl space. It appears that water in seeping thru the exterior wall of the crawl space and that the water is then overflowing into the main mechanical room and draining into one of the floor drains of the mechanical room

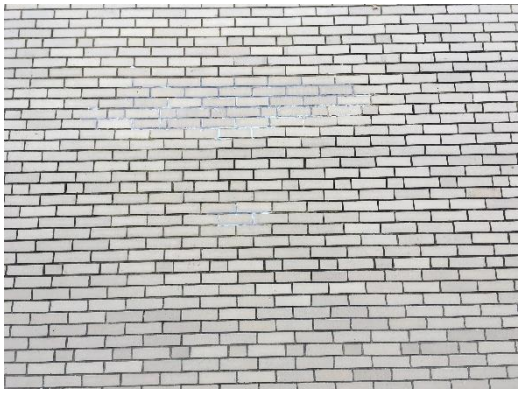
- Signs of water infiltration into the main mechanical room at the bottom of the boiler stack. Water appears to be collecting inside the stack and then coming thru the bottom of the stack wall. The water has begun to rust some of the adjacent pipe supports.

EXTERIOR

The exterior building walls were visually inspected and found to be in good structural conditions except for the loading dock and adjacent site walls. Minor damage to the brick joints was noted especially at areas with signs of water infiltration.
Water for the roof appears to be spilling over the walls of the building. This process has soaked the soffits of the roof overhangs. There are signs of mold on some of the worse affected areas.
There are signs of settlement was noted at the walls near the loading dock. The loading dock walls, and the loading dock slab are damaged and cracked. The site walls adjacent to the loading dock are cracked, appear to be tilting and some of their coping stones have been displaced. Also, the soil against the adjacent building walls is saturated.
Several of the steel columns that support the entrance canopy are rusting at their bases.
Sections of the deck at the small canopies over the exterior doors to the multipurpose room are rusting.

The following are examples of the items that were noted during the inspection:

- Minor damage at exterior brick. There is some damage to the brick joints especially where there are signs of constant moisture in the walls.



- Water from the roof is spilling over the edge especially at the continuous roof overhangs. The water has soaked the soffits at numerous sections of the overhangs. The constant moisture appears to be causing the growth of mold.

- Cracked exterior walls at the loading dock probably due to settlement. The adjacent loading dock walls and slab have been damaged and severely cracked. The adjacent site walls are cracked and damaged.

- Rusted entrance canopy columns. The damage is typically at the base of the columns. Some of the rust appears to be completely thru the sides of the columns.

- Rust damage to the metal deck at the small entrance canopies over the exterior doors to the multipurpose room. The rust is some cases has come thru the metal deck.

Recommended Repairs

The damage observed during the inspection is due to water infiltration, long term exposure to water and the elements and due to minor settlement. The damage noted has not caused major structural issues but if left unattended will lead to expensive structural repairs.

The following are recommended repairs:

- The source of the water infiltration at the main mechanical room need to be determined and addressed as soon as possible. It appears that the infiltration issue is related to the water that appears to be spilling over from the roof and collecting against the exterior walls near the loading dock. This issue must be addressed as soon as possible. Also, the exterior grades must be raised so that any water that happens to spill over the roof is diverted away from the exterior building walls.

- The damaged brick joints along the exterior walls should be repaired by standard repointing methods after the spillover water issue has been addressed.
- The cause of the settlement at the corner of the building near the loading dock will need to be inspected by a geotechnical consultant to determine the cause of the settlement and whether the settlement has subsided or if any remedial geotechnical work needs to be done. Once the geotechnical issues have been addressed, the cracks will need to be repaired and repointed.
- The damaged loading dock wall, loading dock slab and the adjacent stair should be removed and replaced with new.
- The damaged site walls and steps near the loading dock should be removed and replaced with new.
- The spillover water issue over the roof edge must be addressed as soon as possible. The cause of the problem could be due to nearby clogged roof drains or poor roof drainage. All the roof drains should be inspected as soon as possible. The drainage issue should be reviewed by a roofing consultant. Once the water issues have been addressed, the damaged sections of the soffits must be closely inspected. There is the possibility that the constant water issues have damaged the roof deck and that large sections of the roof deck at the overhangs will need to be removed and replaced.
- The cause of the rust at the bases of the canopy piers needs to be determined and addressed as soon as possible. Once this has been done, the lowers sections of the rusted columns will need to be cleaned of all rust and then repaired. There is the possibility that at some of the columns will need to be removed and replaced.
- The roofing and metal deck at the small canopies should be removed and replaced. All flashings at these should be inspected and repaired as needed.

GENERAL STRUCTURAL CONSIDERATION FOR RENOVATIONS

The primary structural concerns associated with renovating the existing buildings are as follows:

- **Removing or modifying masonry walls:**
  Removing or modifying large sections of masonry walls (e.g., making large or numerous openings in a wall) should be limited and if possible, avoided. The existing structural drawings do not indicate how lateral loads are resisted so without further investigation, it can be assumed that all the interior and exterior full-height masonry walls are acting as the primary lateral system for this building. Significant modification to existing walls will trigger a full lateral analysis of the existing building, which can be expected to be inadequate per modern building codes. If inadequate, a new lateral resisting system would be required, and introducing new lateral systems into existing buildings is often very intrusive and costly.

- **New construction over existing framed areas:**
  The existing framed areas, especially those framed with "dox" plank have limited capacity so new walls on these areas should be of lightweight materials to avoid costly reinforcing.

- **Snow drift at new rooftop units or new changes in roof elevation:**
  The original Roof live load is listed as thirty pounds per square foot. Based on a cursory review of the low roof framing adjacent to the high roof, we have determined that the existing low roof structure was not designed for the effects of snow drifting.
  The International Building Code now requires that the designing engineer consider snow drifts at roof elevation changes and against roof obstructions, such as large mechanical units. The International Building Code does not require the existing structure to be analyzed and strengthened for snow drift unless one of the following occurs in the drift area: there are signs of structural issues, additional superimposed dead load is placed on the structure, or the structural framing is altered. Consequently, it is important to limit the installation of new roof top mechanical units to avoid costly structural rehabilitation. If roof top mechanical units *are* to be installed, it is important to avoid locating them in areas prone to drifting snow, which could result in the need for widespread reinforcement of the structure. It is also important to limit each unit's size (typically less than 15' along any face), and to avoid locating two or more units adjacent to each other, as large units will create their own snow drift and the roof structure would need to be analyzed/reinforced for snow drift. In a similar way, it is important to avoid adding new parapets or other changes in roof elevation. One common "change in elevation" occurs when a new (taller) addition is built adjacent to an existing (lower) roof. In this case, the joists supporting the roof adjacent to the new addition will need additional structure to support the added load and it is possible that the girders will also need reinforcement.

- **New rooftop units:**
  Aside from the snow drift concerns, installing new roof top units will require analysis of the supporting structure (which is often inadequate). Therefore, roof reinforcing or new dunnage may be required to transfer gravity and lateral forces into primary structural elements such as columns or beams.

- **New Dead Loads (mass affecting seismic behavior):**
  The addition of new dead loads on the structure, such as new interior masonry walls, water tanks or heavy mechanical units, will affect the seismic mass of the building. Such a change may require that a lateral analysis be performed, and a new lateral resisting system may need to be introduced.

- **Penetrations through the roof and framed floors:**
  New steel angle frames will need to be installed around new penetrations to support the roof deck and framed floor slabs. In steel-framed roof areas, openings should be limited to the space between main steel members to avoid costly structural reinforcing of the roof. In framed floor, new openings should be avoided because the required support frames will be extremely cumbersome (due to the low headroom in the crawl space) and expensive to install.

- **Demolition of foundations:**
  In any areas where existing structure will be demolished and new structure will be built on the same footprint, foundations could be a concern. The existing foundations will likely need to be removed before constructing the new elements. The large concrete pipes below the slab could also cause concerns if new walls were to be added above them.

- **Building a new structure adjacent to existing structure:**

  If a new structure (e.g., new wing) is to be built directly adjacent to any existing structure:
  - The new structure should be structurally independent from the existing structure to avoid inducing new lateral loads into the existing building. In other words, an expansion joint would be necessary at the interface of existing and new structure.
  - Underpinning the existing foundations may be required. This can be mitigated or avoided by using cantilevered structure to meet the existing wing. Such an approach may create architectural constraints such as column placement.
  - The new roof elevation should not be higher than the existing roof elevation if possible (see snow drift notes above). If the new wing is to have a higher roof overall, this goal can still be achieved by stepping the roof down to match the existing roof near the interface (for example, just within 15 feet of the interface).

Description of General Structural Systems

Foundations

- The building's foundations will be designed based on the recommendations of a site-specific geotechnical report.
- It is anticipated that the building's columns will be supported on isolated reinforced concrete footings that will bear on natural soils or on engineered fill.
- It is anticipated that the building's exterior walls and interior 8" masonry walls and thicker will be supported on continuous reinforced concrete strip footings that will bear on natural soils or on engineered fill.
- All continuous wall footings will be doweled to the individual column footings to minimize differential settlement.
- All open footing excavations will be inspected by a Geotechnical engineer to ensure that the design soil bearing pressures have been achieved.
- Exterior footings will bear at least 2'-6" below the finished grades to provide the necessary frost protection.

On Grade Floors

- The floors will be composed of a 5" thick slab on grade reinforced with 6"x6", W2.1 x W2.1 welded wire. The slab will be placed over a 15 mils vapor barrier over crushed gravel or washed stone base.
- The floors at the MEP, receiving, recycling, and receiving rooms will be composed of a 6" thick slab on grade reinforced with 6"x 6", W2.9 x W 2.9 welded wire. The slab will be place over a 15 mils vapor barrier over crushed gravel or a washed stone base.
- Control joints will be provided at a minimum at the column centerlines in both directions.

Elevated Floors

- The elevated floor construction at the classrooms and adjacent support spaces will consist of a 3" thick concrete slab with 6" x 6", W1.4 x W1.4 welded wire reinforcing over a 2" deep 20 gage galvanized composite metal deck.
- The elevated floor slabs will be supported by wide flange beams girders that will be designed to act compositely with the slab.
- The elevated floor framing will be supported by steel columns or reinforced masonry bearing walls.
- The steel columns will be either wide flanges, square or tubular sections or round sections.

Roof Framing

- The roof construction will consist of a 1 ½" deep, 20 gage galvanized wide rib galvanized metal roof deck supported by open web steel joists and wide flange steel beams spaced at 6 feet on center maximum.
- The roof framing will be supported by a combination of steel girders and columns or reinforced masonry walls.
- The roof framing at the "high bay" areas will be designed to clear span the areas below.
- The roof framing will be slopped for drainage at 1/4" per foot minimum.

Lateral Load Resisting System

- The lateral load resisting system will consist of a combination of braced steel frames and reinforced masonry shear walls.
- The lateral resisting elements will extend the full height of the building and will be located within the building walls so that they do not affect the internal building's layout.

Façade System

- The building's exterior walls will consist of either masonry veneer with a combination of reinforced masonry or metal stud backup or glass curtain wall.
- The masonry veneer will be tied to the masonry and metal stud backup system with hot dipped galvanized adjustable wire anchors spaced at 16" on center maximum vertical and horizontal.
- The masonry back up walls will be reinforced as needed to resist gravity and lateral loads.
- All steel lintels in the exterior masonry walls will be hot dipped galvanized.
- All masonry walls will be reinforced with hot dipped galvanized horizontal joint reinforcing spaced at 16" on center maximum and with vertical reinforcing as needed.

Interior Walls

- Walls will either masonry or stud construction.
- Masonry walls will be bearing and non-bearing.
- All interior 8" and thicker masonry walls will be supported on reinforced continuous concrete footings.
- All interior 6" and thinner masonry walls will be supported on reinforced thickened slabs.
- All interior masonry walls will be reinforced with hot dipped galvanized horizontal joint reinforcing spaced at 16" on center maximum and with vertical reinforcing as needed.

Applicable Codes and Standards

1. The International Building Code 2018 with Harford County Amendments
2. Harford County Public Schools Design Manual
3. Reference Code Organizations

- ACI American Concrete Institute
- AISC American Institute of Steel Construction
- ANSI American National Standard Institute
- ASTM American Society for Testing and Materials
- PCA Portland Cement Association
- CRSI Concrete Reinforcing Steel Institute
- AWS American Welding Society
- AISI American Iron and Steel Institute
- BIA Brick Institute of America
- NCMA National Concrete Masonry Association
- PCI Precast Prestressed Concrete Institute

Design Criteria

1. Dead Loads

- Slabs on metal decks varies
- Roofing 7 psf.
- Suspended ceiling 2 psf.
- Mechanical and electrical systems 3 psf.*
- Sprinklers 3 psf.
- At framed floors and roofs above Mechanical rooms the mechanical and electrical dead load will be increased to 10 pounds per square foot minimum. Additional mechanical and electrical design load shall be used as required at specific locations of concentrations of pipe runs, major duct runs and hung equipment.

2. Live Loads

- First Floor 100 psf.
- Kitchen 150 psf.
- Media Center 150 psf
- Class Rooms 40 psf + 15 psf (partitions)
- Corridors above the first floor 80 psf
- Storage Rooms 125 psf.
- Stairs 100 psf
- Mechanical and Electrical rooms 150 psf. *
- Roof 30 psf. **

* Additional loads as required at specific concentration of equipment.

** Additional unbalanced snow loads as required by the building code.

3. Wind Loads

- Ultimate Wind Speed 120 MPH
- Nominal Wind Speed 93 MPH.
- Exposure B
- Internal Pressure Coefficient +/- .18
- Applicable pressure coefficients from section 1609 of the 2018 International Building Code and section 26 of ASCE 7-18. Components and Cladding at walls and roof to be calculated separately with the appropriate Code required factors.

4. Snow Loads

- Snow Importance Factor (Is) 1.1
- Snow Exposure Factor (Ce) 1.0
- Snow Thermal Factor (Ct) 1.0
- Ground Snow (Pg) 30 psf
- Flat Snow Load (Pf) 23 psf

5. Seismic Loads

- Seismic Hazard Exposure Group Group III
- Seismic Importance Factor 1.25
- Seismic Design Category TBD
- Site Class TBD
- Spectral Response Acceleration
- Coefficient at short period SDs = TBD
- Spectral Response Acceleration
- Coefficient at 1 second SD_1 = TBD
- Basic Seismic Force Resisting System Shear walls and braced Steel Frames
- Design Base Shear To be determined.
- Soil profile type To be determined by geotechnical study.
- Analysis procedure Per section 12.14 of ASCE 7-16.

6. Concentrated Loads

- Framed floor slabs will be designed for the indicated uniform live loads or a minimum concentrated load of 1000 pounds, whichever produces the grater stress. The concentrated load shall be uniformly distributed over an area 2.5 feet by 2.5 feet.
- At specific locations floor slabs and framing will be designed for the actual weight and concentration of mechanical and electrical equipment.

7. Deflection Criteria

- Inter-story drift and total drift will not exceed H/400 for wind and seismic loads where “H” is the story height of the building.
- Live load deflection of spandrel and members that support glass will not exceed L/480 with a maximum of 1/2 inch, and spandrel and members above glass or that support masonry

shall not exceed L/600 with a maximum of 5/16 inch where "L" is the span. All other structural floor and roof members will be limited to a maximum live load deflection of L/360 and L/240 respectively.
- All members that support elevator equipment and/or rails will be designed with the limits prescribed by ASME A17.1.

Construction Materials

1. Concrete

• Foundation	3000 psi	145 pcf
• Slabs on Grade	4000 psi	145 pcf
• Framed Floors	4000 psi	145 pcf
• Concrete exposed to weather	4500 psi	145 pcf
• Pre-cast elements	5000 psi	145 pcf
(Minimum concrete strength at 28 days)		

2. Reinforcing Steel

• Reinforcing bars	ASTM A615, 60 KSI
• Welded Wire Fabric	ASTM A185

3. Structural Steel

• Beams, Girders and WF Columns	ASTM A992, 50 KSI
• Accessory Steel	ASTM A36
• Tube Sections	ASTM A500
• Pipe Sections	ASTM A53
• Anchor Bolts	ASTM A307
• High Strength Bolts	ASTM A325 & A490
• Metal Deck	ASTM A446, A611
• Miscellaneous	ASTM A36

4. Special Requirements

- Hot dipped galvanized structural steel shall be utilized at conditions of steel exposed to the weather including roof support dunnage, cooling tower framing, mechanical screen framing and lintels in exterior walls.
- Air entraining admixtures will be used for all concrete exposed to the weather.
- High range, water reducing, super-plasticizer will be used for cast in place concrete slabs and other pumped concrete.
- Water cement ratio for all slabs shall not exceed 0.50.

MECHANICAL/ELECTRICAL/PLUMBING/FIRE PROTECTION NARRATIVE

I. EXECUTIVE SUMMARY – M/E/P/FP

The present Homestead Wakefield Elementary School complex was built in the late 1950's to mid 1960's on a large parcel of land in downtown Belair, Maryland which also includes a middle school and a high school.

Homestead Wakefield Elementary consists of two (2) separate buildings. The Wakefield Building houses the lower elementary grades, with Kindergarten and Pre-K in a separate adjacent building. The Homestead Building located several hundred feet away, with a significant slope through woods in between. This building houses the upper elementary grades. Both buildings have their own Cafeteria, Plating Kitchen, Gymnasium/Multi-Purpose Room with Stage, Media Center, Administrative Offices Suite, Specialty Classrooms and Resource Rooms, thus duplicating shared facilities in both buildings.

While the Wakefield Building received an HVAC and Lighting upgrade approximately 14 years ago, the Homestead Building remains substantially unchanged, except for a few minor renovations and failed equipment replacements, from its initial construction. Neither building is fully up to date with modern, energy efficient systems or high tech teaching aides.

Harford County Public Schools plans to combine the two buildings by either new construction or additions and modifications to one of the existing buildings.

The existing mechanical, electrical, plumbing and electrical systems were generally found to be inappropriate for continued use due to age, condition, capacity and/or configuration to serve the proposed replacement facility and should be replaced. Due to the change in size of the building, the age/type/configuration of existing systems, and the anticipated scope of renovations if the Additions/Modernization option is selected, all the existing mechanical, electrical, plumbing and fire protection systems will need to be replaced/upgraded, including any which have been recently upgraded.

The following sections of this report outline the existing mechanical, electrical, plumbing and electrical systems, and make recommendations for their replacement systems.

II. EXISTING CONDITIONS – HOMESTEAD BUILDING

The Homestead Building was constructed in 1966 and is a single story elementary school building with approximately 52,628 square feet. The Homestead Building Media Center was expanded and renovated in 1998. There have been a few other minor changes in certain areas of the building; however much of the building remains as constructed in 1966.

The building has a flat, built-up roof.

Ceilings were generally 1' x 1' metal pan ceilings, which typically restrict ceiling access. Ceilings in renovated areas such as the Media Center and a Resource Room were suspended lay-in acoustical tile ceilings.

A. Mechanical

1. Mechanical Room Central Heating and Cooling Plant:

The central heating plant consists of two (2) hot water firetube boilers manufactured by Kewanee. Boiler #1, Model # M-95-KO, is rated for 950 MBH heating output utilizing an oil fired Power Flame burner, Model # CR2-OA rated for a maximum fuel consumption of 8.5 gph. Boiler #2 manufactured by Kewanee, Model # M-205-KO, is rated for 2560 MBH heating output utilizing an oil fired Power Flame burner, Model # CR2-OA rated for a maximum fuel consumption of 18.3 gph. Both boilers and burners are very old and in-efficient.

Each boiler is independently vented into a common horizontal breeching which connects to a chimney stack. Combustion air for the boiler flue venting system is served from a wall mounted louver that does not comply with the requirements of the fuel gas code. In addition, the louver is partially blocked by years of dirt and debris.

Heating water is circulated from the boilers out to the building by two (2) heating hot water pumps through insulated heating water supply piping to multi-zone air handling units, constant volume air handling units and miscellaneous heating equipment located throughout the building. Each heating water pump, operating and standby, is manufactured by Taco, rated for circulating 130 GPM utilizing 5 horsepower motors. Both pumps are old very and do not appear to have been re-built. There are two (2) structure hung 120 gallon expansion tanks serving the heating water system. Insulation installed on heating water piping system is aged and in poor condition.

The central cooling plant consists of an exterior grade mounted nominal 115 ton cooling tower manufactured by Baltimore Air Coil, Model FXT-115-GM. Condenser water supply and return piping to and from the cooling tower runs below grade to the school's Boiler/Mechanical Room.

Inside the Boiler Room, the condenser water piping connects to two (2) condenser water pumps (operating and stand-by) which pump condenser water through two (2) water cooled chillers. Condenser water pumps are manufactured by Taco rated for circulating 282 GPM utilizing 7.5 horsepower motors. The condenser water pumps have been rebuilt.

Chilled water for air conditioning is produced by two (2) water cooled chillers. Chiller #1 is manufactured by Carrier Corporation, Model # 30AA115610 rated for 115 nominal tons of cooling, which appears to be original to the building construction in 1966. The chiller uses R-22 refrigerant. The chiller is very old and in-efficient. Chiller # 2 is manufactured by Trane Company, Model # RTWD100F2B02 rated for 100 nominal tons of cooling. Chiller #2 appears to have been installed in approximately 2012, to replace an existing chiller.

There is no refrigerant monitoring and alarm system installed in the Boiler/Mechanical Room nor is there an emergency exhaust system installed for refrigerant purge as required by the mechanical code.

Chilled water is circulated from the chillers out to the building from two (2) chilled water pumps through insulated chilled water supply piping to multi-zone air handling units, constant volume air handling units and miscellaneous heating equipment located in the building.

Heating water pumps, operating and stand-by, are manufactured by Taco rated for circulating 230 GPM utilizing 7.5 horsepower motors. Both pumps are very old and do not appear to be re-built. There is a structure hung, 60 gallon expansion tank serving the chilled water system. Insulation installed on chilled water piping system is aged and in poor condition.

The heating, chilled and condenser water piping and pumping systems have chemical treatment systems.

Automatic Temperature Controls in the building consist of pneumatically controlled valves and devices connected to an old Honeywell Control panel with PE switches. Local pneumatic control panels are at each air handling unit and compressed air is generated by a dual head, floor mounted air compressor with air storage tank manufactured by Quincy. In addition, there are several direct digital control panels installed by Johnson Controls along with a Trane controller which monitor equipment and system temperatures. There are eight (8) HVAC temperature control zones in the building.

2. <u>Heating, Ventilating, and Air Conditioning (HVAC) Systems in the Building</u>:

Classroom wings are served from eight (8) four pipe central station multi-zone and constant volume air handling units with heating and cooling coils which supply heating and cooling air to classrooms and other support rooms. Each of these units has outside air for ventilation. Water flow to each coil is controlled by pneumatically operated three (3) way valves. Supply air is distributed by ceiling mounted supply air devices supplied by supply air ductwork systems concealed above ceilings.

Temperature control in each classroom is accomplished by a pneumatic wall mounted thermostat which regulates heating and cooling dampers within the air handling units.

The Gym/Multi-Purpose Room and Stage are served from two (2), four pipe central station constant volume air handling units with heating and cooling coils which supply heating and cooling air to the space. Units have outside air for ventilation. Water flow to each coil is controlled by pneumatically operated three (3) way valves. Supply air is distributed by supply air ductwork systems which connect to ceiling mounted supply air devices. Temperature control in each room is accomplished by a wall mounted pneumatic thermostat which regulates heating and cooling dampers within the air handling units.

There is miscellaneous hydronic baseboard radiation at the main entrance to the school, at other exits from the building and in miscellaneous areas not conditioned from air handling equipment.

Toilet Rooms, Janitor Closets, Kitchen, and other support spaces are exhausted for odor control and space ventilation by roof mounted exhaust fans.

B. Plumbing

1. A 4" domestic cold water service with main shut off valve enters from the floor up into the Boiler/Mechanical Room. The water service splits and serves water to the heating, chilled and condenser water systems. Water serving the condenser water system is metered. Backflow preventors are installed at connections to these piping systems. In addition, domestic cold water connects to a natural gas fired domestic water heater, located in the Boiler Room, to provide domestic hot water for the building.

2. The domestic water heater is natural gas fired, manufactured by State Industries, Model # SBD100275NEA, rated for 275 MBH input with 266.67 gph recovery.

Included in the domestic hot water system is a mixing valve for water temperature control and a domestic hot water recirculation pumping system.

3. A ±1" medium pressure natural gas main enters into the Boiler/Mechanical Room, through the wall, below grade. The gas line is then reduced through a vented gas pressure regulator before connecting to a wall mounted gas meter. From the meter, a 1-1/4" gas line with main shut-off valve extends to the domestic water heater and then to the Kitchen.

4. Rest Room plumbing fixtures within the building consist of floor mounted, manual flush valve water closets, floor mounted stall type manual flush valve urinals, and wall hung lavatories with push down metering faucets. The stall type floor mounted urinals do not comply with current Health Department requirements.

5. Sinks in classrooms consist of drop in, countertop stainless steel sinks with faucet and sink mounted bubblers.

6. Electric water coolers located in the corridors are wall mounted, ADA compliant type with push bar, bubbler and bottle filler.

7. Storm water drainage in the building consists of roof mounted drains with rain leaders which collect above the ceiling and extend down below grade to an underground storm water piping system.

C. Fire Protection Systems

1. Sprinkler Fire Suppression System

The building is not protected by a sprinkler fire suppression system. This no longer meets Code Requirements.

2. Fire Alarm System

The existing Simplex fire alarm system, which consists primarily of 8" bells and manual pull stations, with control panel and zoned annunciator in the Principals Office, appears to be original to the building construction. There were no provisions for hearing impaired persons, per ADA and NFPA-72.

D. Electrical

1. Electric Service and Power Distribution

Electric service to the Homestead Building is original to the building construction from a BGE pad mounted transformer (number 20048 ABC) located in the Utility Yard adjacent to the Cooling Tower. This transformer supplies secondary power at 480Y/277 volts, 3 phase, 4 wire to a main switchboard in the Boiler Room.

The Main Switchboard is a Westinghouse circuit breaker type switchboard, which was installed at the time of building construction. The 1,000 ampere main circuit breaker and the various feeder circuit breakers are individually mounted. The switchboard is beyond its expected useful life, and parts availability is limited, problematic and expensive. In addition, the State Department of General Services recommends that the electric service for an Elementary School be a minimum of 2,000 amperes.

Power distribution in the building is at 480Y/277 volts, 3 phase, 4 wire to 480Y/277 volts, 3 phase, 4 wire branch circuit panelboards throughout the building, which serve fluorescent lighting and peripheral mechanical equipment. Local dry type transformers supply 280Y/120 volt, 3 phase 4 wire power to branch circuit panelboards serving receptacles and miscellaneous small equipment.

For the most part, all branch circuit panelboards appear to be original to the building construction. The panelboards and dry type transformers are beyond their expected useful life, and parts availability is limited, problematic and expensive.

The original Boiler Room Motor Control Center was replaced in 2015 with a new Square D Model 6 motor control center, due to an apparent failure of the existing MCC. This is in good condition but will likely not be applicable to the replacement school.

2. Emergency Power

There is no emergency generator. An "old code" arrangement of fusible disconnect switches serving exit signs and fire alarm, tapped ahead of the main circuit breaker exists on the wall behind the main switchboard. This method of emergency power is no longer recognized by the National Electrical Code.

Emergency lighting is provided by local emergency battery unit lighting fixtures. Exit signs are typically plastic housing LED type with integral battery backup, which appear to have been retrofit onto the original edge-lit exit sign backboxes.

3. Interior Lighting

Interior lighting was generally fluorescent, with fixtures original to the building construction in the mid 1960's having been retrofit at some point with energy efficient T8 fluorescent lamps and electronic ballasts.

Classroom and Cafeteria lighting consisted of 2' x 4' fluorescent troffers with small cell eggcrate, vertical blade louvers.

Kitchen lighting was provided by 1'x 4' fluorescent troffers with prismatic acrylic lenses.

A few rooms, such as a Resource Room had been retrofit with modern 2'x 2' lay-in acoustical tile ceilings with 2' x 4' fluorescent troffer fixtures with prismatic acrylic lenses.

Lighting in the Gym was pendant mounted low bay metal halide fixtures with acrylic diffusers.

Corridor lighting appears to have been upgraded from incandescent fixtures to surface mounted fluorescent fixtures mounted to the original junction boxes. A number of the original incandescent downlights remain in the Lobby, some of which have been re-lamped with compact fluorescent or LED replacement lamps.

Lighting controls were mostly manual switches, many of which were low voltage switches controlling remote individual circuit, GE-RR7 24 volt relays. Switches were typically mounted higher than current ADA height of 48" above finished floor.

4. Exterior Lighting

Exterior lighting is very limited. There is some under canopy lighting along the front entrance canopy, at the rear loading dock and Boiler Room soffit areas. Parking lot lighting is limited to a few poles with metal halide floodlights. In general, it does not appear that the building or site is well lit for after hour activities.

5. Telecommunications Systems

Telephone service enters the building underground at the Boiler Room. There is a telephone backboard along the wall to the right of the motor control center. The Toshiba telephone switch is mounted on the wall above the telephone backboards.

The Main Distribution Frame is located in the former Sound Room in the Main Office Suite. There are two (2) side by side data racks with fiber and copper patch panels, network switches and other equipment.

The building is fully wired for computer data networking, with hard wired outlets as well as a wireless access point in each classroom. Wiring appears to be older Category 5, which somewhat limits network speeds and bandwidth.

The building is fully wired for distribution of cable television signal from Comcast/Xfinity, although Harford County Public Schools is moving away from this in favor of on-demand programming over the Internet. The video system is distributed from the TV Studio located adjacent to the Media Center.

Each classroom was outfitted with an interactive whiteboard and associated video projector. In most cases, the video projector was mounted near the center of the room, thus causing the teacher to cast a shadow over a portion of the board while writing on it. A few rooms, such as the Resource Room, had been retrofitted with short throw projectors which eliminate this issue. Sound from the video system was provided by speakers in the video projector; there were no remote speakers in the ceiling to better distribute sound.

6. Sound System

The original building sound system wall mounted speakers are still in use in each classroom, although the return call switch has been replaced by a telephone on the Teacher's desk. The original sound rack in the Main Office has been replaced with a data rack which contains the amplifiers and an AM/FM radio tuner with cassette tape player.

A local sound system is provided in the Gymnasium, with a wall mounted sound cabinet on the Stage.

7. Security System

A Radionics Intrusion Detection System is provided throughout the building, with initiating devices consisting of passive infrared motion sensors, glass break sensors and door contacts.

A keypad for arming/disarming the system is located in the main lobby, while the control panel is located in the IDF room.

Digital video cameras are located in various locations on the interior and exterior of the building. The cameras were upgraded in 2014. The main system video monitor is located in the Main Office, with the Network Video Recorder (NVR) and other equipment mounted in the rack in the MDF in the Main Office Suite. The NVR and Security Camera Serer were upgraded in 2019.

III. EXISTING CONDITIONS – WAKEFIELD BUILDING

The Wakefield Building was the original building of the present elementary school complex, constructed in 1958. It is a single story elementary school building with approximately 58,245 square feet. In 1968 a separate four (4) classroom, 4,585 square foot Kindergarten building was constructed across the parking lot from the main school building. The Wakefield building Media Center was renovated and expanded in 1996.

The building has a flat, built-up roof.

In 2007, the Wakefield Building received a systemic upgrade, with a new HVAC system, new ceilings and lighting throughout and a fire alarm system replacement.

Ceilings were generally 2' x 4' lay-in acoustical tile ceilings throughout.

The Boiler/Mechanical Room is located in a basement below the Kitchen. The Boiler Room floor is approximately 18 feet below the first floor level. The Main Electrical Room is located in a room at the Boiler Room mezzanine. It is accessed through the Boiler Room areaway.

A. Mechanical

1. Mechanical Room Central Heating and Cooling Plant:

The central heating plant consists of two (2) hot water, oil fired, firetube boilers manufactured by Cleaver Brooks. Boiler #1, Model # CB100-102, is rated for 4,184 MBH heating input utilizing a maximum fuel consumption of 30 gph. Boiler #2 manufactured by Cleaver Brooks, Model # CB100-80, is rated for 2,511 MBH heating input utilizing a maximum fuel consumption of 18 gph. The Boiler nameplates indicate construction dates of 1988. Both boilers and burners are old and in-efficient.

Each boiler is connected by fuel oil supply and return piping which receives fuel oil from a floor mounted duplex fuel oil transfer pump, which draws oil from an outdoor underground fuel oil tank.

Each boiler is independently vented into a chimney stack. Combustion air for the boiler flue venting system is provided from wall mounted louvers which do not comply with the requirements of the fuel gas code.

Heating water is circulated from the boilers in a primary heating loop by two (2) heating water pumps, operating and stand-by, manufactured by Bell and Gossett. The primary heating water pumps are rated for circulating 535 GPM utilizing 10 horsepower motors. From the boiler primary heating water loop, there is secondary heating water loop which connects to the primary loop at a hydraulic bridge. Heating water is pumped to four pipe classroom unit ventilators, fan coil units and miscellaneous hydronic heaters throughout the building. Each secondary heating water pump, operating and stand-by, are manufactured by Bell and Gossett, rated

for circulating 425 GPM utilizing 20 horsepower motors. Both pumps are controlled by independent variable frequency drives. There is a floor mounted, 317 gallon expansion tank serving the heating water system. Insulation installed on heating water piping system is in good condition.

The central cooling plant consists of an exterior grade mounted nominal 180 ton air cooled chiller manufactured by McQuay, Model AGS180CH12-ER10. Chilled water supply and return piping to and from the chiller is run below grade from the chiller to the school's Boiler/Mechanical Room.

In the Boiler/Mechanical Room, the chilled water piping connects to an insulated plate and frame heat exchanger, then to two (2) primary chilled water pumps (operating and stand-by) which pump chilled water back to the air cooled water chiller. Primary chilled water pumps are manufactured by Bell and Gossett rated for circulating 425 GPM utilizing 20 horsepower motors. The primary chilled water system includes glycol to allow cold weather operation and eliminate the need to drain the chiller in the winter.

Secondary chilled water is circulated from the plate and frame heat exchanger through insulated chilled water supply piping to four pipe classroom unit ventilators and fan coil units throughout the building. Chilled water is returned to the Mechanical Room plate and frame heat exchanger by two (2) secondary chilled water pumps. Each chilled water pump, operating and stand-by, are manufactured by Bell and Gossett. The secondary chilled water pumps are rated for circulating 400 GPM utilizing 25 horsepower motors. Both secondary chilled water pumps are controlled by independent variable frequency drives. There is an insulated floor mounted vertical expansion tank serving the chilled water system. Insulation installed on chilled water piping system is in good condition.

There is no refrigerant monitoring and alarm system installed in the Boiler/Mechanical Room nor is there an emergency exhaust system installed for refrigerant purge as required by the mechanical code.

The heating and chilled water piping and pumping systems have chemical treatment systems.

Automatic Temperature Controls in the building consist of direct digital controls which control two (2) way valves and devices connected to Johnson Metasys control panels which control and monitor equipment and system temperatures.

2. Heating, Ventilating, and Air Conditioning (HVAC) Systems in the Building:

Classroom wings are served from numerous four pipe classroom unit ventilators with heating and cooling coils that supply heating and cooling air to classrooms. Unit ventilators have exterior wall louvers for the introduction of outside air for ventilation. Corridors are conditioned by ceiling mounted four pipe fan coil units. All fan units appear to be designed with outside air for ventilation. Water flow to each coil is controlled by DDC controlled two (2) way valves. Temperature control is accomplished by a wall mounted DDC thermostat that regulates heating and cooling control valves and outside and return air dampers within each unit ventilator.

The Multi-Purpose Room and the Administration Offices are served from direct expansion roof mounted constant volume air handling units with hydronic heating and direct expansion cooling coils that supply heating and cooling air to the space. Units have outside air hoods for the introduction of outside air for ventilation. Water flow to the heating coils is controlled by DDC controlled two (2) way valves. Supply air is distributed by supply air ductwork systems with that connect to ceiling mounted supply air devices. Temperature control is accomplished by a wall mounted DDC thermostat that regulates heating and cooling from the air handling units.

The Media Center is conditioned from multiple split system air handling units consisting of indoor fan coil units and exterior mounted heat pump units. Supply air

is distributed by supply air ductwork systems which connect to ceiling mounted supply air devices. Temperature control is accomplished by a wall mounted DDC thermostat that regulates heating and cooling from the air handling units.

There are miscellaneous hydronic baseboard radiation units at the main entrance to the school, in exterior hallways, at other exits from the building and miscellaneous areas not conditioned from air handling equipment.

Toilet Rooms, Janitor Closets, Kitchen, and other support spaces are exhausted for odor control and space ventilation by roof mounted exhaust fans.

B. Plumbing

1. A 4" domestic cold water service with a main shut off valve, water meter and backflow preventer enters into the Boiler/Mechanical Room. The water service provides water to the heating and chilled water systems. Water serving the central plant systems are metered and meters are connected to the building's energy management system. Backflow preventors are installed at connections to each system. In addition, domestic cold water extends and connects to a natural gas fired domestic water heater.

2. The domestic water heater is natural gas fired, manufactured by Bradford White Corporation, Model # EF100T199TE3N2, 100 gallon tank capacity rated for 199 MBH input with 238.8 gph recovery. Included in the domestic hot water system is a domestic water expansion tank, mixing valve for water temperature control in the building and two (2) domestic hot recirculation pumping systems serving the Kitchen and the remainder of the building.

3. A 1-1/2" natural gas main enters into the Boiler/Mechanical Room, through the wall, below grade. The gas line connects to a wall mounted BGE gas meter. From the meter, a 1-1/2" gas line with main shut-off valve extends to the domestic water heater and then to the Kitchen.

4. Plumbing fixtures within the building consist of floor mounted, manual flush valve water closets with black toilet seats, floor mounted, stall type manual flush valve urinals, and wall hung lavatories with push down metering faucets. Some toilets and lavatories have been fitted with grab bars; however, they do not appear to the ADA compliant. This would need to be confirmed by the architect. The black toilet seats and stall type floor mounted urinals do not comply with Health Department requirements.

5. Miscellaneous sinks in classrooms consist of drop in, countertop stainless steel sinks with faucet and sink mounted bubblers.

6. Electric water coolers located in the corridors are wall mounted type, ADA compatible with push bar, bubbler and bottle filler.

7. Storm water drainage in the building consists of roof mounted drains with rain leaders that collect above the ceiling and extend down below grade to an underground storm water main.

C. Fire Protection Systems

1. Sprinkler Fire Suppression System

The building is not protected by a sprinkler fire suppression system. This is no longer Code compliant.

2. Fire Alarm System

The fire alarm system was replaced as part of the 2007 HVAC replacement project. The Fire Alarm Control Panel is a Simplex 4010 panel, located in the Main Electric Room at the Boiler Room Mezzanine. Audio-visual devices are horn/strobe units with ADA/NFPA-72 compliant clear strobes. Initiating devices are limited to

manual pull stations and duct smoke detectors. There is a graphic annunciator panel in the Front Entry Vestibule, along with a separate emergency ventilation stop button with tamper resistant cover.

D. Electrical

1. Electric Service and Power Distribution

Electric service to the Wakefield Building was upgraded as part of the 2007 HVAC upgrade project. A BGE pad mounted transformer, located on the north side of the driveway opposite the Boiler Room supplies secondary power at 480Y/277 volts, 3 phase, 4 wire to an Eaton/Cutler Hammer main switchboard with 3,000 ampere main circuit breaker. The main switchboard is located in a dedicated Main Electric Room on the Boiler Room mezzanine. This room is accessed thru double doors from the Boiler Room areaway.

2. Emergency Power

There is no emergency generator.

Emergency lighting is provided by local emergency battery unit lighting fixtures or emergency battery units in selected normal power fixtures. Exit signs are typically plastic housing LED type, with integral battery backup. Exit signs are a mix of red and green color letters.

3. Interior Lighting

Interior lighting is generally fluorescent, with fixtures in most areas replaced as part of the HVAC upgrade project. Fixtures typically use energy efficient T8 fluorescent lamps and electronic ballasts.

Classroom lighting is typically pendant mounted fluorescent indirect/direct fixtures. Control is manual, with the inner row and the outer row separately switched. A rotary dimmer type switch, in the same Wiremold surface box, controls a paddle fan in the center of the classroom.

Cafeteria and Kitchen lighting consists of continuous rows of fluorescent fixtures with wrap around acrylic prismatic lenses.

Lighting in the Gym/Multi-Purpose Room is pendant mounted low bay metal halide with acrylic diffusers.

Media Center lighting was not replaced during the HVAC replacement. It remains a mix of 2' x 4' fluorescent deep cell parabolic louver troffers, pendant mounted direct/indirect fixtures and compact fluorescent downlights.

Corridor lighting consists of surface mounted drop basket batwing fluorescent fixtures.

4. Exterior Lighting

Exterior lighting is very limited. There is some under canopy lighting along the front entrance canopy and a few metal halide wall packs. Parking lot lighting is limited to a few poles with metal halide floodlights. In general, it does not appear that the building or site is well lit for afterhours activities.

5. Telecommunications Systems

Telecommunications systems were generally not replaced during the HVAC replacement project.

The original telephone service entered the building underground to a Janitors Closet in the corridor opposite the Boiler Room entrance. This service appears to have been abandoned.

The current Main Distribution Frame (MDF) is located in the Media Center Resource Room. A single rack contains the school servers, fiber and copper patch panels and miscellaneous equipment. Voice 110 punchblocks and the cable television distribution equipment is mounted on a plywood backboard which is mounted on the wall behind the data rack.

The MDF supplies several Intermediate Distribution Frame (IDF) closets strategically located throughout the building. The IDF's connect to the MDF via 62.5 micron single and multimode fiber optic cables, 25 pair copper voice trunk cables and RG-11 coax for television signal distribution.

The Homestead Building is also connected to the Wakefield Building by 62.5 micron single and multimode fiber optic cables, which distribute from the Wakefield MDF.

The building is fully wired for computer data networking, with hard wired outlets as well as a wireless access point in each classroom. Wiring appears to be older Category 5, which somewhat limits network speeds and bandwidth.

Each classroom was outfitted with an interactive whiteboard and associated video projector. In most cases, the video projector was mounted near the center of the room, thus causing the teacher to cast a shadow over a portion of the board while writing on it. A few rooms, such as the Resource Room, had been retrofitted with short throw projectors which eliminate this issue. Sound from the video system was provided by powered speakers in the classroom ceiling.

The building is fully wired for distribution of cable television signal from Comcast/Xfinity, although Harford County Public Schools is moving away from this

in favor of on-demand programming over the Internet. The video system is distributed from the MDF in the Media Center Resource Room.

6. Security System

A Radionics Intrusion Detection System is provided throughout the building, with initiating devices consisting of passive infrared motion sensors, glass break sensors and door contacts.

A keypad for arming/disarming the system is located in the main lobby, while the control panel is located in a work area off a nearby classroom.

Digital video cameras are located in various locations on the interior and exterior of the building. The main system video monitor is located in the Main Office, with the Network Video Recorder (NVR) and other equipment mounted in the rack in the MDF in the Main Office Suite.

Digital video cameras are located in various locations on the interior and exterior of the building. The cameras were upgraded in 2014. The main system video monitor is located in the Main Office, with the Network Video Recorder (NVR) and other equipment mounted in the rack in the MDF in the Main Distribution Frame (MDF). The NVR and Security Camera Serer were upgraded in 2019.

IV. EXISTING CONDITIONS – WAKEFIELD KINDERGARTEN BUILDING

The Kindergarten Building was constructed in 1968 as a separate building across the parking lot to the east of the main building. It is a single story building with approximately 4,585 square feet. The Kindergarten includes four (4) Kindergarten and Pre-K Classrooms, each with its own in-suite toilet room. Ceilings are typically 1’ x 1’ metal pan type ceilings, which restrict ceiling access.

The Kindergarten Building has a sloped, shingled roof which pitches up to a center flat mechanical area surrounded by a screen wall. The rooftop HVAC equipment was replaced in 1999.

A. Mechanical

Kindergarten classrooms are served by a roof mounted multi-zone air handling unit consisting of a nominal 20 ton direct expansion cooling coil and an air cooled remote condensing unit. The unit contains a natural gas fired furnace rated at 450 MBH heating output. The unit introduces outside air for ventilation. Supply air is distributed by ceiling concealed supply air ductwork systems that connect to ceiling mounted supply air devices. Return air is then ducted back from each classroom by wall mounted return air grilles through concealed return air ductwork back to the rooftop unit. Temperature control in each classroom is accomplished by a wall mounted thermostat which regulates heating and cooling dampers within the air handling unit.

Toilet Rooms, Janitor Closet and the Electric Room are exhausted by a roof mounted exhaust fan and concealed exhaust ductwork above ceilings with ceiling mounted exhaust air devices.

Toilet Room are heated by wall mounted electric heaters with integral controls.

Automatic Temperature Controls in the building consist of a direct digital control panel that control the operation of the rooftop unit and exhaust fan. From this panel, the controls are connected to a Johnson Metasys control panel in the main school building.

B. Plumbing

1. A 1-1/2" natural gas main enters into the building with main shut-off valve which extends to the multi-zone HVAC unit on the roof.

2. Plumbing fixtures within the building consist of floor mounted, manual flush valve water closets and wall hung lavatories with push down metering faucets.

3. Miscellaneous sinks in classrooms consist of drop in, countertop stainless steel sinks with faucet and sink mounted bubblers.

4. Storm water drainage is exterior on the building consisting of roof gutters and several downspouts which discharge to underground stormwater piping.

C. Fire Protection Systems

1. The Kindergarten Building is not protected by a sprinkler fire suppression system.

2. The Kindergarten Building is served by the same Fire Alarm System as the Main Building. Wiring is extended between the two buildings below grade.

D. Electrical

1. Electric Service and Power Distribution

A 300 ampere circuit breaker in the main distribution switchboard supplies power at 480Y/277 volts, 3 phase, 4 wire to the Kindergarten Building.

2. Emergency Power

Similar to the main building, there is no emergency generator serving the Kindergarten Building.

Emergency lighting is provided by local emergency battery unit lighting fixtures or emergency battery units in selected normal power fixtures. Exit signs are typically plastic housing LED type, with integral battery backup.

3. Interior Lighting

Interior lighting is typically fluorescent with energy efficient T-8 lamps and electronic ballasts.

4. Exterior Lighting

Similar to the Main Building, there is no only limited lighting on the Kindergarten Building

5. Telecommunications Systems

Telecommunication systems in the Kindergarten Building are similar to that found in the Main Building.

V. PROPOSED REPLACEMENT FACILITY

Several options, and several student capacities are being considered for a replacement facility to replace the existing multiple building school complex. These include Additions/Modernization to the existing Wakefield Building, or a completely new combined school building on the Wakefield Building site. Capacity options under consideration are summarized as follows:

Number of Students	Area (Square Feet) New Construction	Area (Square Feet) Addition and Modernization
800	85,000 – 2 stories	±95,000 – 1 story
1,000	95,000 – 2 stories	±115,000 – 1 story
1,100	110,000 – 2 stories	±125,000 – 1 story

Due to the change in size of the building, the age/type/configuration of existing systems, and the anticipated scope of renovations if the Additions/Modernization option is selected, all the existing mechanical, electrical, plumbing and fire protection systems will need to be replaced/upgraded, including any which have been recently upgraded.

All new mechanical, electrical, plumbing and fire protection systems shall be specified in accordance with the latest version of the Harford County Public Schools Design Manual.

A. Mechanical

Heating, Ventilating, and Air Conditioning (HVAC)

1. Under the various scenarios listed above for the Additions/Modernization to the Wakefield Building to achieve the desired student capacities or construction of a new school building, the following are HVAC system options that would be appropriate. Additional evaluation should be provided during the Schematic Design Phase to select the most appropriate systems for the selected design alternatives.

A) **Option No. 1: High Efficiency Central Chilled Water and Heating Water Plant with Central Station Variable Air Volume and Constant Volume Air Handling Units and Variable Refrigerant Flow (VRF) System for the Administration Area**

Under this option, a high efficiency packaged air cooled chilled water system consisting of exterior mounted package chiller with evaporator and condensing sections and multiple stage compressor unloading would be provided to generate cooling system chilled water. Primary chilled water with a 30% glycol mixture would be circulated between the plate and frame heat exchanger in the Mechanical Room and the chiller by constant speed chilled water circulating pumps (one operating/one stand-by). Chilled water for HVAC equipment throughout the school would be circulated through the secondary side of the plate and frame heat exchanger from

variable speed secondary chilled water circulating pumps (one operating/one stand-by) through a secondary chilled water loop.

Heating for the building would be generated by several high efficiency natural gas fired condensing heating water boilers. Primary heating water would be circulated in the Mechanical Room by constant speed heating water circulating pumps (one operating/one stand-by). Heating water for HVAC equipment throughout the school would be circulated by variable speed secondary heating water circulating pumps (one operating/one stand-by) through a secondary heating water loop.

Cooling Plant Capacities:
800 students in a ±95,000 square foot building – 260 tons.
1,000 students in a ±115,000 square foot building – 315 tons.
1,100 students in a ±125,000 square foot building – 340 tons.

Heating Plant Capacities:
800 students in a ±95,000 square foot building – 6,080 MBH.
1,000 students in a ±115,000 square foot building – 7,328 MBH.
1,100 students in a ±125,000 square foot building – 7,936 MBH.

The air handling equipment under this option would consist of a large built-up variable air volume air handling unit to serve all of the classroom spaces. Units shall be complete with air side economizer cycles, energy recovery wheels and demand control ventilation.

Air handling units serving the Cafeteria/Kitchen and Gym/Multi-Purpose Rooms would consist of central station built-up type air handling units with chilled water and heating water coils served from the chilled water and heating water central plant. Each central station unit shall be complete with an air side economizer cycle, demand control ventilation and include an energy wheel. In addition, units shall be provided with a direct expansion

cooling coil served from an air cooled condensing unit for summer operation.

Medium pressure supply air duct mains would extend horizontally above the corridor ceiling of each level to each classroom. Each perimeter classroom would be conditioned by a direct digital control (DDC) variable air volume (VAV) series flow terminal unit with hot water heat and low pressure distribution ductwork to vaned ceiling supply air diffusers.

Return air from all conditioned spaces would be drawn into a ceiling plenum through ceiling mounted vaned return air grilles. Return air would be drawn back to the air handling units through open end return air ductwork within the ceiling plenum.

Under this option, a Variable Refrigerant Flow (VRF) system consisting of ducted and cassette type direct expansion (DX) evaporators would be provided for the Administration and other 12-month-occupancy areas. This would provide for independent temperature control zones throughout the 12-month-occupancy areas and would also allow the 12-month-occupancy areas to be conditioned without energizing the chilled water and heating water central plants. The VRF system would include multiple outdoor heat recovery units to support the VRF system along with dedicated all electric outside air systems with heat recovery units for ventilation air ducted to the various rooms and exhaust air ducted from toilet rooms and various rooms.

B) **Option No.2: High Efficiency Central Chilled Water and Heating Water Plant with Ceiling Mounted 4-Pipe Blower Coil Units and Constant Volume 4-Pipe Air Handling Units**

The central chilled water and heating water plants, under this option, would be similar to Option No. 1: High Efficiency Central Chilled Water and Heating Water Plant with Central Station Variable Air Volume and Constant Volume

Air Handling Units and Variable Refrigerant Flow (VRF) System for the Administration Area.

Under this option, each classroom would be served by a four-pipe blower coil unit. Each blower coil unit shall be complete with an air side economizer cycle. The Administration and Lobby areas would be served by a central station built-up type air handling unit with chilled water and heating water coils served from the chilled water and heating water central plant. Each central station unit shall be complete with an air side economizer cycle and include an energy wheel. In addition, unit shall include a direct expansion cooling coil and air cooled condensing unit for summer operation. All air handling unit supply air distribution would be through insulated low-pressure supply air distribution ductwork to vaned ceiling supply air diffusers. Return air from all conditioned spaces would be drawn into a ceiling plenum through ceiling mounted vaned return air grilles. Return air would be drawn back to the blower coil units through open end return air ductwork at each unit within the ceiling plenum. Air handling units serving the Cafeteria/Kitchen and Gym/Multi-Purpose Rooms would consist of four-pipe central station built-up type air handling units with chilled water and heating water coils served from the chilled water and heating water central plant. Each central station unit shall be complete with an air side economizer cycle and include energy wheels. In addition, units serving 12-month-occupancy areas shall be complete with a direct expansion cooling coil served from an air cooled condensing unit for summer operation when the remainder of the building is unoccupied. Outside air required at each blower coil unit and central station built-up type air handling unit shall be provided from full size outside air louvers located in perimeter walls. Relief air from each classroom shall be achieved by relief air grilles in each classroom connected to stacked vertical duct risers to roof mounted relief air hoods. Relief air from the Administration and Lobby, Cafeteria/Kitchen and Gym/Multi-Purpose Rooms shall be achieved by relief air grilles with ductwork connected to roof mounted relief air hoods.

C) **Option No.3: Variable Air Volume/Constant Volume Air Handling Units**

Under this option, classrooms, and administrative rooms would be conditioned by variable air volume (VAV) package rooftop air handling units complete with air side economizer cycles and demand control ventilation. Package rooftop air handling units for the Cafeteria/Kitchen and Gym/Multi-Purpose Rooms would be single zone, VAV units complete with air side economizer cycles and demand control ventilation. Rooftop units would include direct expansion (DX) cooling coil, hot gas reheat, a natural gas fired heat exchanger and an energy recovery wheel. Vertical medium pressure supply and low-pressure return ducts would extend down from each VAV rooftop unit to horizontal supply branches. A medium pressure supply air duct main would extend horizontally above the corridor ceiling to each classroom or office. Each perimeter classroom would be conditioned by a direct digital control (DDC) variable air volume (VAV) series flow terminal unit with electric heat for space temperature maintenance and low pressure distribution ductwork to vaned ceiling supply air diffusers. Perimeter Administrative offices would be conditioned by a direct digital control (DDC) variable air volume (VAV) series flow and parallel flow terminal units with electric heat and low pressure supply air distribution ductwork to vaned ceiling supply air diffusers. Interior offices would be conditioned by single duct, cooling only, DDC VAV terminal units with low pressure supply air distribution ductwork to vaned ceiling supply air diffusers.

Return air from all conditioned spaces would be drawn into a ceiling plenum through ceiling mounted vaned return air grilles. Return air would be drawn back to the rooftop air handling units through open-end return air ductwork within the ceiling plenum.

Each VAV terminal unit would have DDC thermostatic control and each constant volume rooftop air handling unit would have DDC thermostatic control.

The items noted below may apply to each of the applicable options noted above:

(a) All air handling systems shall be complete with economizer cycles, demand control ventilation and carbon dioxide (CO_2) control.

(b) All roof mounted air handling systems will be set on insulated roof curbs with internal vibration isolation. Additional structural steel support will be required to support the new rooftop equipment.

(c) All Storage Rooms, Electric Rooms, Mechanical Rooms on the perimeter of the building, but which are not provided with air conditioning as noted above shall be heated with electric or hydronic terminal heating equipment. The heating source would be based on the system option.

(d) Toilet Rooms, Janitors Closets, Art Classrooms and Science Classrooms shall be exhausted by roof mounted exhaust fans set on insulated roof curbs connected to low pressure exhaust air ductwork with exhaust air registers.

(e) Kitchen grease hoods shall be exhausted by roof mounted upblast grease exhaust fans set on insulated roof curbs connected to black steel ductwork fire protected by a fire wrap insulation. Makeup air for grease exhaust hoods shall be supplied from natural gas fired, 100% outside air units with direct expansion cooling.

(f) Mechanical Rooms, Electric Rooms and other rooms requiring ventilation shall be ventilated by inline or roof mounted fans set on

insulated roof curbs connected to low pressure ventilation air ductwork with registers.

(g) Central plant chilled water and heating water systems shall be complete with expansion tanks, air separators and chemical treatment systems.

(h) All HVAC systems and equipment shall be controlled from a Johnson Metasys Direct Digital Control (DDC) system, with tie into the Harford County Board of Education Facility Management System (FMS) via Internet connection. The existing Harford County Board of Education Building Automation System (BAS) is a Johnson Controls Metasys System. The HVAC monitoring and control system shall be one of direct digital controls and communicate with the Board FMS. All equipment must be BACnet capable and shall be connected to the BAS. Communication means the ability of the Board FMS operator to fully utilize the Metasys network manager software to receive alarms, logs, and reports; monitor operating conditions; change control set points and operating schedules; and operate equipment as desired.

2. All piping, specialties, hangers, supports, etc. for the heating, ventilating, and air conditioning (HVAC) systems would be installed in accordance with State and local codes and would generally be concealed within the walls and above ceilings.

(a) Air conditioning condensate drainage shall be Type DWV copper inside the building and Schedule 40 PVC outside the building.

(b) Heating and chilled, water piping 2½" and smaller shall be Type L hard copper water tube with press fittings. Heating and chilled water piping 3" and larger shall be Schedule 40 black steel with long radius welded or mechanical joints/fittings.

(c) Natural gas piping 2½" and smaller above ground shall be Schedule 40 black steel with malleable iron threaded joints/fittings. Natural gas piping 3" and larger above ground shall be Schedule 40 black steel with long radius welded joints/fittings.

(d) Refrigerant piping shall be Type L hard copper refrigerant tube, dehydrated and sealed. Fittings shall be wrought copper with solder ends. Joints shall be brazed with silver alloy brazing using a nitrogen purge.

(e) Reduced pressure backflow preventer shall be installed in domestic cold water piping serving make-up water to chilled water and heating water systems.

B. Plumbing

1. A complete plumbing system shall be provided to serve all new plumbing fixtures in the existing school building/proposed addition or new building as outlined in the architectural sections of this report. All plumbing fixtures shall be complete in every detail with all trim and connections. All exposed fixture trim shall be chrome plated brass. All piping, specialties, hangers, supports, etc. for the plumbing systems shall be installed in accordance with State and local codes and shall generally be concealed within the walls and above ceilings.

1) The school building shall be served by an independent 4" domestic water service extended from the municipal service. A reduced pressure backflow preventer shall be provided at the service entrance prior to extending out to the building.

2) A new natural gas main with exterior meter shall enter the building with a

main shut-off valve for extension to domestic water heater(s), the Kitchen and potentially gas fired boilers or rooftop air handling equipment depending on what HVAC option is selected.

3) Sanitary and storm water piping above grade shall be constructed of cast iron. Underground piping shall be Schedule 40 PVC.

4) The roof drainage system shall consist of roof drains connected to an onsite municipal underground storm water system and an independent roof drainage overflow piping system extended to daylight. Roof drain sumps and horizontal storm water piping above grade shall be insulated.

5) Domestic water piping shall be insulated and constructed of Type L copper with press fittings.

6) Natural gas piping shall be welded and/or screw type, constructed of schedule 40 black steel.

7) All plumbing fixtures and equipment shall be water saving and energy efficient. Plumbing fixtures shall be provided as follows:

   (a) Water Closets: Water saving, floor mounted and/or wall mounted, elongated, white vitreous china, automatic flush valve type with open front seat. Water closets for handicapped shall be mounted at handicapped height. Water closets for Pre-K, Kindergarten and lower grade levels shall be mounted at age appropriate heights.

   (b) Urinals: Water saving, wall hung, vitreous china, automatic flush valve type with carrier. Urinals for handicapped shall be mounted at handicapped height. Urinals for Pre-K, Kindergarten and lower grade levels shall be mounted at age appropriate heights.

(c) Countertop Lavatories: Countertop white enameled cast iron basin. Sinks shall have metering lever faucet, supplies, stops, P-trap, and grid drain. Handicap lavatories shall be mounted at handicapped height and shall be provided with offset traps and exposed waste, hot and cold-water piping shall be insulated with white under sink pipe covers.

(d) Wall Hung Lavatories: White enameled cast iron basin. Sinks shall have metering lever faucet, supplies, stops, P-trap, and grid drain. Handicap lavatories shall be provided with offset traps and exposed waste, hot and cold-water piping shall be insulated with white under sink pipe covers,

(e) Service Sink: Floor mounted white enameled cast iron with hose end faucet and integral vacuum breaker.

(f) Classroom Sink: Stainless steel single compartment with gooseneck faucet with wrist blade handles and non-squirting push button bubbler.

(g) Electric Water Coolers: Stainless steel, dual level barrier free, including bottle fillers, certified lead free.

Handicap accessible plumbing fixtures shall be provided as required by Americans with Disabilities Act (ADA) where shown on the architectural drawings.

8) Cast iron floor drains shall be provided in all toilet rooms, mechanical rooms and where required. Floor drains shall have deep seal traps and shall be primed.

9) Floor sinks shall be provided in the Kitchen where required. Floor sinks

shall have deep seal traps.

10) All floor drains shall be primed with floor drain trap priming device. Trap primer shall be installed with pipe connection at the top of the main water supply. A copper line from distribution unit shall be extended to each floor drain. Traps shall be primed on a minimum 3 psi pressure drop.

11) Domestic hot water needs shall be provided by centralized electric or gas fired direct vented tank type water heater to serve the domestic hot water requirements of the building. The domestic hot water system shall be designed for 140°F for kitchen application, complete with a mixing valve station to distribute 105°F water to the building. Kitchen and building domestic hot water systems shall include hot water recirculation pumps and piping, installed according to the requirements of the local codes.

C. Fire Suppression/Protection

1) The entire facility shall be protected with a wet pipe fire sprinkler system. During the early stages of design, a flow test shall be performed on the water mains adjacent to the school site to confirm available pressure and confirm the need for a fire pump.

2) The school building shall be served by a new independent 6" fire entrance extended from the municipal service. O.S.&Y. valves with fire alarm system monitored tamper switches and a double check valve backflow preventer shall be installed prior to the fire protection sprinkler zone header.

3) Fire Protection Sprinkler zones shall generally match the fire alarm system zoning.

D. Electrical

1. Electric Service and Power Distribution

Although the existing 480Y/277 volts, 3 phase, 4 wire 3,000 ampere electric service at the Wakefield Building would have sufficient capacity to serve a renovated and expanded building for 800 or 1000 students, the existing switchboard does not contain provisions for additional feeder circuit breakers to be added, and there is no space in the existing Main Electric Room to add an additional distribution section to the switchboard.

Under any of the above options for a replacement school facility, a new electric service should be provided in a dedicated Main Electric Room located either in an addition to the existing Wakefield building, or in a new school building. The new electric service should be rated 480Y/277 volts, 3 phase, 4 wire as follows:

- 800 student school 95,000 square feet 3,000 amperes
- 1,000 student school 115,000 square feet 3,000 amperes
- 1,100 student school 125,000 square feet 3,000 amperes

New branch circuit panels rated 480Y/277 volts, 3 phase, 4 wire should be provided throughout the facility to serve lighting, HVAC peripheral equipment such as VAV terminal units and other large loads.

New branch circuit panels rated 208Y/120 volts, 3 phase, 4 wire should be provided throughout the facility to serve receptacles, audio-visual equipment, educational equipment, computer equipment and similar loads.

Local dry type transformers should be provided to step power from the 480/277 volt panels down to supply the 208/120 volt panels.

2. Emergency Power

Emergency power shall be provided by an exterior mounted, diesel powered standby generator, which shall provide emergency power to two (2) automatic transfer switches:

ATS-1 shall serve Emergency Life Safety loads such as egress lighting, exit signs, fire alarm system, telephone system, IT loads serving school sound and communications systems.

ATS-2 shall serve Optional Standby loads such as heating equipment to maintain heat throughout the building, kitchen refrigeration equipment, etc.

This school will not be used as a Community Area of Refuge, as this function is provided at the neighboring Belair High School. As such, there will be no provisions for powering whole areas of the building for community refuge center use during long term power outages.

The generator fuel supply shall be sized to operate the generator at 100% load for a minimum of 72 hours.

The generator shall be located outdoors in a weather resistant, Level 2 sound attenuated housing with sub-base type fuel tank. Sound levels shall meet State, County and local requirements.

3. Interior Lighting

All lighting fixtures shall be LED, with a minimum color rendering index (CRI) of 85, and a correlated color temperature (CCT) of 3500K.

Lighting controls shall be automated type in accordance with International Energy Efficiency Code (IECC) or ASHRAE 90.1 requirements. Automated lighting sensors shall typically run lighting on at 50% level when the room is occupied. A pushbutton

shall allow the lighting to be raised to 100%. The lighting shall automatically turn off when the room has been unoccupied for more than 20 minutes. Specific control sequences shall be developed during design based on room use.

4. Emergency and Exit Lighting:

Emergency lighting shall be provided in all corridors, open office areas, public spaces, meeting, classroom or conference rooms, assembly areas, stairways, toilet rooms, etc. Emergency lighting shall be provided by connection of standard lighting fixtures to circuits fed from the Life Safety branch of the emergency power system. Emergency lighting in classrooms and similar spaces shall be controlled via Emergency Transfer Relay for normal control when utility power is available, and automatic switchover to full on, powered by emergency power circuit when utility power fails.

Exit signs shall be LED type, with molded, UV stabilized thermoplastic housing and stencil face, shall be provided throughout the building at all exitways, and throughout corridors and egress pathways as required by Code. Exit lettering shall be red or as required by the Authority Having Jurisdiction. Exit signs shall be always on and shall be connected to circuits fed from the Life Safety branch of the emergency power system.

5. Exterior Lighting:

New exterior lighting shall be provided for all parking lots, driveways, roadways, and walkways, and for the complete building perimeter.

Lighting for roadways and parking lots shall consist of LED full cut-off luminaires on 25’ aluminum poles. Lighting for walkways shall consist of decorative LED full cutoff type fixtures mounted on 14’ aluminum poles. Illumination shall be designed for an average of 1.0 footcandles, with a maximum to minimum ration not to exceed 7:1. These fixtures shall operate from dusk until 11:00 PM.

Building mounted security lighting shall be provided to illuminate the entire perimeter of the building. Where soffits are available, LED downlight fixtures shall be recessed into the soffit. Where there are no soffits, fixtures shall be wall mounted full cut-off LED luminaires. These fixtures shall operate dusk to dawn for security purposes.

All exterior luminaires shall meet IESNA and International Dark Sky Association requirements for full cut-off luminaires.

All underground conductors shall be installed in PVC conduit.

Exterior lighting control shall be via the Johnson Controls Building Automation System provided under Division 25. Separate exterior lighting control shall be provided for security (building mounted, dusk to dawn operation) and roadway/parking lot (dusk to 11:00 PM) operation.

6. Fire Alarm System

The building shall have a completely new device addressable, analog detection fire alarm system. The system shall be monitored by the HCPS monitoring vendor.

Alarm Indicating Devices for the Gymnasium, Cafeteria and associated Lobby and egress pathways shall be voice evacuation. The Alarm Indicating Devices in the remainder of the building will be horn/strobes.

Smoke detectors shall be provided at each elevator stop and in the elevator machine room, on either side of fire/smoke separation doors, in each Telecommunications Closet, at the Fire Alarm Control Panel and each NAC panel, and elsewhere as required by Code.

Heat detectors, which activate the elevator shunt trip, shall be provided within 12" of each sprinkler head in the elevator shaft, pit and machine room.

The building sprinkler system shall be monitored for sprinkler flow and valve position, on a zone by zone basis as well as at the incoming sprinkler service. Sprinkler system zones shall match the Fire Alarm system zones, which by Code shall not exceed 22,500 square feet per zone.

Provide relay at each local Sound System to mute the system on Fire Alarm activation.

7. Security and Telecommunications Systems – General

The existing Security and Telecommunications Systems in both existing buildings are limited in scope and typically of older technology. Under any proposed scenario for either addition/modernization or new construction, all existing Security and Telecommunications Systems should be replaced in their entirety with new equipment and wiring.

Security Systems (Intrusion Detection, Access Control and Video Monitoring) should generally be designed in accordance with the Harford County Public Schools Design Manual. Specific system requirements and design should be coordinated with Office of Safety and Security.

Telecommunications Systems (Telephone, Data Network, Classroom Flat Panel Touch Screens, Clock System) should generally be designed in accordance with the Harford County Public Schools Design Manual. Specific system requirements and design should be coordinated with Office Technology and Information Systems.
The system shall be monitored by the HCPS monitoring vendor.

8. Intrusion Detection System

Provide a complete Intrusion Detection system based on a Bosch Radionics 9112 Master Unit.

The system shall include Passive Infrared Motion Sensors in each room with an exterior door or window accessible either directly from grade or from an adjacent roof. Provide door contacts on exterior doors to Boiler Room, Main Electric Room and all roof access hatches or doors.

Provide system control Keypads to arm/disarm the security system at the main entrance, custodial entrance, and kitchen entrance.

The Intrusion Detection System shall be interfaced to the Access Control System so that valid access to the building shall automatically disarm the Intrusion Detection System.

9. Access Control System

The building shall be locked down at all times. Main doors at front lobby, near the teachers' parking lot, athletic fields or playground equipment, instrumental music room, and custodial entrance shall have electronic locks that allow the use of a proximity card reader device to allow them to be unlocked without keys.

The access control system shall use proximity type access cards.

Provide video intercom door entry system at the Front Lobby door and at the Kitchen entry door. The Front Lobby door shall be monitored and released from any Administrative computer. The Kitchen door shall be monitored from the Kitchen Managers office or any Administrative computer.

Provide door entry system to provide door release for kitchen door at loading dock. Remote release shall be provided by an intercom station in the kitchen manager's office and at the school's main office.

10. Video Surveillance System

Provide a complete, IP camera based video monitoring system on the interior and exterior of the building. Cameras shall be provided on the exterior of the building to cover the entire exterior perimeter of the building. Cameras shall be provided on the interior of the building to cover all corridors, primary entry doors, the Main Office Reception Room, the Cafeteria Serving Line, and elsewhere as directed by the HCPS Office of Safety and Security.

The system shall include a Network Video Recorder, located in a rack in the Main Distribution Frame Room. The Network Video Recorder shall include sufficient hard drive space to record all cameras for a minimum of 30 days.

The Network Video Recorder shall be connected to the School data network to allow viewing of cameras, and operation of Access Control door releases on Administrative workstations. It shall also be possible to view the cameras via a secure connection over the Internet.

11. Telephones

Telephones shall be Voice Over IP (VOIP) type, connected via the School Data Network. Telephones shall be provided in each Classroom and similar Instructional Space at the teachers desk, at each desk in offices and teacher planning rooms, media center, resource officer office. Wall mounted telephones shall be provided in conference rooms, work rooms, faculty lounge, health suite, records rooms, work rooms, copy and file rooms, gymnasium, platform, cafeteria and kitchen.

The Telephone Server shall be rack mounted in the MDF.

Provide interface between the Telephone Server and the School Paging System server to allow voice paging.

12. Data Network

Provide a complete data network, in accordance with HCPS standards.

Provide Wireless Access Point (WAP) in each classroom and similar teaching space. Provide full WAP coverage for the Media Center, Gymnasium, Cafeteria, Kitchen, Health Suite, and all office areas.

Provide wired data connections to each Classroom and Instructional Space Teachers Desk, each Office desk location, each Flat Panel Touch Screen, each copy machine, each Building Energy Management System panel, and elsewhere as indicated in the HCPS Design Manual.

Data wiring shall generally be CAT 6, except WAP's shall be wired with CAT 6E cable and jacks.

13. Classroom Flat Panel Touch Screens

Each classroom and similar teaching space shall have a flat panel touch screen display at the front of the room, with HDMI connections at the Teachers Desk and below the display for guest input to the screen. Sound shall be distributed via four (4) self-powered speakers in the ceiling of each room.

14. Master Clock System

A system of centrally updated Power Over Ethernet (POE) IP Clocks shall be provided as follows:

1. All Corridors – Digital, double face, ceiling mounted
2. Cafeteria – Analog, wall mounted
3. Gymnasium – Analog, wall mounted
4. Media Center – Analog, wall mounted

The central clock server shall be rack mounted in the Main Distribution Frame Room

15. School Overhead Paging System

A complete system of IP (Internet Protocol) based overhead paging speakers shall be provided throughout the facility, including all corridors, classrooms, and all occupied spaces.

Paging access shall be via telephone.

Speakers in Classrooms and occupied spaces shall have talkback capability.

The central paging server shall be rack mounted in the Main Distribution Frame Room

16. Local Sound Systems:

Provide local sound systems for distribution of sound from microphones and local program material in each of the following spaces:

1. Gymnasium
2. Cafeteria
3. Vocal Music Room
4. Instrumental Music Room

Provide Fire Alarm relay to mute local sound system on Fire Alarm activation.

*** END OF M/E/P/FP SECTIONS OF REPORT ***