ACTION

HOWARD COUNTY
PUBLIC SCHOOL SYSTEM

BOARD OF EDUCATION OF HOWARD COUNTY
MEETING AGENDA ITEM

TITLE: Wilde Lake Middle School Feasibility Study **DATE:** November 21, 2013

PRESENTER(S): Mr. Bruce Gist, Director of School Construction
Mr. Mike Lahowin, Principal, TCA Architects

OVERVIEW:
The attached feasibility study describes various scenarios to address the systemic and programmatic needs at Wilde Lake Middle School. Wilde Lake Middle School opened in 1969 with an open classroom design for Grades 6 – 8. The school is a single story building with masonry exterior wall construction. The school has had one building addition and one major renovation in 1975 and 1996 respectively.

Wilde Lake Middle School specifically serves the Town Center of Columbia so it is important that the school prepare to meet the demands of the higher student population as Columbia continues to grow. Due to the predicted increase in student population, the need to reallocate program spaces inside of the school, and various systemic needs of the building, we have investigated three options for the project including a limited renovation and addition, a major renovation and addition, and a replacement school.

Based on lower life cycle costs, improvements to the building and site, and a potentially lower local funding contribution, a replacement school is recommended. The replacement school would be built on Wilde Lake Middle School property and would be one of only three net zero energy schools in the state of Maryland.

RECOMMENDATION/FUTURE DIRECTION:
Approve recommendation to proceed with planning for a replacement school, pending approval of the Interagency Committee on School Construction.

Submitted by:		**Approval/ Concurrence:**	
	Ken Roey Chief Facilities Officer		Renee A. Foose, Ed.D. Superintendent
	Bruce Gist Director, School Construction		Susan C. Mascaro Chief of Staff

tca | architects

Annapolis, Maryland

Feasibility Study

for

Wilde Lake Middle School

for the

Howard County Public School System

tca | architects
Annapolis, Maryland 410-841-6205

21 November 2013

Specializing in the design of educational facilities

Feasibility Study

for

Wilde Lake Middle School

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21 November 2013

Table of Contents

OVERVIEW / SUMMARY

Design Team 4
Project Introduction 5
Project Background and Methodology 6
Design Goals 7
Overview of Schemes 8
Scheme 1 - Light Renovation and Addition to Existing School 9
Scheme 2 - Major Renovation and Addition to Existing School 10
Scheme 3 - New Replacement School 11
Feasibility Study Recommendation 12

EXISTING CONDITIONS

Vicinity Map 13
Existing Site Plan 14
Existing Floor Plan 15
Existing Site Assessment 16
Existing Building Assessment 18
Analysis of Existing Room Sizes 20
Existing Building Space Analysis 21
Existing Building Enclosure Assessment 24
Existing Structural System Assessment 28
Existing Mechanical Assessment 30
Existing Electrical Assessment 35

SCHEME 1 **LIGHT RENOVATION AND ADDITION TO EXISTING SCHOOL**

Summary 39
Site Plan 40
Floor Plan 41
Architectural Design Narrative 42
Civil and Structural Design Narratives 43
Mechanical Design Narrative 44
Electrical Design Narrative 61
Sustainable Design Goals 63
Detailed Cost Estimate 64

SCHEME 2 **MAJOR RENOVATION AND ADDITION TO EXISTING SCHOOL**

Summary 65
Site Plan 66
Floor Plan 67
Architectural Design Narrative 68
Civil and Structural Design Narratives 69
Mechanical and Electrical Design Narratives 70
Sustainable Design Goals 71
Detailed Cost Estimate 72

SCHEME 3 **NEW REPLACEMENT SCHOOL**

Summary 73
Site Plan 74
Conceptual Site Phasing Diagrams 75
Floor Plans 76
Civil Design Narrative 77
Architectural and Structural Design Narratives 78
Mechanical Design Narrative 79
Plumbing Design Narrative 82
Electrical Design Narrative 84
Energy Statement 88
Sustainable Design Goals 89
Detailed Cost Estimate 90

Design Team

ARCHITECT	TCA Architects, LLC	Annapolis, MD
CIVIL ENGINEER	Fisher, Collins & Carter, Inc.	Ellicott City, MD
STRUCTURAL ENGINEER	Johnson Engineering Assoc.	Darnestown, MD
MECHANICAL / ELECTRICAL / PLUMBING ENGINEERS	Gipe Associates, Inc. James Posey and Associates	Baltimore, MD Baltimore, MD
BUILDING ENCLOSURE INVESTIGATOR	Froehling & Robertson, Inc.	Cockeysville, MD
CONSTRUCTION MANAGER	OAK Contracting, LLC	Towson, MD

Project Introduction

PROJECT SUMMARY

Current Capacity of Wilde Lake Middle School:	506 Students
Proposed Capacity:	662 Students
Existing Building Square Footage * does not include the four existing relocatable classrooms	70,530 GSF *
Existing Building Height:	One Story
Construction Classification:	Type 2B
Use Group:	Educational with A-3 Assembly spaces

CONSTRUCTION BUDGET

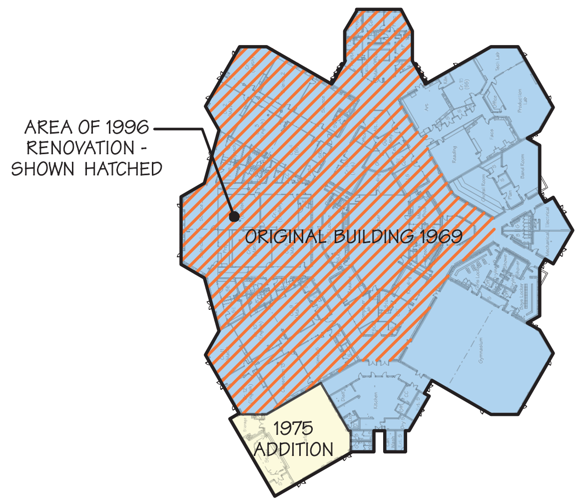
Current Construction Budget ** excludes A/E design fees, CM fees, related costs, FF&E and project contingency	$ 23,000,000 **

PROJECT SCHEDULE

Selection of Feasibility Study Scheme:	November 2013
Design Notice-to-Proceed:	December 2013
Completed Schematic Design Phase:	April 2014
Completed Design Development Phase:	August 2014
Completed Construction Documents:	December 2014
Permits Received:	February 2015
Out for Bids:	February 2015
Bid Opening:	March 2015
Start Construction:	May 2015
School Occupied:	August 2017

Project Background

The existing Wilde Lake Middle School is a one-story building that was originally constructed in 1969. In 1975, a 4,100 sf cafeteria and stage were constructed which increased the school to its current size of 70,530 sf (not including the four relocatable classrooms currently on site). In 1998, the open space plan was renovated to create self-contained classrooms (see hatched area in diagram to right). Additional construction has been done over the years to further partition the existing building.



The school currently has a state-rated capacity (SRC) of 506 students. In addition to the design goals stated on page 7, this project will increase the capacity by 156 students, thus bringing the school capacity to 662 students, which is equal to that of the HCPSS middle school prototype design.

This feasibility study illustrates three schemes where the capacity of Wilde Lake Middle School is increased:

Scheme 1 - Light Renovations and Addition
Scheme 2 - Major Renovations and Addition
Scheme 3 - New Replacement School

Methodology

The existing school has been evaluated by the design team to determine the existing condition of the facility and to understand operational concerns of the school staff. The goal of Schemes 1 and 2 is to improve the existing facility under the HCPSS "Guidelines Manual for Renovations and Modernizations of Existing Schools" as well as following the educational program developed for the most recent new middle school, Middle School No.20, which has a 662 student capacity. Under this direction, all existing teaching stations remain in the renovated area for Scheme 1 and will be the minimum 660 square feet, while Scheme 2 locates most teaching stations in a newly constructed addition. All teaching stations in new construction will be at least 750 square feet each for all three schemes. The replacement school reflects the middle school educational program developed from the evolution of the HCPSS prototype design as it has gone through the design process five times. The information presented in this report is based on the following:

- Analysis of the existing Wilde Lake Middle School. The design team conducted a thorough visual evaluation of the existing building.
- Review of existing construction documents for the original building, the 1975 addition and the 1996 renovation as provided by HCPSS.
- Review of the Educational Program Assessment conducted by Gilbert Architects, Inc. dated August 2008.
- Analysis of existing site features including, but not limited to, the utilities, site access, playfields and the Columbia Association's non-credited open space requirements.
- Meeting with HCPSS Department of Transportation to review existing vehicular circulation pattern deficiencies.
- Development of two renovation schemes that address existing site concerns, along with a scheme showing the feasibility of the prototype middle school being constructed.

Design Goals

- Increase the capacity of Wilde Lake Middle School from 506 to 662 students (+156).
- Ensure that the building is fully accessible and meets the new 2010 Americans with Disabilities Act (ADA) guidelines.
- Improve the complicated corridor circulation within the building by reducing the amount of angles in corridors and linking current corridors to provide looped circulation.
- Provide more linear corridors with fewer alcoves and hidden spaces.
- Increase the amount of natural daylighting and exterior views in occupied spaces.
- Investigate the feasibility of renovating the existing building to meet the needs of the latest HCPSS middle school educational program, life safety code and building codes in comparison to constructing the HCPSS middle school prototype design as a new replacement school.
- Improve security of the school by providing a controlled main entrance with a new vestibule that provides direct access to the main office.
- Provide stormwater management facilities for all new construction on site.
- Minimize impact to school operations during construction by maintaining existing building infrastructure, thereby minimizing costs.
- Improve vehicular circulation on-site by separating the bus drop-off/pick-up area from the car drop-off/pick - up area.
- Ensure the safety and comfort of all students, faculty, school staff and visitors.
- ‘Green School’ construction improvements will be designed to conserve energy, water and materials, thus reducing negative impacts on human health and the environment. It is a goal for this project to achieve a LEED certification by the United States Green Building Council.

Overview of Schemes

Scheme 1 - Light Renovations and Addition

Area of Existing Building	70,530 gsf
Area of New Addition	± 24,300 gsf
Total Area	**± 94,830 gsf**
Construction Duration (occupied)	**27 months**
LEED certification	**'Certified' Level**
Construction Cost	**$ 24,268,453**

Scheme 2 - Major Renovations and Addition

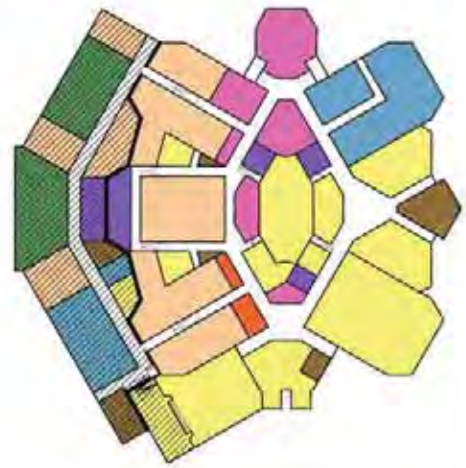
Area of Existing Building	70,530 gsf
Area of New Addition	± 30,000 gsf
Total Area	**± 100,530 gsf**
Construction Duration (occupied)	**27 months**
LEED certification	**'Certified' Level**
Construction Cost	**$ 26,051,568**

Scheme 3 - New Replacement School

Area of First Floor	68,700 gsf
Area of Second Floor	27,138 gsf
Total Area	**95,838 gsf**
Construction Duration	**27 months**
LEED certification	**'Gold' Level**
Construction Cost	**$ 28,225,630**

Scheme 1
Light Renovations and Addition to Existing School

Area of Light Renovation	± 42,030 gsf
Area of Major Renovation	± 28,500 gsf
Area of New Addition	± 24,300 gsf
Total Area	**± 94,830 gsf**
Construction Duration (occupied)	27 months
Building Subtotal	$17,195,311
Demolition Subtotal	$ 295,000
Sitework Subtotal	$ 2,323,335
Construction Cost Subtotal	**$19,813,646**
Relocatables for Occupied Construction	$ 1,050,000
Phasing Costs	$ 140,000
Premium for Off-Hour Work	$ 231,040
Cost Estimate Contingency (10%)	$ 2,100,365
Escalation for Bid Date Contingency (4%)	$ 933,402
Construction Cost Grand Total	**$ 24,268,453**

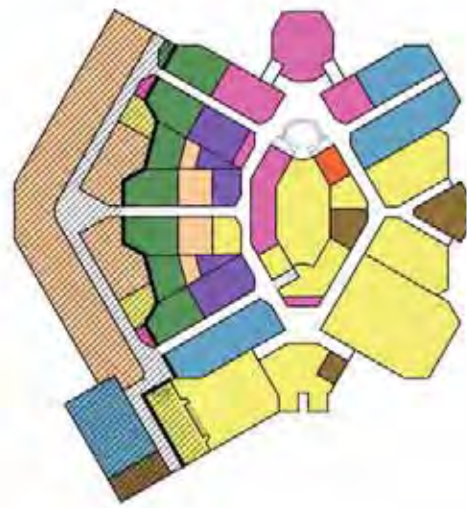


Scheme 1 Design Attributes:

- Majority of existing walls will remain; therefore, most existing classrooms will remain as classrooms, though they will receive new finishes, cabinetry, doors, data, electrical and mechanical systems.
- Undersized science labs and music suite will be relocated to new addition to meet the educational program requirements.
- Existing classroom locations will not allow for windows, but skylights can be implemented to provide natural daylight. This scheme will not be able to meet the requirements of the LEED credit for daylight and views.
- Existing corridor ramps and stairs will remain; therefore, the new addition will be ±18" below the finish floor of the main entrance and the cafeteria. Note: A new ramp will be constructed to access the existing cafeteria from the new addition.
- Existing building circulation will be improved by creating looped circulation; one inner loop for access to existing classrooms and one outer loop leading students through the new addition.
- Cafeteria will be enlarged to meet educational program requirements. New addition will include a Stage with a ramp that will meet the ADA accessible path requirements.
- Mechanical system will utilize geothermal technology.
- School will not have access to playfields for duration of construction (± 27 months).
- School should achieve USGBC LEED 'Certified' certification.

Scheme 2
Major Renovations and Addition to Existing School

Area of Light Renovation	± 19,730 gsf
Area of Major Renovation	± 50,800 gsf
Area of New Addition	± 30,000 gsf
Total Area	**± 100,530 gsf**
Construction Duration (occupied)	27 months
Building Subtotal	$18,380,032
Demolition Subtotal	$ 475,000
Sitework Subtotal	$ 2,664,045
Construction Cost Subtotal	**$21,519,077***
Relocatables for Occupied Construction	$ 450,000
Phasing Costs	$ 140,000
Premium for Off-Hour Work	$ 729,600
Cost Estimate Contingency (10%)	$ 2,210,908
Escalation Contingency (4%)	$ 1,001,983
Construction Cost Grand Total	**$ 26,051,568**



Scheme 2 Design Attributes:

- Most classrooms and the music suite will be located in the newly constructed addition.
- The majority of classrooms will be located along exterior walls allowing for windows providing natural daylight. Skylights will be added to learning stations that do not have an exterior wall. Daylight and views have proven positive results in a student's ability to learn and will also provide LEED credits. This scheme will be able to meet the minimum requirements of the LEED credit for daylight and views.
- Lower classroom level will be raised ±18" to match the finish floor of the main entrance and the cafeteria, thus eliminating the need for the existing ramps in the corridors (see Structural Constraints of Existing Building diagram on page 29).
- Building circulation will be improved by minimizing the length of corridor circulation and providing continuous corridor loops throughout the classroom wing.
- Staff supervision of corridors will be improved by reducing the number of angles in the corridor layouts and providing long lines of vision throughout.
- Cafeteria will be enlarged to meet educational program requirements. New addition will include a Stage with a ramp that will meet the ADA accessible path requirements.
- Mechanical system will utilize geothermal technology.
- School will not have access to playfields for duration of construction (± 27 months).
- School should achieve USGBC LEED 'Certified' certification.

Scheme 3
New Replacement School

Area of First Floor	68,700 gsf
Area of Second Floor	27,138 gsf
Total Area of Prototype Middle School	**95,838 gsf**
Construction Duration	27 months
Building Subtotal	$19,591,942*
Sitework Subtotal	$ 3,701,800
Construction Cost Subtotal	**$23,293,742**
Site Phasing & Demolition of Existing Building	$ 722,403
Cost Estimate Contingency (5%)	$ 1,200,807
Escalation for Bid Date Contingency (4%)	$ 1,008,678
Construction Cost Grand Total	**$ 26,225,630**
Upgrading Prototype Design to Net Zero	$ 4,500,000**
Less Grant from MD Energy Administration	(- $ 2,500,000)
Construction Cost Total for Net Zero Building	**$ 28,225,630**

Notes:

* Bid-Day Construction Cost from Middle School No.20.

** Net Zero Energy Building requires an enhanced building design to greatly reduce energy needs through efficiency gains such that the balance of the energy needs can be supplied with renewable technologies (i.e. solar PV panels).

Scheme 3 Design Attributes:

- This project has been accepted into the Net Zero Energy School Grant Program offered by Maryland Energy Administration (MEA) and Public School Construction Program (PSCP). Building systems will be designed such that over the course of a year, the energy consumed will equal the energy produced on site; thus net zero.
- Building indicated is the current HCPSS 662 student capacity middle school prototype (MS#20).
- This scheme will provide natural daylight to 90% of occupied spaces and earn two LEED credits.
- Highly efficient mechanical system will utilize geothermal technology.
- Floor plan includes Recreation and Parks spaces per the prototype design. This square footage will be redesigned to account for existing educational programs at Wilde Lake Middle School that are not in the prototype design (see Space Analysis of Existing Building on pages 21-23).
- School will not have access to playfields for duration of construction (± 27 months).
- Site design for this scheme will allow students to enter building directly from parent drop-off without crossing the bus-loop and to access playfields directly from gymnasium without crossing the service drive.
- Project will need to get a variance from Columbia Association to provide the appropriate amount of paving for all the vehicular circulation on site. The process of obtaining such a variance is estimated to take a year.
- School should achieve USGBC LEED ‘Gold’ certification.

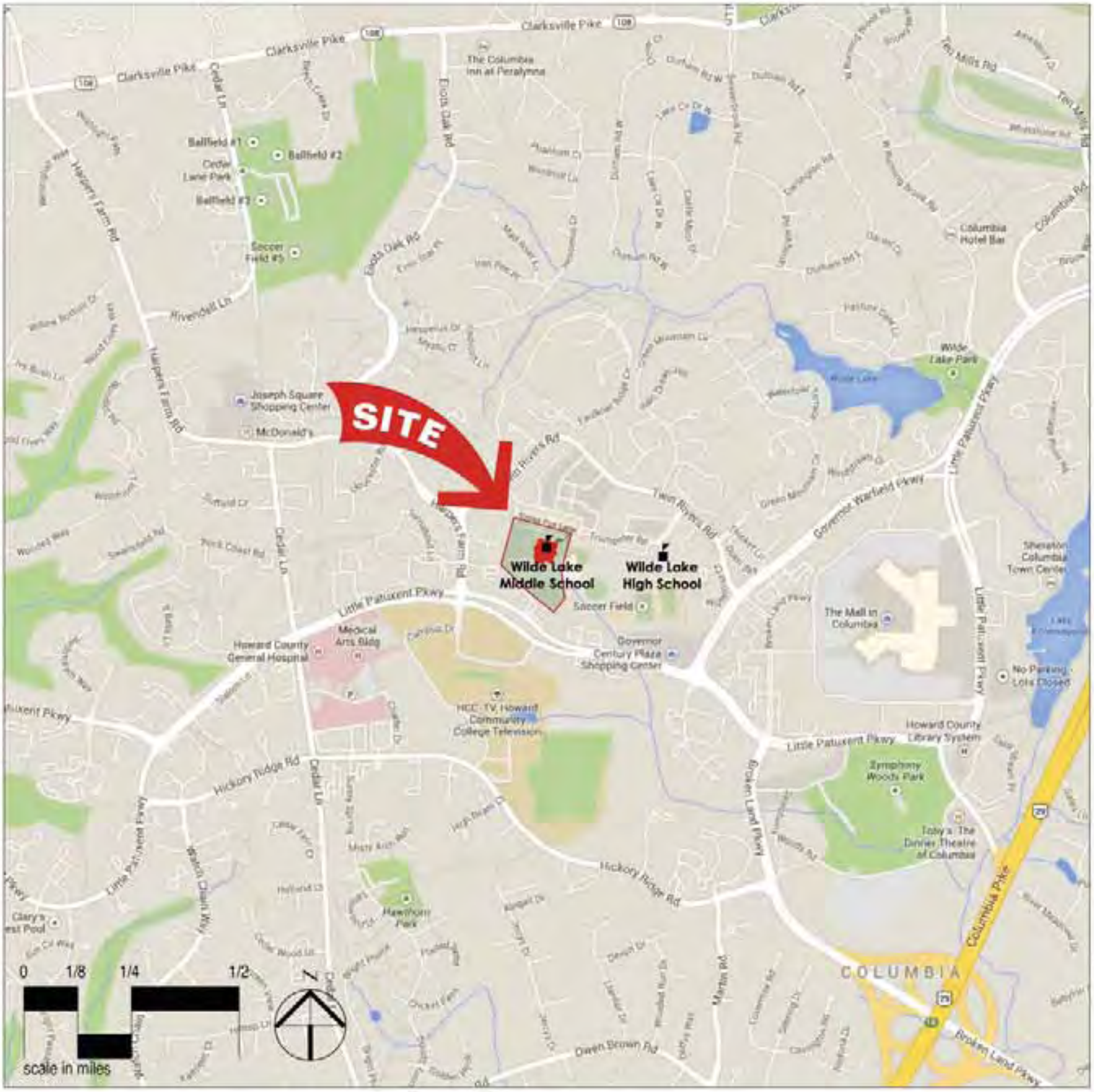
Feasibility Study Recommendation

After review of all schemes, the staff recommends **Scheme 3**, thus constructing a new high performance, Net Zero energy school building alongside the existing Wilde Lake Middle School which will be demolished upon completion of the new school.

<u>Benefits of Scheme 3 Include the following</u>:

- Scheme 3 allows the occupants of Wilde Lake to work, teach and learn, in a newly constructed building where all spaces will be constructed for their intended use. No spaces will be repurposed as in the renovation / addition schemes.
- There will be virtually no disruption to the students of Wilde Lake Middle School during construction of Scheme 3. (The renovation / addition schemes would have required teaching and learning to be located within the same building during the 27 months of phased construction.)
- Scheme 3 provides more natural daylighting and exterior views in occupied spaces than the renovation / addition schemes.
- Scheme 3 provides the most efficient corridor circulation pattern throughout the building, compared to the renovation / addition schemes.
- Scheme 3 completely separates the bus drop-off/pick-up area from the car drop-off/pick-up area. Students will not cross a vehicular driveway as they enter/exit the school from the car drop-off/pick-up area as they would in the other schemes.
- Scheme 3 provides a superior energy efficient building. While the middle school prototype building meets the current Energy Conservation Code, the design modifications will surpass those code requirements to create an enhanced building design.
- Scheme 3 results in lower operating costs over the life of the school compared to the renovation / addition schemes.
- Scheme 3 allows the Net Zero energy school building to be used as a teaching tool to educate students, educators and community members about the benefits of energy efficiencies and renewable energy technologies.
- Scheme 3 should achieve a 'Gold' level of LEED certification compared to the renovation/ addition schemes which would likely achieve a 'Certified' level.
- The state of the art, highly energy efficient building provided by Scheme 3 will result in one of the first 'Net Zero Energy' public school buildings in Maryland. To create a 'Net Zero Energy' building, an enhanced design is provided to reduce energy needs through efficiency gains such that the balance of energy needs can be provided by on-site renewable energy technologies (i.e. solar PV panels). Building design enhancements will provide:
    - a superior building envelope (walls, doors, windows and roof) with a a higher thermal resistance
    - a highly efficient mechanical system utilizing geothermal and energy recovery technologies
    - solar hot water heating
    - enhanced lighting design which minimizes energy consumption by careful light fixture selection and automated controls with dimming capabilities and occupancy sensors

Vicinity Map



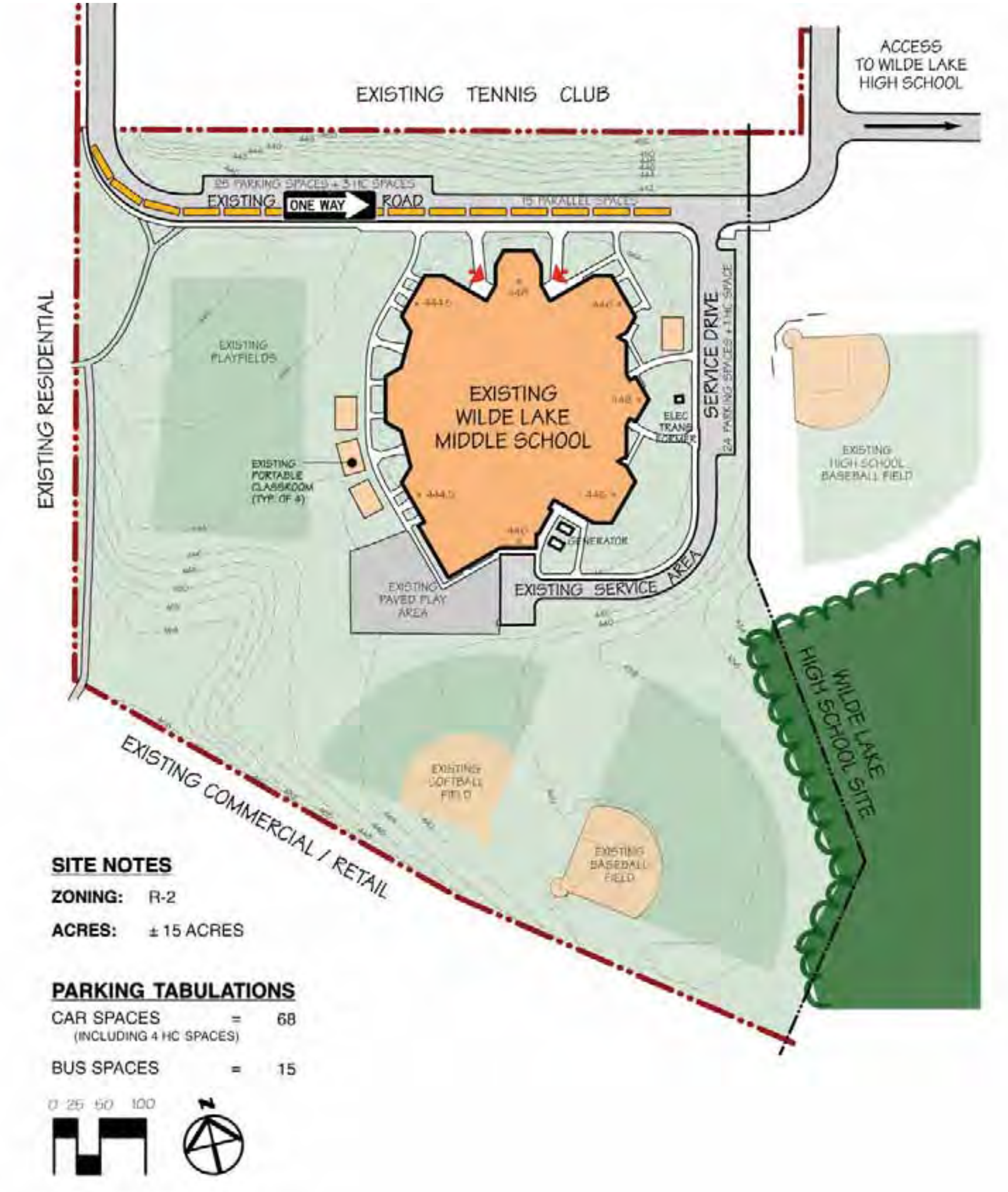
Map data: Google

The existing Wilde Lake Middle School is located on Cross Fox Lane in Columbia, Maryland approximately one mile west from the Mall in Columbia. It is bordered to the north by a tennis club, to the west by a residential community, and to the south by a commercial area and to the east by Wilde Lake High School.

This site was originally developed for the school in 1969 and is currently shared with Wilde Lake High School. The middle school site elements utilizes ± 15 acres of the shared site.

Public water, sewer and natural gas serve the site.

Existing Site Plan

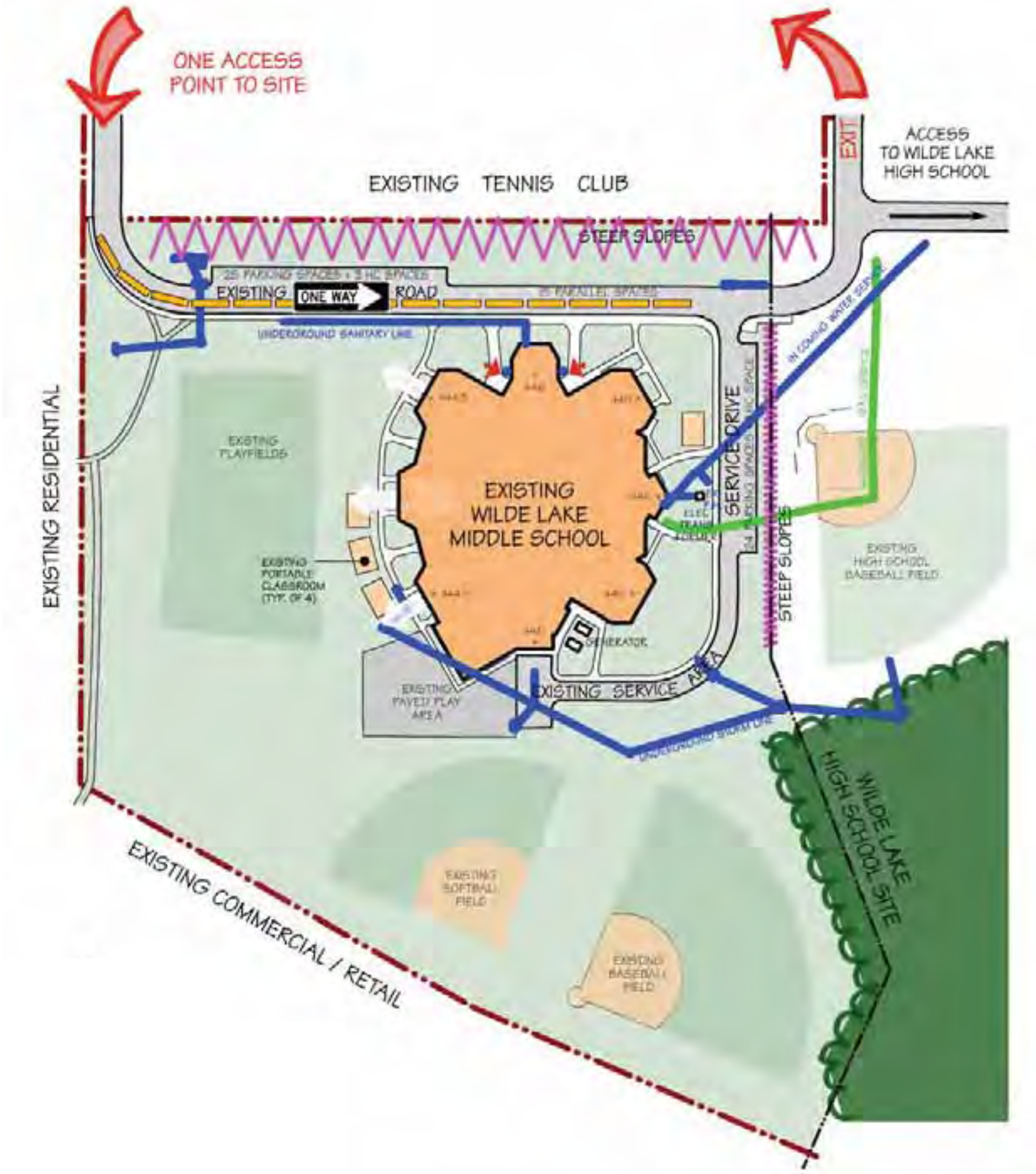


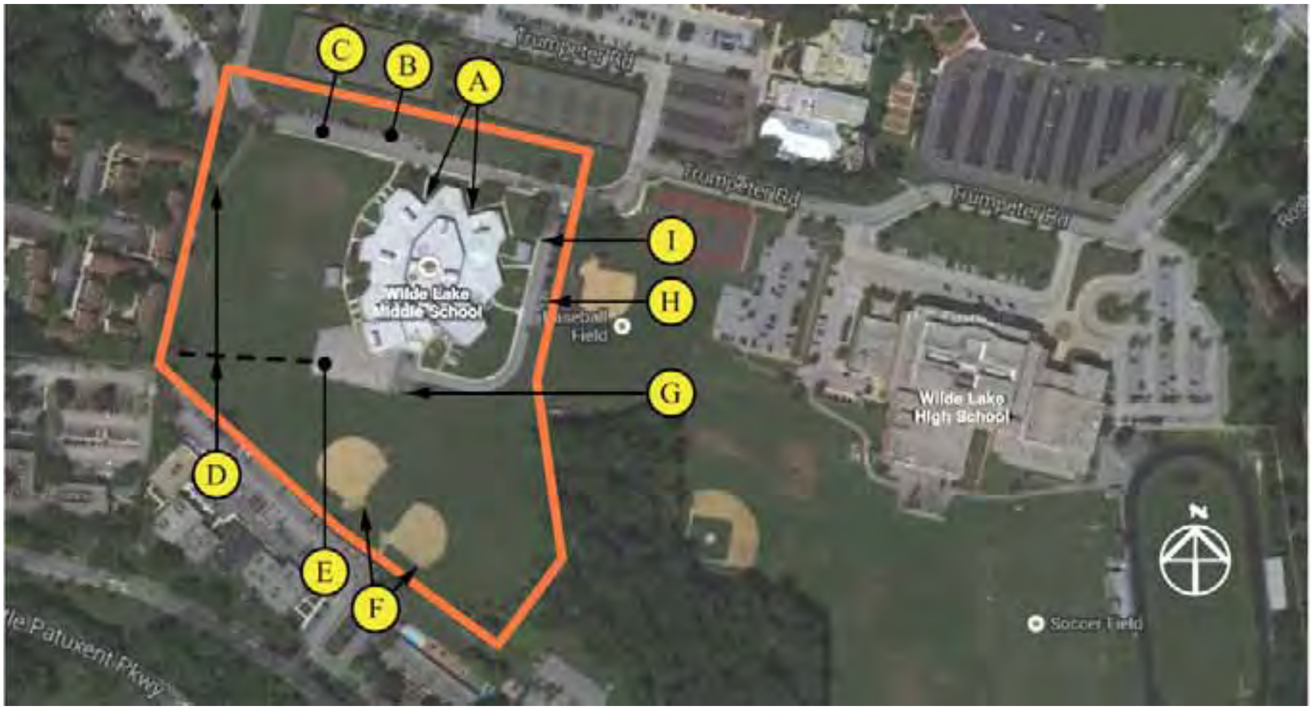
Existing Floor Plan

Existing Site Assessment

Wilde Lake Middle School shares a site with Wilde Lake High School. The middle school utilizes approximately 15 acres of this combined site. An existing one-way road in front of the middle school connects both the middle and high school portions of the site. There are 68 existing car parking spaces designated for middle school use and curbside bus parking on the one-way road for approximately 15 busses.

There is currently one softball field and one baseball field to the south of the school along with one large multipurpose field with an unskinned softball field overlapped to the west. A large paved play area adjacent to the cafeteria accommodates two outdoor basketball courts. There are currently four portable classrooms on site, three to the west of the school and one to the east.





Based on a recent site inspection, the following site items were observed:
(See aerial photo above for exact location on site)

A. A majority of exterior door entrances are not ADA compliant. Many entrances are provided with a step adjacent to the door and several exterior doors have been provided with non-compliant ADA ramps. The existing ramps are lacking a 5 foot level landing adjacent to the door.
B. Resurfacing the parking areas over many years has resulted in curb heights of only a few inches. It is recommended that all concrete curbs be replaced and set at a proper elevation.
C. The number of existing staff spaces parking is inadequate. There is no clear distinction between the parent drop-off and the bus parking area. The existing parking areas need to be expanded to accommodate additional parking as well as providing distinct areas for parent drop-off and bus drop-off. The recorded non-credited open space area for the combined school site (both high school and middle school) is 6.529 acres. Upon completion of the high school renovation in 1995, the total non-credited open space was documented (SDP 94-100) to be 6.045 acres leaving only 0.5 acres of non-credited open space for additional middle school parking and driveways. Approval will be required from the Howard Hughes Corporation in Columbia if any additional parking and driveways exceed 0.5 acres. If approved by the Howard Hughes Corporation, the Final Development Plan criteria process will take approximately one year.
D. A new paved pedestrian path should replace a bare path across a grass area connecting the adjacent property to the paved play area since the students are not using the existing paved path along the west property line.
E. The existing asphalt paved play area is severely worn and cracked and requires replacement.
F. There are no team benches for the softball and baseball fields and the existing fencing is worn and needs to be replaced.
G. The existing dumpsters, currently located on grass, should be provided with a concrete dumpster pad and enclosure.
H. Standing water was observed in the corner of the parking spaces to the east of the school.
I. Portions of an existing sidewalk, adjacent to the service drive, are lower than the top of the curb creating safety concerns and need to be replaced.

<End of Existing Site Assessment>

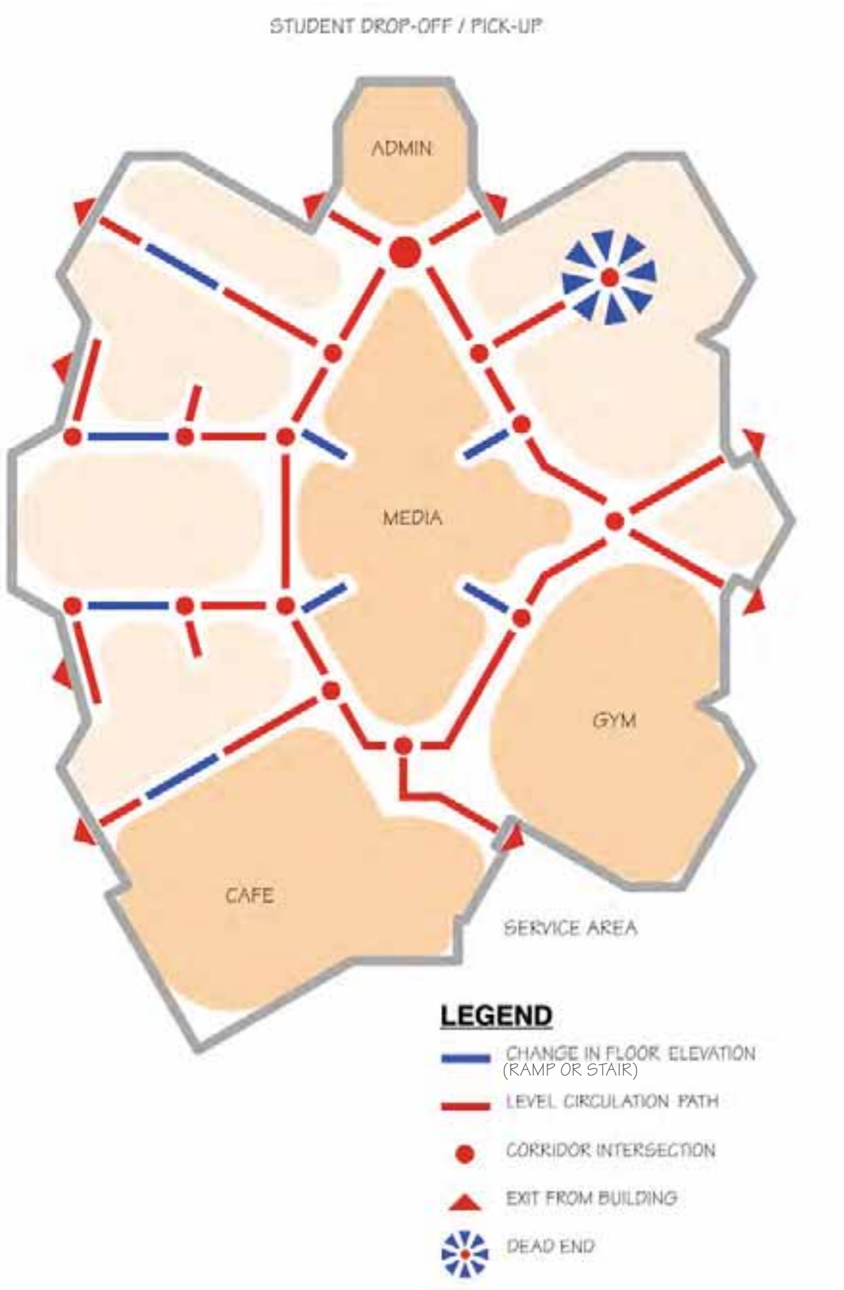
Existing Building Assessment

Wilde Lake Middle School was originally constructed in 1969. An addition of a cafeteria and stage was constructed in 1975. The open classroom pods and the central core of the building underwent major renovation in 1996. (See diagram on page 6 for locations of past renovations and addition.) The current total gross square footage of the school is 70,530 square feet.

The original design was an open classroom concept with two level changes throughout the building. Each of the three open wings on the west side of the building had a large teaching station along the exterior wall that was set 18" lower than the main level. The Media Center, as it was originally designed, had no walls enclosing it but was set 18" higher than the main level and had steps along the perimeter that defined the space.

There are currently six ramps and eight sets of stairs to accommodate the level changes in the existing school, along with multiple corridor intersections and a dead end condition in the Tech Ed wing. See diagram to right.

In 1996, the west classroom wings and the core of the building were renovated (see diagram on page 6). The open pods were converted to 18 self-contained classrooms. Four new corridors were added to provide access to the new teaching stations. Four ramps were constructed, one for each corridor, to access the lower level of each corridor. In the core of the building, classrooms and offices were added along the perimeter of the media center creating an enclosed space. New ramps and stairs were constructed to provide access to the media center from the main level corridors to the raised media center. The diagram to the right shows the building's corridor circulation as it functions today.



CIRCULATION DIAGRAM FOR EXISTING BUILDING

The 1996 renovation created 18 teaching stations out of the original three open classroom pods. Only five teaching stations in the entire building currently have an exterior wall with a window. Therefore, most classrooms lack natural daylight and views to the outside.

Other changes have occurred over the years which include, but are not limited to:

- ◊ Enclosing the Art, Home Ec and Tech Ed classrooms
- ◊ Painting the gymnasium and replacing the gym equipment
- ◊ Constructing Classroom 16 to the east of the media center
- ◊ Partitioning off a Reading classroom within the media center
- ◊ Constructing a Guidance suite in the original lobby area
- ◊ Four portable classrooms have been placed on site to house a Social Studies classroom, Health classroom, World Language classroom and the Ensemble.

The existing building analysis diagram on page 20 indicates spaces which are oversized or undersized in comparison to the HCPSS middle school educational program in addition to spaces which are not ADA compliant. The following observations are based on this diagram:

- The current Health Suite is a single room without a private rest area or a private exam room as required. Overall, the entire health suite is significantly undersized and does not meet Maryland's current COMAR regulations.

- The existing school is not fully handicap accessible:
  - ◊ Restrooms do not comply with the new 2010 ADA guidelines.
  - ◊ Main entrance doors do not comply with the ADA guidelines because there is not enough clear floor space on the pull side of each door.
  - ◊ The Stage floor is not provided with ramp access and therefore, does not have an ADA accessible path.
  - ◊ The existing Technology Resource room does not have an ADA accessible path because the ramp from Media Production is too steep.

- It appears that the Music Suite has not been renovated since the building was constructed in 1969. These spaces are undersized when compared to the current HCPSS middle school educational program. The Music Suite is also remote from the stage for performances.

- The Art classroom has received light renovations, but is still undersized.

- The Home Ec classroom and cabinetry appears to be as constructed in 1969, though walls have been added to enclose this space; it is greatly undersized.

- The existing school does not have all of the Special Education spaces listed in the current HCPSS middle school educational program.

- The Gymnasium is one of the few oversized rooms in the existing building, but the physical education support spaces are undersized.

- The Media Center is located at the central core of the building. It is undersized due to the construction of the Reading classroom to the north.

- The Cafeteria and Kitchen are both undersized when compared to the current MS educational program for the increased student capacity of 662 students.

- All five of the existing science labs are undersized and are remote from each other.

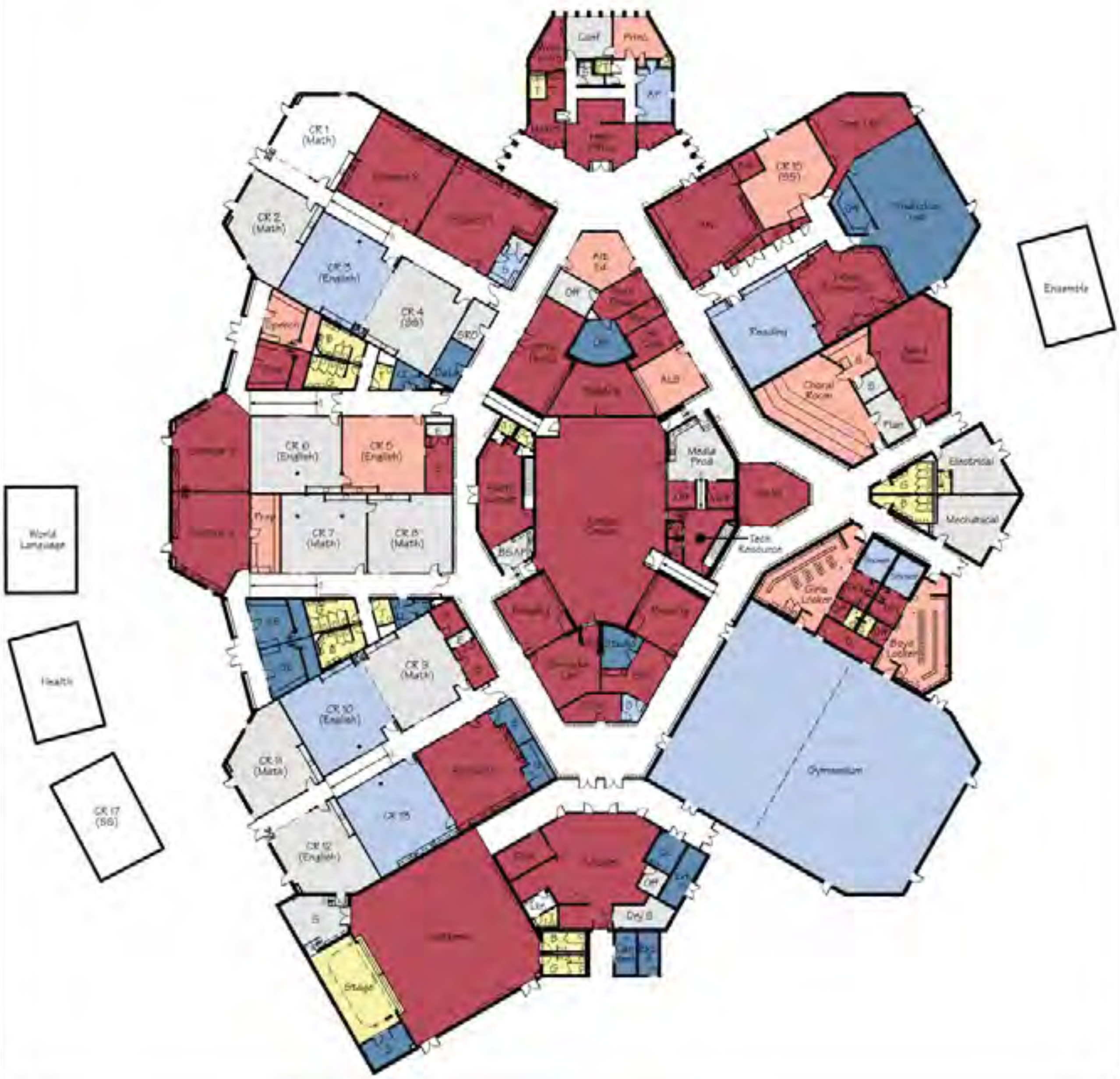
Analysis of Existing Room Sizes

LEGEND

- (dark red) = UNDERSIZED - MORE THAN 20% BELOW SF REQUIRED BY PROGRAM
- (light red) = UNDERSIZED - BETWEEN 11-19% BELOW SF REQUIRED BY PROGRAM
- (grey) = WITHIN 10% OF THE SF REQUIRED BY PROGRAM
- (light blue) = OVERSIZED - BETWEEN 11-19% ABOVE SF REQUIRED BY PROGRAM
- (dark blue) = OVERSIZED - MORE THAN 20% ABOVE SF REQUIRED BY PROGRAM
- (yellow) = NOT ADA COMPLIANT

ABBREVIATIONS

B	BOYS' TOILET ROOM
CC	CUSTODIAL CLOSET
CR	CLASSROOM
E	ELECTRICAL CLOSET
G	GIRLS' TOILET ROOM
S	STORAGE ROOM
T	TOILET ROOM
MDF	MAIN DISTRIBUTION FRAME ROOM



Existing Building Space Analysis

Areas indicated in net square feet.

	Programmed Square Footage			Existing Building		Program / Exist. differential	
	Area	S.F.	Total	Area	S.F.	Area	%
Administration			**2,705**		**2,171**	**-534**	**-20%**
Principal's Office (incl. toilet)	1	265	265	1	237	-28	-11%
Assistant Principal's Office	1	185	185	1	220	35	19%
Conference Room	1	200	200	1	215	15	8%
Workroom/Mailroom (inclu. storage)	1	460	460	3	294	-166	-36%
Reception Area / Secretarial	1	625	625	1	444	-181	-29%
Volunteer/Community Room	1	160	160	0	0	-160	-100%
Staff Dining (provide 2 adjacent ADA toilets)	1	500	500	1	497	-3	-1%
School Store	1	60	60	0	0	-60	-100%
Principal's Secretary	1	100	100	1	129	29	29%
Security Office (SRO) *	1	150	150	1	135	-15	-10%
Art			**1,600**		**942**	**-658**	**-41%**
Studio	1	1,350	1,350	1	874	-476	-35%
Kiln Room	1	100	100	1	68	-32	-32%
Storage	1	150	150	0	0	-150	-100%
Cafeteria / Food Service			**7,135**		**5,174**	**-1,961**	**-27%**
Kitchen Area	1	2,160	2,160	1	1,514	-646	-30%
Dry Storage Area	1	165	165	1	166	1	1%
Office	1	60	60	1	63	3	5%
Student Dining	1	3,550	3,550	1	2,800	-750	-21%
Stage (including ramp)	1	1,200	1,200	1	631	-569	-47%
Computer Lab			**700**		**445**	**-255**	**-36%**
Computer Lab	1	700	700	1	445	-255	-36%
Building Services			**1,180**		**1,071**	**-109**	**-9%**
Custodial Office (incl. toilet)	1	190	190	1	71	-119	-63%
Work Storage Area	1	60	60	0	0	-60	-100%
General School Storage	1	225	225	1	276	51	23%
Outside Equipment Storage	1	140	140	2	245	105	75%
Decentralized Custodial Closets	3	50	150	3	290	140	93%
Kitchen Custodial Closet	1	50	50	0	0	-50	-100%
Can Wash	1	65	65	1	105	40	62%
Main Distribution Frame Room	1	300	300	1	84	-216	-72%
General Academic Areas			**16,610**		**14,874**	**-1,736**	**-10%**
Classrooms	17	800	13,600	20	14,153	553	4%
Storage Area	4	150	600	6	454	-146	-24%
Teacher Planning Room	2	780	1,560	1	267	-1,293	-83%
Seminar Room	2	425	850	0	0	-850	-100%
Gifted & Talented Resource Room			**875**		**330**	**-545**	**-62%**
GT Resource Room	1	800	800	1	274	-526	-66%
Planning Storage Room	1	75	75	1	56	-19	-25%

* Existing program at WLMS
** Efficiency from two-story prototype

Existing Building Space Analysis

	Programmed Square Footage			Existing Building		Program / Exist. differential	
	Area	S.F.	Total	Area	S.F.	Area	%
Guidance			**1,330**		**837**	**-493**	**-37%**
Secretarial/ Reception (incl. closet)	1	360	360	1	195	-165	-46%
Counseling Offices	2	150	300	2	372	72	24%
Record Storage	1	220	220	2	136	-84	-38%
Conference Room	1	250	250	0	0	-250	-100%
Pupil Services Office	1	100	100	0	0	-100	-100%
Data Clerk *	1	100	100	1	134	34	34%
Health Education			**810**		**0**	**-810**	**-100%**
Classroom (includes storage)	1	810	810	0	0	-810	-100%
Health Suite (s.f. edited to comply with COMAR)			**785**		**264**	**-521**	**-66%**
Toilets	2	60	120	1	42	-78	-65%
Waiting	1	100	100	1	52	-48	-48%
Rest Area	2	100	200	1	56	-144	-72%
Storage	1	40	40	0	0	-40	-100%
Office	1	100	100	1	50	-50	-50%
Treatment	1	125	125	1	64	-61	-49%
Exam	1	100	100	0	0	-100	-100%
Home Economics			**1,835**		**815**	**-1,020**	**-56%**
Classroom	1	1,735	1,735	1	815	-920	-53%
Storage	1	100	100	0	0	-100	-100%
Media Center			**4,875**		**3,598**	**-1,277**	**-26%**
Main Reading Room	1	3,600	3,600	1	2,683	-917	-25%
Technology Resource Room	1	400	400	1	247	-153	-38%
Office/Work Space	1	150	150	1	84	-66	-44%
Media Production	1	450	450	2	529	79	18%
Storage Area	1	275	275	2	55	-220	-80%
Music			**3,280**		**2,135**	**-1,145**	**-35%**
Choral Room	1	1,000	1,000	1	876	-124	-12%
Band Room	1	1,400	1,400	1	851	-549	-39%
Ensemble Room	1	300	300	0	0	-300	-100%
Instrument Storage	1	200	200	1	171	-29	-15%
Materials Storage	1	80	80	1	80	0	0%
Teacher Planning	3	50	150	1	157	7	5%
Practice Rooms	3	50	150	0	0	-150	-100%
Physical Education			**9,200**		**8,325**	**-875**	**-10%**
Gymnasium	1	5,700	5,700	1	6,421	721	13%
Shower Area	2	100	200	2	232	32	16%
Lockers	2	750	1,500	2	1,276	-224	-15%
Laundry	1	115	115	2	82	-33	-29%
Storage (Large Equipment)	1	350	350	1	146	-204	-58%
Storage (Small Equipment)	1	90	90	0	0	-90	-100%
Storage (Towel)	2	50	100	2	30	-70	-70%
Office/Shower/Toilet	2	135	270	2	138	-132	-49%
Activity Room (incl. storage)	1	875	875	0	0	-875	-100%

*   Existing program at WLMS
** Efficiency from two-story prototype

Existing Building Space Analysis

	Programmed Square Footage			Existing Building		Program / Exist. differential	
	Area	S.F.	Total	Area	S.F.	Area	%
Science			**6,530**		**4,835**	**-1,695**	**-26%**
Science Laboratories	5	1,150	5,750	5	4,308	-1,442	-25%
Preparation Room	2	150	300	1	201	-99	-33%
Storage Room	2	90	180	3	326	146	81%
Project/Seminar Room	2	150	300	0	0	-300	-100%
Special Education			**3,340**		**1,323**	**-2,017**	**-60%**
Related Services Therapy Area	1	400	400	0	0	-400	-100%
Conference Room	1	300	300	1	180	-120	-40%
Classrooms	3	400	1,200	0	0	-1,200	-100%
Teacher Planning	1	350	350	2	536	186	53%
ADA Toilet	1	90	90	0	0	-90	-100%
ALS Classroom *	1	400	400	1	340	-60	-15%
Speech	1	300	300	1	267	-33	-11%
Storage	4	75	300	0	0	-300	-100%
Student Support Center			**670**		**455**	**-215**	**-32%**
BSAP Academic Mentor Office *	1	120	120	1	120	0	0%
Contract Room (Alternative Education) *	1	400	400	1	335	-65	-16%
AEPS (Alternative Education) Office *	1	150	150	0	0	-150	-100%
Technology Education			**2,750**		**2,212**	**-538**	**-20%**
Production Lab	1	950	950	1	1,462	512	54%
Dust Room	1	100	100	0	0	-100	-100%
Storage Rooms	2	150	300	0	0	-300	-100%
Tech Laboratory	1	1,315	1,315	1	591	-724	-55%
Resource	1	85	85	1	159	74	87%
World Language			**1,225**		**166**	**-1,059**	**-86%**
Classroom (incl. storage)	1	900	900	0	0	-900	-100%
ESOL *	1	325	325	1	166	-159	-49%

Space Analysis Summary

	Programmed Square Footage S.F.	Existing Building S.F.	Program / Exist. differential Area	%
Total Net Sq.Ft.	**67,435**	**49,972**	**-17,463**	**-26%**
Gross Area Factor (Walls, Circulation, Toilets, Mech./ Elec. Rooms, Data Closets, etc.)	**32,515**	**20,558**	**-11,957**	**-37%**
Efficiency = Net / Gross	67% **	71%		
Gross Area Total	**99,950**	**70,530**	**-29,420**	**-29%**
Total Number of Teaching Spaces		**28**		
HCPSS capacity	**662**	**506**	**-156**	
Temporary Classrooms		**4**		

* Existing program at WLMS
** Efficiency from two-story prototype

Existing Building Enclosure Assessment

The project site is located at 10481 Cross Fox lane in Columbia, Maryland. The school was originally constructed in 1969 and is approximately 45 years old. Additions and renovations were completed in 1975 and 1996 bringing the current structure to a gross area of 70,530 square feet.

The exterior features of the structure include brick veneers, precast concrete panels, standing seam Mansard type perimeter roofing, and steel framed windows and storefronts. Planter boxes and concrete sidewalks/pavements were found adjacent to many portions of the structure.

The envelope components were found to be in good overall condition with only minor maintenance or repairs required at this time. There was no evidence of structure settlement or mortar joint reinforcing failure.

The exterior brick veneers and mortar systems were generally found to be in good overall condition with only isolated issues related to minor joint cracking, mortar erosion and only two identified locations of minor joint reinforcement corrosion. The identified issues are not considered to affect the integrity of the structure and do not require any action at this time.

Steel lintels, exposed structural steel, exposed decking, window frames, and exterior doors were found to be in good condition with no short term repairs required.

The precast concrete had excessive mortar joint cracking and loose/missing mortar at the vertical joint with the adjacent brick. It is recommended that the mortar be removed at all of these joints and be replaced with a matching flexible caulk.

Some soffit and sidewalk locations were missing caulk at the brick interface which should be replaced to prevent water and insect infiltration.

Figure 1 - Exterior

Figure 2 - Loose Brick

Figure 3 - Mortar Erosion

Figure 4 - Mortar Erosion

Figure 5 - Mortar Joint Cracking

SCOPE OF INVESTIGATIONS

This Building Enclosure Condition Report presents the findings of a building exterior visual condition survey of the property known as the Wilde Lake Middle School in Columbia, Maryland. The report provides an assessment of the exterior features along with recommended short term repairs, major distress or failure and recommendation (if any) for further invasive studies, if required.

Mr. Thomas C. Simon, PE of Froehling & Robertson, Inc. (F&R) conducted a reconnaissance of the subject property on August 22, 2013. The walk-through of the building was performed to evaluate the present condition of the facility. F&R visually evaluated the exterior and accessible interior portions of the building as to their structural performance and condition.

PROPERTY CONDITION

In general, the structure appeared to be in ***good condition*** for a structure of this age and type of construction. Major improvements and renovations have occurred since the initial construction of the property, and maintenance appears to have been timely and consistent. During the performance of this survey, F&R identified several minor items associated with the project site that merit prompt attention and/or repair, which are discussed herein.

MASONRY - BRICK AND CMU

The primary exterior finish is clay brick masonry. The brick was found to be in very good overall condition with no evidence of cracking, spalling, pop-outs or efflorescence.

PRECAST CONCRETE

Precast concrete panels were used as a decorative feature at most corners. Generally, the precast concrete panels are in good condition without cracking or obvious reinforcement corrosion. The mortar joints adjacent to the panels are failing as described in the mortar joint section of this report. One panel on the East side of the structure appears to have experienced impact damage (see Figure 6). This damage appears to be primarily aesthetic in nature.

Figure 6 - Precast Impact Damage

Figure 7 - Mortar Joint Crack

Figure 8 - Mortar Joint Crack

Figure 9 - Cracked CMU

Figure 10 - Crack at CMU Joint

JOINT MORTAR

Mortar joints were typically tight and well tooled with little evidence of joint failure. Several isolated areas of brick horizontal hairline joint cracking was identified (see Figures 7 and 8); however, the cracking does not appear to be due to settlement or wall movement and is likely due to temperature or material expansion/ contraction. The cracking is not extensive and does not merit repair at this time.

Three areas of cracking were identified in visible CMU. This cracking was identified in the mechanical room exterior wall above the door (see Figure 9), a gymnasium corner joint (see Figure 10), and a stair step crack in an interior hallway wall near the art room (see Figure 11). The cracking did not appear to penetrate through to the exterior of the structure. The cracking is not extensive at this point in time; however, should be monitored for future movement.

Extensive mortar joint cracking and loss of mortar was identified at the vertical joints next to the exterior pre-cast concrete elements (see Figures 12 and 13). This distress is likely due to the dissimilar contraction and expansion of the different concrete and masonry elements causing excess stress on the joint. It is recommended that all vertical mortar joints at the precast elements be removed and replaced with a color match flexible caulk to allow future movement without joint failure.

JOINT REINFORCEMENT

Joint reinforcement corrosion and subsequent mortar joint failure is not a chronic issue at this structure. Only two isolated areas of joint corrosion were noted which were located in the newer gymnasium walls. The corrosion at these two small isolated areas appears to be due to insufficient mortar cover over the reinforcement allowing water penetration to the steel and subsequent corrosion. (see Figures 14 and 15) The corrosion has not advanced to a point where the integrity of the mortar has been compromised. This area should be monitored for future corrosion and mortar joint distress.

Figure 11 - CMU Cracking

Figure 12 - Precast Joint Crack

Figure 13 - Mortar Crack at Precast

Figure 14 - Joint Reinforcement Corrosion

Figure 15 - Joint Reinforcement Corrosion

STEEL LINTELS

The steel lintels over openings appear to be in very good condition with no evidence of loss of coating or corrosion. Bearing length appears to be sufficient.

WINDOW FRAMES

Window Frames appear to be in good condition with ongoing maintenance including painting and caulking.

EXPOSED STRUCTURAL STEEL

Where observed in the gymnasium, mechanical and electrical rooms, the structural steel appears to be in good condition with no corrosion or distress noted.

EXPOSED STEEL DECKING

Where observed in the gymnasium, mechanical and electrical rooms, the steel decking appears to be in good condition with no corrosion or distress noted.

MASONRY WEEPS AND FLASHING

The masonry weep holes were found to be in-place at regular intervals. No blockage or damage was noted.

CAULKING

Several areas were identified where caulking was missing or disturbed. These areas were primarily at concrete slab/sidewalk to brick interfaces (see Figure 16). Additionally some soffit caulking was missing at the brick interface (see Figure 17), Missing caulk should be replaced to ensure that water and/or insects do not penetrate the building or subgrade which could lead to future damage.

SETTLEMENT

There was no evidence of structural settlement other than minor cracking of concrete pads adjacent to several areas of the structure (see Figure 18) and the movement of a planter box near the main entrance. The settlement of the slabs and planter box has not progressed to the point where repairs are merited (see Figures 19 and 20),

Figure 16 - Missing Caulk

Figure 17 - Missing Caulk at Soffit

Figure 18 - Sidewalk Cracking

Figure 19 - Slab Settlement

Figure 20 - Planter Settlement

Existing Structural System Assessment

Wilde Lake Middle School was constructed in 1969 as a one story structure with two small mezzanines above the media center support spaces and staff lounge. The roof structure is comprised of a gypsum roof on bulb tees supported by steel joists. The roof structure bears on load bearing masonry walls and steel columns (see diagram on next page for locations). A one story cafeteria addition was constructed in 1975 and is comprised of metal roof deck supported by steel joists which bear on masonry walls. The building was entirely renovated in 1996 which required reinforcement of the existing roof structure to support new mechanical units as well as infilling portions of a lower slab elevation to expand on the main finished floor elevation thereby reducing the amount of lower slab which is accessed by corridor ramps.

Based on a recent site inspection, which was of a cursory nature, the following site items were observed:

A. The original (1969) roof system is a "bulb tee" poured gypsum deck on form board. This roof system will need to be carefully protected during construction because it is moisture sensitive. This type of roof system is difficult to repair, to add new holes through, and to fill in existing holes. Poured gypsum deck roofs are typically no longer used in new construction.

B. As the existing building is renovated and enlarged, the following items need to be considered:

1. The existing roof will require additional structural members for any new mechanical equipment added to the existing roof. The process of adding new beams to reinforce the existing roof is slow and tedious.

2. Any new addition which is taller than the existing adjacent building will create snow drifting loads on the existing roof structure which will require additional structural members to reinforce the roof. As previously stated, the process of adding new beams to reinforce the existing roof is slow and tedious.

3. Since some of the existing building is masonry wall bearing, there is reduced flexibility for enlarging spaces, rearranging spaces, introducing corridors, etc. In order to provide flexibility, some of the existing bearing walls may have to be removed. The removal of bearing walls will require shoring of the existing roof structure and the installation of new roof beams and columns with new footings.

4. Working inside the existing building is a difficult process. It will be difficult to move new steel and materials to the required locations. In some locations shoring will be required and, in most cases, there is limited space to work. It will be difficult to erect new steel to support the existing roof since a crane cannot be utilized to move steel and the length of new steel will likely need to be spliced. This type of work is not efficient and is labor intensive.

5. The existing structure is low (short) compared to new buildings. Consideration will need to be given to the depth of new utilities and ductwork so that ceilings are of an acceptable height.

6. Given the nature of existing buildings and the inability to discover and/or visually see all existing components and areas, discoveries will be made that will require changes to be implemented in the field.

C. To install new mechanical equipment on the existing roof, the following will need to be considered:

1. New equipment longer than 15' in length will create snow drifting loads on the existing roof in addition to the weight of the equipment and curb.

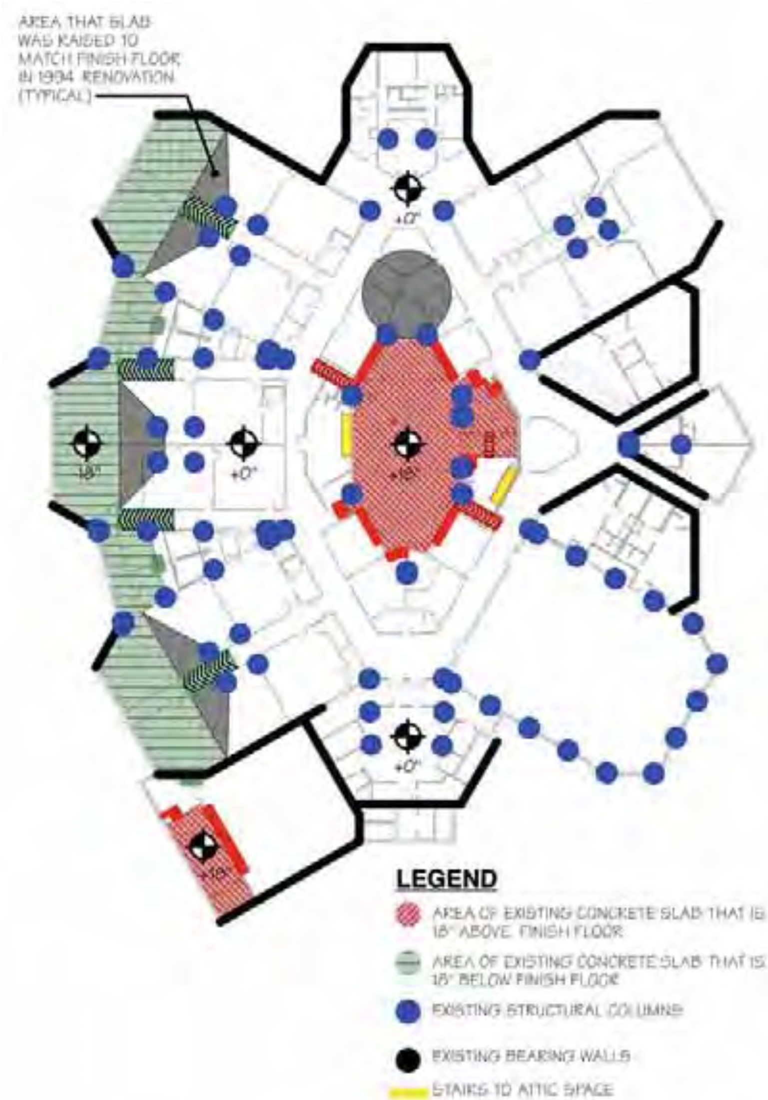
2. When replacing existing equipment with new equipment, the new equipment cannot be longer or heavier than the existing equipment. By following this criteria, the existing roof will (probably) not require structural reinforcement. If longer or heavier, the existing roof will require structural reinforcement.

D. The existing concrete slab on grade is not at a constant elevation. (See diagram to right) Some areas of the building have slabs that are higher and lower than the majority of the slab on grade. Existing stairs and ramps are provided between these changes in slab elevation.

E. Exterior walls of the building are unreinforced composite brick and block walls. The condition of the ties between the brick and block is unknown at this time and will require further investigation by a forensic engineer.

F. It has been observed that some of the steel lintels over existing openings are rusting and need repair. Additionally, joints around precast panels need to be repaired and some precast panels, where cracked, will need to be replaced. Miscellaneous repairs are needed to the metal mansard roofing if it is to remain.

G. The existing walls are not vertically reinforced. Vertical reinforcing will need to be added if a greater quantity of windows and/or larger windows are to be added to the existing masonry walls.



STRUCTURAL CONSTRAINTS OF EXISTING BUILDING

H. Since the purpose of this renovation is to create a building that is as maintenance free as possible for the next 20-25 years, new masonry walls should be properly reinforced and have cavity insulation for high energy efficiency. Additionally, new walls should be provided with a proper moisture barrier to prevent water/mold from migrating into the building. If the existing walls are to remain in place, they will not provide all of the structural and environmental criteria listed above.

<End of Existing Structural System Assessment>

Existing Mechanical System Assessment

GENERAL:

Wilde Lake Middle School is located at 10481 Cross Fox Lane, Columbia, Maryland 21044. The original building was constructed and occupied in 1969. The building is a single story structure, slab on grade with three (3) different finished floor elevations and consists of approximately 66,430 square feet with an addition constructed in 1975 (4,100 sq. ft.). The total existing building area is approximately 70,530 sq. ft. with a State rated capacity of 506 students.

A rooftop unit replacement project was completed in 1998, resulting in the replacement of eleven (11) existing gas-fired single zone and multi-zone rooftop units. These units were replaced with variable air volume gas-fired rooftop units. The air distribution systems were replaced using variable air volume (VAV) terminal control units equipped with electric heating coils.

EXISTING MECHANICAL SYSTEMS:

A. Existing Heating/Cooling Plant:

No central heating or cooling plant exists within the building. The existing building is heated in its entirety by perimeter electric resistance heaters (horizontal, cabinet heater and/or fin-tube radiation) and electric heating coils located in terminal control units. Gas-fired furnaces located in existing rooftop units are used to preheat the mixture of outside air and return air. The rooftop units utilize direct expansion (R-22) as a base of cooling.

B. Existing HVAC Systems:

The current existing heating, ventilation and air conditioning (HVAC) of the building is accomplished by eleven (11) roof-mounted air handling units. One (1) rooftop unit serving the Kitchen is heating & ventilating only. Ten (10) rooftop units are heating and cooling units, of which three (3) units are constant volume, and seven (7) units are variable air volume (VAV) type. Refer to Table 1 on page 32 for existing air handling unit characteristics.

Cooling is generated by packaged air-cooled condensing units utilizing R-22 reciprocating, hermetically sealed compressors, integral with the RTUs. Each unit has two (2) independent refrigeration circuits. Heating is generated by gas-fired heat exchangers within the RTUs.

C. Existing Air Distribution System:

Classrooms, Media Center and Administration:

Supply air is delivered by an overhead variable volume air distribution duct system serving ceiling mounted supply air diffusers. The rooftop unit typically provides constant temperature supply air (55°F - 58°F) to variable air volume terminal control units which modulate air flow based on space temperature requirements. Each variable air volume terminal control unit is equipped with an electric heating coil. When the space temperature falls below its setpoint, the supply air is heated to offset room heat losses. The return air system is ducted and connects ceiling return air grilles to the rooftop unit(s).

Perimeter electric resistance heaters (cabinet unit heaters, baseboard radiation, etc.) are present at entry ways, corridors, etc. to offset exterior door/wall heat loss and infiltration losses. Ducted exhaust collects from adjacent group and individual toilet rooms and terminates to exhaust fans on the roof.

Gymnasium:

Supply air is delivered by an overhead exposed air distribution duct system serving round horizontal throw diffusers. The supply air duct is split into two (2) equal sections and is located between and through the steel joist. Ducted return air collects from a single large vertical in-wall grille while some air is transferred to the boys and girls locker rooms. Ducted exhaust collects from the locker rooms and terminates to an exhaust fan on the roof. The P. E. Office is served by AHU No. 10.

D. Existing Utilities:

Water Service: The existing building is served by a six (6)-inch incoming water service. The cold water service originates in the Mechanical Room. The fire protection system is fed from this 6" line (90 psi static pressure) as well as a 4" line with pressure regulating valve providing potable water for the building (approximately 65 psig).

Sanitary: The existing building is served by a public sanitary system.

Gas Service: The existing building rooftop units and domestic water heater are served by a natural gas service originating at the Mechanical Room. The gas line is 3" in size.

E. Existing Plumbing System:

A four (4)-inch domestic water service, as described above, serves the building in its entirety. Hot water generation is supplied by a gas-fired hot water heater and associated storage tank located in the Mechanical Room. The domestic water heater is a high efficient type as manufactured by A.O. Smith (Cyclone Model BTH 400A-100). It was installed in 2011 and has a capacity rating of 399,900 BTYUH input, 465.3 recovery gallons per hour with a 100 gallon storage tank. Hot water and hot water recirculation lines are distributed in parallel fashion adjacent to the cold water line throughout the building.

The domestic hot water master mixing valve is also located in the Mechanical Room. It appears the domestic water lines were replaced in 2008.

F. Existing Fire Protection System:

Presently, the entire building is fully sprinklered. The six (6)-inch incoming water service located in the Mechanical Room serves the fire protection/sprinkler system.

EXISTING MECHANICAL SYSTEMS EVALUATIONS:

The American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE), estimates the median service life for single-zone rooftop air conditioning units to be fifteen (15) years. The existing units were installed in 1998 and are approaching the end of their anticipated life expectancy. The units were custom fabricated and constructed of aluminum. They appear to be in fair condition; however, they are less efficient than current code requirements. The units also utilize R-22 refrigerant, which has been phased out. The air distribution systems were replaced with rooftop units in 1998.

The incoming water service feeds the building directly from the public system without the use of a backflow preventer.

TABLE 1: Wilde Lake Middle School - Existing Air Handling Unit Characteristics

EXISTING DESIGNATION	TYPE	LOCATION	SERVICE	COOLING TONS	MANUFACTURER	AGE (yrs)
RTU-1: Serves Classrooms (VAV) Model #: 3CZZ29-0302-DN3.0-09SE Serial #: 4581-0496148 RTU-1 (50 lbs.) Refrigeration System: R-22 2 compressors Electrical: 460V/3Ø/60Hz 70.0 RLA 76.2 MCA 97.4 MCOP	CV	Roof	Classroom VAV	30	Seasons 4 Custom	15
RTU-2: Serves Classrooms (VAV) located on low roof Model #: 3CZZ29-0332-DN3.5-10SE Serial #: 4581-0496149 RTU-2 R22, (64 lbs.) 75.7 RLA 82.2 MCA, 108.2 MCOP Electrical: 460V/3Ø/60Hz 70.0 RLA 76.2 MCA 97.4 MCOP	VVT	Roof	Classroom VAV	30	Seasons 4 Custom	15
RTU-3: Model #: 3CZZ29-0302-DN3.0-09SE Serial #: 4581-0469150 RTU-3 (60 lbs.) 70.9 RLA 76.2 MCA, 90 MCOP Electrical: 460V/3Ø/60Hz 70.0 RLA 76.2 MCA 97.4 MCOP	CV	Roof	Classroom VAV	30	Seasons 4 Custom	15
RTU-4: Model #: 3CZZ26-0202-ON2.5-06SE Serial #: 5383-0598229 RTU-4 (50 lbs.) Electrical: 460V/3Ø/60Hz 70.0 RLA 76.2 MCA 97.4 MCOP	CV	Roof	GYM CV	25	Seasons 4 Custom	15

EXISTING DESIGNATION	TYPE	LOCATION	SERVICE	COOLING TONS	MANUFACTURER	AGE (yrs)
RTU-5: Model #: 3CZZ26-0202-DN2.5-06SE Serial #: 5383-0598230 RTU-5 (50 lbs.) 58.3 RLA 63.3 MCA 80 Amp MCOP	CV	Roof	GYM CV	25	Seasons 4 Custom	15
RTU-6: Model #: 3CZZ29-0332-MN3.0-10SE Serial #: 5383-0598231- RTU-6 (65 lbs.) 82.3 RLA 89.5 MCA 110 MCOP Electrical: 460V/3Ø/60Hz 70.0 RLA 76.2 MCA 97.4 MCOP	CV	Roof	Classroom VAV	30	Seasons 4 Custom	15
RTU-7: (H&V) Model #: 3CZZ17-XXXA-1N12-10SE Serial #: 5073-0697306 RTU-7 16.1 RLA 19.3 MCA 30 MCOP Electrical: 460V/3Ø/60Hz 70.0 RLA 76.2 MCA 97.4 MCOP	CV	Roof	Kitchen CV	H&V	Seasons 4 Custom	15
RTU-8: Model #: 3CZZ27-014DN1.5-05SE Serial #: 5073-0697308 RTU-8 (20 lbs.) 38.4 RLA 41.6 MCA 54.4 MCOP Electrical: 460V/3Ø/60Hz 70.0 RLA 76.2 MCA 97.4 MCOP	CV	Roof	Admin VAV	20	Seasons 4 Custom	15
RTU-9: Model #: 3CZZ29-0332-MN.0-10SE Serial #: 5073-0697310 RTU-9 (64 lbs.) 77.4 RLA 83.9 MCA 100 MCOP Electrical: 60V/3Ø/60Hz 70.0 RLA 76.2 MCA 97.4 MCOP	MZCV	Roof	Classroom VAV	30	Seasons 4 Custom	15

EXISTING DESIGNATION	TYPE	LOCATION	SERVICE	COOLING TONS	MANUFACTURER	AGE (yrs)
RTU-10: Model #: 3CZZ29-0332-MN3.010SE Serial#: 5073-0697309 RTU-10 (75 lbs.) 71.4 RLA 83.9 MCA 100 MCOP Electrical: 460V/3Ø/60Hz 70.0 RLA 76.2 MCA 97.4 MCOP	CV	Roof	Classroom VAV	30	Seasons 4 Custom	15
RTU-11: Model #: 30ZZ29-0272-DN3.8-08SE Serial #: 5073-0697312 RTU-11 (50 lbs.) 64.3 RLA 68.9 MCA 80 MCOP Electrical: 460V/3Ø/60Hz 70.0 RLA 76.2 MCA 97.4 MCOP	CV	Roof	Cafeteria CV	25	Seasons 4 Custom	15

Notes:

CV = Constant Volume

VAV = Variable Air Volume

<End of Existing Mechanical System Narrative>

Existing Electrical System Assessment

EXISTING ELECTRICAL SYSTEMS

A. Existing Electrical Distribution System:

The building main distribution panel (MDP) is 3000A, 480/277V, 3 phase, 4 wire. A BGE pad-mounted transformer, located outside on the eastern side of the site, serves the building. The meter is located within the electrical room. The MDP, manufactured by Federal Pacific Equipment (FPE), is original to the building construction in 1969. It is configured with 3 fusematic circuit breaker service disconnects: a 50A for emergency loads, a 1600A for lighting and receptacle loads, and another 1600A for HVAC equipment (AC and electric heat.) This serves panelboards throughout the school as well as the portable trailers. Lighting and HVAC equipment are generally 480/277V. Local dry type transformers supply 208/120 volt, three phase, four wire service for receptacle loads.

Although the building was renovated in 1996, the original building electrical distribution system, manufactured by Federal Pacific, is still in use. Additional panelboards and transformers were installed at that time as needed to support the renovation requirements. Similarly, a panel was added to support the Cafeteria addition in 1975. Panelboards serving the classroom areas are surface mounted in dedicated closets. Elsewhere, including the Media Center, Administration, etc, the panels are recessed mounted within the space.

B. Existing Emergency Distribution System:

A propane generator was installed in 1996 to provide emergency power for the building. This was originally accomplished with the tap ahead of the building main, which was a code recognized emergency source when the building was constructed. The original emergency lighting panel is located within the Administration Area. The generator and associated propane tank are located south of the building outside the Kitchen within fenced enclosures. The generator is manufactured by Kohler. The contract drawings indicate the generator capacity to be 30kW/37.5kVA, 480/277V, 3 phase, 4 wire, with a 50A output circuit breaker.

An automatic transfer switch (ATS) was installed within the building adjacent to the kitchen panels, with the normal side fed from the tap ahead of the main in the switchboard as described above. The ATS serves panel EMH located within the main electrical room. The original emergency panel in the Administrative Area is backfed from panel EML, fed from EMH via a dry type transformer.

C. Existing Lighting:

Lighting throughout the building consists primarily of three lamp, 2x4 prismatic lensed troffers. Four lamp 2x4 light fixtures have been installed in areas with high ceilings, such as, the Media Center and Cafeteria. Industrial strip fixtures are utilized in equipment spaces. Surface mounted 2x4 fixtures are utilized in areas adjacent to the Media Center, apparently due to a restricted ceiling space. The lighting dates back to the 1996 renovation, utilizing T8 lamps and electronic ballasts, along with a few compact fluorescent downlights. The Gymnasium lighting consists of T5HO fluorescent high bay troffers, which appear to be a more recent installation.

The controls for the building “normal” lighting are manual only. Control of corridor lighting is through the use of keyed switches. The classrooms and offices lighting controls are on/off via a single toggle switch.

Existing Lighting (Cont'd) :

Emergency egress lighting is provided throughout the building, including each classroom space. Egress lighting and LED exit signs are connected to the generator source via contactor. Exterior egress lighting is also connected to the generator source via contactor. The interior egress lights and exit signs are turned off when the security system is armed. A manual over-ride switch is located at the main entrance adjacent to the fire alarm annunciator panel.

Building mounted HID wall packs are located around the perimeter of the building for exterior lighting. These were installed in 1996. The original fixtures in the soffits at the entry doors, as well as pole mounted fixtures, appear to be from the original 1969 design. The pole mounted HID fixtures are approximately 12' high, with integral photocell, mounted flush with grade. Two HID pole mounted flood lights have been installed to illuminate the front entry. They are controlled with a timeclock/photocell with a timed manual override.

D. Existing Fire Alarm System:

An EST IRC-3 Fire Alarm Control Panel with auto-dialer is located within the Main Electrical Room. The system appears to have been installed as part of the 1996 renovation. The system consists of manual pull stations at the main corridor doors and exits, sprinkler flow and tamper switches, duct detectors, and horns/strobes in the corridors and classrooms. The system appears to be ADA compliant with coverage and mounting heights. A graphic annunciator panel is located on the right side of the main entry.

E. Existing Telecommunications System:

The telephone main point-of-presence (MPOP) and PBX is located in the Main Electrical Room. Service is routed underground adjacent to the incoming electrical service. Data and CATV service appears to be extended to the main distribution frame (MDF) in the media center equipment room. This room is also where the Verizon and Inter-County Broadband Network fiber MPOP is located. A recessed telephone terminal cabinet (TTC) is located in the Administration Area, and a surface TTC is located in one of the classroom wing electric closets, both original to the building. A 50 pair voice trunk is extended from the MPOP to the MDF public address system.

A Rauland Teledata Center TC4180 public address system, located in media equipment room, serves the entire school and portable trailers. Telephone handsets in each classroom are connected to the system for in-building service and have the capability to call out. Public address (PA) system speakers are located ceiling mounted in the classrooms, with an occasional wall mounted speaker in corridors. Class changing signals are through the PA speakers, although program bells are still in place. Speaker horns are located on the exterior of the building. Announcements are made from both the media rack and through administration telephones in the main office. In addition to the telephones, each classroom has a call-switch with two-way speaker. The telephones automatically override the local speaker once the handset is lifted. Simplex Time Signal program clocks are located in the corridors and public spaces. A Rauland digital clock is located in the Administration Area.

The media retrieval system is located adjacent to the PA system rack in the media equipment room adjacent to the Media Center. The original CATV cabinet is located in the adjacent room. Cabling is distributed to individual outlets throughout the building from this location.

Existing Telecommunications System (Cont'd) :

Data outlets have been installed throughout the building for computer use. A rack is located in the room with the original CATV cabinet, and a cabinet is located on the opposite side of the wall in the room beyond. CAT 5e horizontal cabling is distributed from this location to data outlets throughout the building. A wall mounted data rack is located within the Administration Area. Wireless access points have been installed in each classroom in the building.

F. Existing Security System:

The security system consists of an intrusion detection system, video surveillance and an access control system. The intrusion detection system consists of motion sensors located at building entry points. Keypads for arming/disarming the system are located at the main entry, adjacent to the fire alarm annunicator, and within the Main Electrical Room. Ademco control panels are located in the Main Electrical Room. Proximity Card readers with magnetic locks and request to exit devices are located on main egress doors and select exterior doors, including those to the portable classrooms. Altronix system control panels are located in the media center equipment room and a storage closet next to the main office.

Fifteen video surveillance cameras are located throughout corridors in the building. The head-end rack with monitor and DVR is located adjacent to the data rack at the Media Center. A flat screen monitor is located within the Administration Area. This system has been recently installed.

The intrusion detection may be reused with modifications and expansions as required to suit the revised space configuration and building addition. New access control and video surveillance cameras are recommended to be provided per current HCPSS standards. IP video surveillance cameras will be located to provide coverage inside building corridors and points of entry, as well as on the exterior of the building, with pan-tilt-zoom capability. An Alphone video intercom will be provided between the front entry and Administration Area for visitor access.

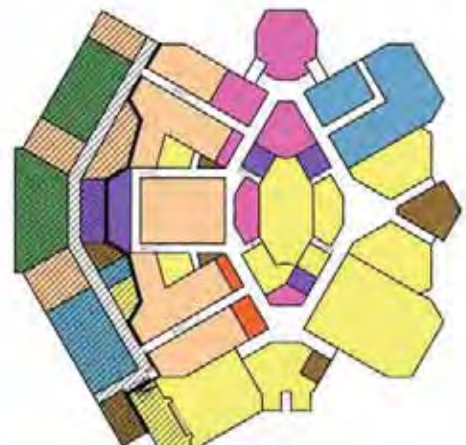
<End of Existing Electrical System Assessment>

< End of Existing Conditions >

Summary of Scheme 1
Light Renovations and Addition to Existing School

Scheme 1 explores the possibility of reusing as many of the existing teaching stations as will meet the minimum requirements as established by the HCPSS Guidelines for Renovation and Modernization of Existing Buildings. Thus, many of the existing windowless classrooms will remain in their current location, but will receive new finishes, cabinetry, mechanical, data and electrical systems as well as skylights in ceiling to provide natural daylight.

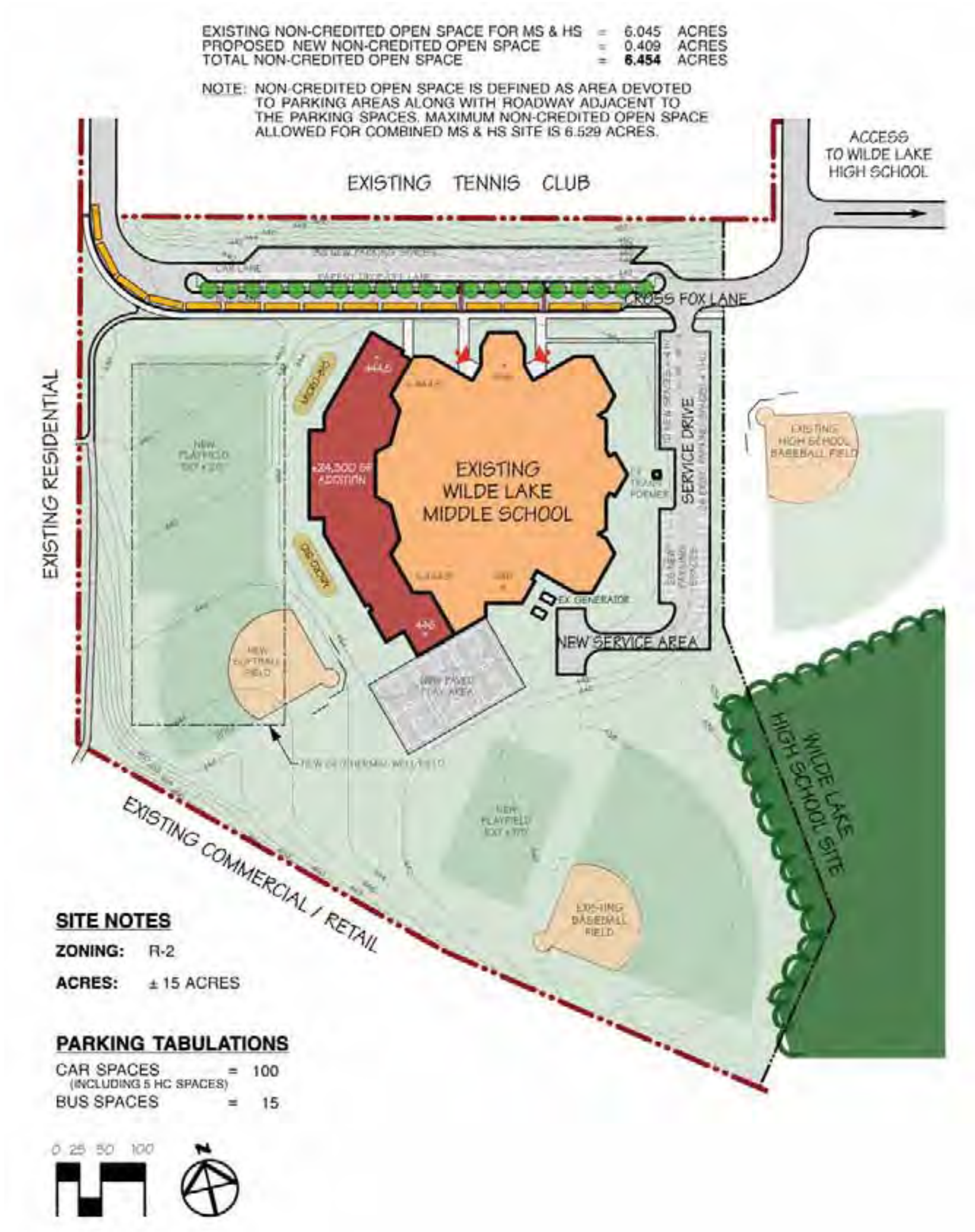
Area of Light Renovation	± 42,030 gsf
Area of Major Renovation	± 28,500 gsf
Area of New Addition	± 24,300 gsf
Total Area	**± 94,830 gsf**
Construction Duration (occupied)	27 months
Building Subtotal	$17,195,311
Demolition Subtotal	$ 295,000
Sitework Subtotal	$ 2,323,335
Construction Cost Subtotal	**$19,813,646**
Relocatables for Occupied Construction	$ 1,050,000
Phasing Costs	$ 140,000
Premium for Off-Hour Work	$ 231,040
Cost Estimate Contingency (10%)	$ 2,100,365
Escalation for Bid Date Contingency (4%)	$ 933,402
Construction Cost Grand Total	**$ 24,268,453**



Scheme 1 Design Attributes:

- Majority of existing walls will remain; therefore, most existing classrooms will remain as classrooms, though they will receive new finishes, cabinetry, doors, data, electrical and mechanical systems.
- Undersized science labs and music suite will be relocated to new addition to meet the educational program requirements.
- Existing classroom locations will not allow for windows, but skylights can be implemented to provide natural daylight. This scheme will not be able to meet the requirements of the LEED credit for daylight and views.
- Existing corridor ramps and stairs will remain; therefore, the new addition will be ±18" below the finish floor of the main entrance and the cafeteria. Note: A new ramp will be constructed to access the existing cafeteria from the new addition.
- Existing building circulation will be improved by creating looped circulation; one inner loop for access to existing classrooms and one outer loop leading students through the new addition.
- Cafeteria will be enlarged to meet educational program requirements. New addition will include a Stage with a ramp that will meet the ADA accessible path requirements.
- Mechanical system will utilize geothermal technology.
- School will not have access to playfields for duration of construction (± 27 months).
- School should achieve USGBC LEED 'Certified' certification.

Site Plan



EXISTING NON-CREDITED OPEN SPACE FOR MS & HS = 6.045 ACRES
PROPOSED NEW NON-CREDITED OPEN SPACE = 0.409 ACRES
TOTAL NON-CREDITED OPEN SPACE = 6.454 ACRES
NOTE: NON-CREDITED OPEN SPACE IS DEFINED AS AREA DEVOTED TO PARKING AREAS ALONG WITH ROADWAY ADJACENT TO THE PARKING SPACES. MAXIMUM NON-CREDITED OPEN SPACE ALLOWED FOR COMBINED MS & HS SITE IS 6.529 ACRES.
EXISTING TENNIS CLUB
ACCESS TO WILDE LAKE HIGH SCHOOL
CROSS FOX LANE
EXISTING RESIDENTIAL
+24,500 SF ADDITION
EXISTING WILDE LAKE MIDDLE SCHOOL
SERVICE DRIVE
EX GENERATOR
NEW SERVICE AREA
EXISTING HIGH SCHOOL BASEBALL FIELD
WILDE LAKE HIGH SCHOOL SITE
EXISTING COMMERCIAL / RETAIL
EXISTING BASEBALL FIELD
SITE NOTES
ZONING: R-2
ACRES: ± 15 ACRES
PARKING TABULATIONS
CAR SPACES = 100
(INCLUDING 5 HC SPACES)
BUS SPACES = 15
0 25 50 100

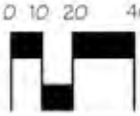
Floor Plan

LEGEND

- = ADMINISTRATIVE SPACES
- = GRADES 6-8
- = SCIENCE LABS
- = SPECIAL EDUCATION
- = CENTRAL SUPPORT SPACES
- = ARTS & TECHNOLOGY
- = BUILDING SERVICES
- = STUDENT SUPPORT SPACES
- = AREA OF ADDITION

ABBREVIATIONS

B	BOYS' TOILET ROOM
CC	CUSTODIAL CLOSET
CR	CLASSROOM
E	ELECTRICAL CLOSET
G	GIRLS' TOILET ROOM
S	STORAGE ROOM
T	TOILET ROOM
MDF	MAIN DISTRIBUTION FRAME ROOM
IDF	INTERMEDIATE DISTRIBUTION FRAME ROOM
SE	SPECIAL EDUCATION



Existing Builing	=	70,530 GSF
Area of Addition	=	± 24,300 GSF
Area of Proposed Plan	=	± 94,830 GSF

Architectural Design Narrative

Scheme 1 retains all existing spaces that are currently up to code and meet the minimum requirement of 660 square feet to be considered a teaching station as dictated by the HCPSS "Guidelines Manual for Renovations and Modernizations of Existing Schools". Of the three schemes, this one presents the least impact to the existing Wilde Lake Middle School building.

The floor plan entails ±42,000 SF of light renovation, ±28,530 SF of major renovation, and ±24,300 GSF of new construction for a school with a total of ±94,830 GSF. In areas of light renovation, walls will remain intact and spaces will receive cosmetic upgrades, new finishes and new cabinetry (if applicable). In areas of major renovation, existing walls will be removed and spaces will be reconstructed in configurations required to accommodate the new use of space, technology and/or to make handicap accessible. Floor areas that are presently 18-inches below the main finished floor level of the building will remain and will be served by existing ramps.

Most Classroom spaces will remain in their current locations and configurations and will receive only light renovation. The Gymnasium and Kitchen will receive light renovations; however, the adjacent cafeteria and locker room areas will be enlarged.

The Administrative Area, Health Suite, Guidance Suite, Art Room, Technology Education Suite, Home Economic Classroom, Media Center and support spaces will receive major renovations to increase the size of the spaces.

The new addition will house the Music program, Science labs, World Language and Gifted/Talented classrooms and new Special Education spaces. The Music Suite will be located close to the Stage for performances. All spaces in the addition will meet the HCPSS middle school educational program requirements for square footage. A new mechanical and electrical room will be constructed for the new systems.

Circulation within the school will be improved by adding a new corridor in the addition which will connect two existing corridors of the school and provide an outer circulation loop. Due to existing structural constraints, there will be an inner circulation loop to connect the two existing corridors in the center of the western side of the building

The floor level of the addition will be 18-inches below the main finished floor level of the existing building to match the adjacent floors of the existing building and will be served by existing ramps located in the existing corridors.

The organization of various school departments will be greatly improved; however, some departments will still be fragmented due to space and structural constraints.

A preliminary LEED analysis (Leadership in Energy and Environmental Design) shows that the building in Scheme 1 should achieve a "LEED Certified" level under the latest version of "LEED for Schools" as published by the United States Green Building Council (USGBC). See page 63.

Construction of Scheme 1 will be done in phases since the school will need to remain occupied during the 27± months.

<End of Architectural Design Narrative>

Civil Design Narrative

ZONING NT (New Town)

DRIVES, WALKS AND PARKING

Cross Fox Lane will be widened and reconfigured to provide two different pathways for the bus traffic and the car traffic. A center island with trees and a low masonry wall will separate the two traffic patterns. Pedestrians will be led to one of two controlled crossings of the bus lane in front of the main entrance of the building.

New walkways will be provided to connect all the existing site elements with each other and the residential community to the west of the site.

Parking will be provided along the north side of Cross Fox Lane and along both sides of the reconfigured service drive for a total of 100 car parking spaces on site.

UTILITIES

Water - Existing 6" service enters building at mechanical room near service drive.

Sanitary Sewer - Existing sanitary lines exit the building near the main entrance and run westward parallel to Cross Fox Lane.

Storm Drain - Existing stormwater leaves the site at the southeast corner of the property towards the wooded area.

Stormwater Management - New bioretention areas will need to be constructed to accommodate the treatment of the water for the new addition and new impervious paving.

Gas - Existing service enters building at mechanical room near service drive.

ADDITIONAL INFORMATION

Landscape Plan - Proposed planting will consist only of what is necessary to vegetatively stabilize the disturbed areas of the site. Plantings will be necessary for the stormwater management facility in order to meet requirements of the 2000 Maryland Stormwater Design Manual and the 2007 update. Taking this into consideration, additional landscape material proposed for the school site as part of the addition will be kept to a minimum in order to accommodate the school's desire to minimize maintenance.

Grading Permit - Since there will be more than 5,000 square feet of disturbance, a grading permit will be required.

Wetlands/Waterways - An environmental survey has not been performed at this time, but no existing wetlands are known to be on the site.

Forest Conservation - This requirement is not applicable within Columbia.

Columbia Association - A series of meetings will be required with the Village of Wilde Lake to review the Site Plan. In addition, a public hearing will be required with the Planning Board for approval of the Site Plan. The planning Board hearing is required for any Site Plan disturbing over 5,000 square feet of area. The County will also require the Planning Board Notice to be sent to the County Council members along with the Columbia Association and the Howard Hughes Corporation.

<End of Civil Design Narrative>

Structural Design Narrative

Structural steel framing will be used for all new construction except for the new stage addition which will be masonry wall bearing. Foundation will consist of conventional spread footings. Building will be reinforced concrete slab on grade. Exterior walls will consist of brick faced insulated masonry cavity wall construction. Roof system will consist of steel deck on open web steel joists.

<End of Structural Design Narrative>

Mechanical Design Narrative

PROPOSED HVAC SYSTEM ALTERNATIVES

GENERAL:

The proposed HVAC Systems to be analyzed during Design Development consist of a high efficiency conventional four-pipe Heating/Cooling Distribution System, a Geothermal Water Source Heat Pump System and a Hybrid type of System using an Earth Heat Exchanger (Geothermal) in conjunction with a Conventional Heating/Cooling System.

The Administration Area, Media Center, Gymnasium and Cafeteria which function twelve (12) months a year, and/or may function during non-educational times shall be zoned such that they can operate independently from the rest of the school. All other areas shall be separately zoned based on use and function.

The proposed four (4) systems alternative systems recommended to be analyzed include:

Option 1: Four-pipe high efficiency variable air volume system with heat recovery and free cooling outdoor air economizer cycle.

Option 2: Four-pipe fan coil units used in conjunction with a decoupled dedicated outdoor air system (DOAS) with integral heat recovery for ventilation.

Option 3: Geothermal water source water to air and water to water heat pumps used in conjunction with a decoupled dedicated outdoor air system (DOAS) with integral heat recovery for ventilation.

Option 4: Hybrid Geothermal water to water heat pumps used in conjunction with conventional high efficiency boilers and chillers.

From an energy efficiency and 2009 LEED for Schools - EA credit 1 standpoint, the proposed system options shall obtain the following minimum requirements based on existing building renovations:

HVAC OPTION	% ENERGY COST SAVINGS	LEED POINTS
Option 1	22%	8
Option 2	20%	7
Option 3	26%	10
Option 4	24%	9

The Mechanical Systems shall include all work associated within the building of Heating, Ventilating, Air Conditioning (HVAC), and Plumbing Systems. These systems shall extend to 5 feet beyond the building wall.

The Mechanical Systems, in concert with the Architectural considerations, are intended to create spaces that are flexible, functional, energy efficient, and respond to the needs of this facility.

Within the envelope of the new facility, the proper heating, cooling, ventilation, air exchanges, and Automatic Temperature Control / Energy Management Systems shall be provided for all spaces to create the appropriate thermal environment. All areas shall be provided with heating, ventilation, and air conditioning. The HVAC and related Mechanical Systems shall not only be functional and responsive to the need, but shall be simple, reliable, durable, maintainable, and easily accessible. The HVAC System utilizes energy conservation techniques to the greatest extent possible, while maintaining comfortable control. All HVAC components shall be capable of a complete override from the Energy Management System.

Heating and Cooling Systems and their associated controls shall be designed and zoned to enable the building to operate at less than full occupancy without conditioning the entire building.

The Mechanical Systems shall be designed to meet ASHRAE Standard 90.1-2010 (State Requirement) while exceeding ASHRAE Standard 90.1-2007 (current LEED Base Model Requirement) in an effort to achieve LEED Certification.

The Mechanical Systems, including Plumbing and Fire Protection, shall be designed in accordance with ASHRAE Standards, International Mechanical and Building Codes, NFPA, the International Plumbing Code, County Code Requirements, and IAC Standards.

CODES AND STANDARDS

- 2012 International Building Code (IBC)
- 2012 International Mechanical Code (IMC)
- 2012 International Energy Conservation Code (IECC)
- 2009 International Fire Code (IFC)
- 2009 National Standard Plumbing Code
- 2009 National Fuel Gas Code
- NFPA 13: Standard for the Installation of Sprinkler Systems, latest edition
- NFPA 90A: Standard for the Installation of Air Conditioning and Ventilating Systems, latest edition
- ASHRAE 2009 through 2012 Handbooks

OPTION 1: HIGH EFFICIENCY VARIABLE AIR VOLUME SYSTEM

A. Heating System:

The proposed Heating System is hot water. The building shall be heated by means of a Hot Water Circulating System servicing hot water heating coils located in air handling units, room terminal control units, baseboard radiation, unit heaters, and convectors.

The boiler's fuel source shall be natural gas. Base-mounted end suction distribution system centrifugal pumps, located in a mechanical space, shall circulate the required quantities of hot water, by piping systems to air handling units, room terminal control units and miscellaneous terminal heating units. A redundant circulating pump shall serve as a backup to the lead circulating pump.

The heating water loop shall be variable flow and shall provide the necessary low temperature (140°F maximum) hot water to air handling unit coils, unit heaters, terminal control units, baseboard radiation, and miscellaneous terminal heating units. The heating water pump shall utilize a variable frequency drive to vary pump speed based on the system's differential pressure. The system differential pressure operating setpoint shall be automatically reset based on analyzing all control valve positions. The heating water loop supply temperature shall be reset based on outside air temperature. Constant hot water circulation by means of in-line centrifugal type circulating pumps shall provide the necessary freeze protection of preheat coils. A redundant circulating pump shall serve as a backup to the lead circulating pumps.

Heating water pumps shall be trimmed with flexible connectors, suction diffusers (strainers for inline pumps), multipurpose valves, isolation valves, pressure gauges and flow meters.

Generation equipment shall include three (3) or four (4) high efficiency (90%-95% efficiency) variable flow condensing type fire tube hot water boilers (AERCO Benchmark, Cleaver Brooks Clearfire) sized equally for the total heating capacity. Boilers shall have their combustion air piped directly to the outside such that there are no open flame devices and the boilers and chillers can be located in a common mechanical equipment room.

Water expansion and air removal devices shall be provided in the Primary Heating Water System. Water pressure regulators located downstream of backflow preventers shall provide the makeup water requirements. All makeup water usage shall be metered and monitored through the EMS.

Chemical Treatment Systems shall be provided for the Hot Water Circulating System.

Hot Water Heating System piping shall be Schedule 40 Black Steel and insulated in accordance with ASHRAE Standards.

The Heating System shall operate automatically whenever the outside air temperature is 65° or less.

B. Cooling Systems:

The building shall be cooled by means of a Central Chiller Plant with chilled Water Circulating System serving chilled water coils located in air handling units.

Chilled water shall be generated by a single high efficiency, multiple (2) variable speed compressor(s), magnetic bearing water cooled centrifugal type chiller. A high efficiency air cooled chiller utilizing multiple variable speed compressors and multiple independent refrigeration circuits shall be analyzed to the water cooled chiller system. For the air cooled chiller option it is recommended the chilled water loop be provided with glycol to prevent drawing during the winter season. The chiller/glycol loop would be separated from the building chilled water loop by a flat plate and frame heat exchanger. This will allow the chilled water system to be functional whenever the outside air temperature is above 55°F regardless of the season. The chiller shall use an environmentally safe refrigerant in accordance with The Clean Air Act.

Basemounted end suction centrifugal pumps, located in the new Mechanical Room, shall circulate the required quantities of chilled water, by piping systems, to air handling unit cooling coils. A redundant circulating pump shall serve as a backup to the lead circulating pump. The chilled water pump shall utilize a variable speed drive and the chilled water plant shall operate as a variable primary flow system based on system differential pressure. The system differential pressure operating setpoint shall be automatically reset based on analyzing all control valve positions. A differential pressure bypass shall maintain minimum chilled water flow through the chiller.

The capacity and part load performance of the chiller shall be selected to precisely and efficiently track the building load based on the hour by hour building load requirements.

An induced air cooling tower associated with the chiller shall utilize a variable speed fan to reject heat to the atmospheric heat sink. A remote sump shall be considered if mechanical cooling is desired when warm winter days occur.

Basemounted end suction centrifugal pumps for condenser water shall be located in the Mechanical Room.

Chilled water and condenser water pumps shall be trimmed with flexible connectors, suction diffusers, multipurpose valves, isolation valves, pressure gauges, and flow meters.

Water expansion and air removal devices shall be provided in the Chilled Water System. Water pressure regulators located downstream of backflow preventers shall provide the makeup water requirements for each system. Makeup water usage for the chilled water and condenser water system shall be metered and monitored through the EMS.

Independent Chemical Treatment Systems shall be provided for the chilled water and condenser systems.

Chilled water piping shall be welded Schedule 40 Black Steel and shall be insulated in accordance with ASHRAE Requirements. Condenser water piping shall be Schedule 40 Galvanized Steel with mechanical couplings. Condenser water piping shall be insulated.

The Chiller System (i.e., mechanical cooling) shall operate automatically whenever outside air temperature is above 50° F unless drained for the winter season.

C. <u>Air Distribution Systems:</u>

Multiple air handling units shall provide the necessary ventilation and supply air to maintain the desired environmental conditions and makeup air requirements. Minimum ventilation air rates shall be determined by the requirements set forth by the current ASHRAE Standard 62 and the International Mechanical Code.

All air handling unit systems shall be provided with 100% outside air economizer cycles for free cooling. All air moving equipment and ductwork shall be installed in accordance with requirements of SMACNA and ASHRAE.

Multiple air handling units shall be provided and shall serve Classroom Areas, Administration Suite, Gymnasium, Cafeteria, and Media Center. These air handling unit zones shall be coordinated with the HCPSS Facilities Department and defined during the Design Phase.

The proposed air handling unit(s) shall be single zone, variable air volume, medium pressure air handling unit(s) with direct drive airfoil plenum type supply fan, belt drive backward inclined airfoil return fan, economizer Section, mixing box, filter Section with 30% (MERV 8) prefilters and 85% (MERV 13) final filters with (differential pressure gauge across each filer bank), hot water preheat coil with circulating pump, and chilled water dehumidification/ cooling coil. Air handling units serving assembly spaces (i.e., without terminal control units) shall be provided with a heating coil(s) located downstream of the cooling coil. The supply and return fan shall be provided with a variable flow controller (i.e., variable speed drives). Outside air, relief air, return air and supply air streams shall be equipped with air flow measuring stations. Return air shall volumetrically track supply air and relief air shall volumetrically track outside air to maintain a slight possible building pressure.

All outside air shall be preconditioned through the use of a heat recovery device so as to capture and reuse waste heat. A dedicated outdoor air system unit(s) shall serve multiple adjacent air handling units, an individual air handling unit or a heat recovery device shall be component integral with the air handling unit.

Variable air volume type air handling units shall distribute supply air (55°F) to room terminal control units through a medium pressure round/flat oval duct system. Each classroom shall be provided with a room terminal control unit for independent temperature control. The proposed room terminal unit is a standard (i.e., non-fan powered) variable air volume terminal control unit equipped with hot water heating coil which shall vary the amount of conditioned primary air to the space from the air handling unit. Low pressure sound lined rectangular supply air ductwork located at the outlet of room terminal units shall serve ceiling supply diffusers.

For assembly type spaces (Gymnasium, Cafeteria, etc.) air handling units shall additionally be provided with an auxiliary heat recovery device (sensible heat only) integral with the unit which shall be utilized for free reheat during the dehumidification sequence of operation. The unit(s) shall modulate in airflow capacity to maintain space temperature setpoint conditions much like the modulating damper in a thermostatically controlled variable air volume terminal control unit. A return fan equipped with a variable speed drive shall be controlled to volumetrically track the supply fan air flow.

A return air fan equipped with a variable speed control shall draw return air through a hard ducted return air system connected to room return air registers. The return fan shall be controlled to volumetrically track the supply fan air flow.

Low pressure sound lined rectangular supply air ductwork located at the outlet of room terminal units shall serve ceiling supply diffusers.

All return air systems shall be hard ducted from room return air grilles to the air handling unit through a low pressure duct system.

< end of HVAC Option 1 >

OPTION 2: FOUR-PIPE FANCOIL UNIT SYSTEM WITH DEDICATED OUTDOOR AIR SYSTEM (DOAS)

A. Heating System:

The proposed Heating System is hot water. The building shall be heated by means of a Hot Water Circulating System servicing hot water heating coils located in air handling units, fan coil units, baseboard radiation, unit heaters, and convectors.

The boiler's fuel source shall be natural gas.

Base-mounted end suction distribution system centrifugal pumps, located in a mechanical space, shall circulate the required quantities of hot water, by piping systems, to air handling units, fan coil units and miscellaneous terminal heating units. A redundant circulating pump shall serve as a backup to the lead circulating pump.

The heating water loop shall be variable flow and shall provide the necessary low temperature (140°F maximum) hot water to air handling unit coils, fan-coil units, unit heaters, baseboard radiation, and miscellaneous terminal heating units. The heating water pump shall utilize a variable frequency drive to vary pump speed based on the system's differential pressure. The system differential pressure operating setpoint shall be automatically reset based on coil control valve position. The heating water loop supply temperature shall be reset based on outside air temperature. Constant hot water circulation by means of centrifugal in-line type circulating pumps shall provide the necessary freeze protection of preheat coils. A redundant circulating pump shall serve as a backup to the lead circulating pumps.

Heating water pumps shall be trimmed with flexible connectors, suction diffusers (strainers for inline pumps), multipurpose valves, isolation valves, pressure gauges and flow meters.

Generation equipment shall include three (3) or four (4) high efficiency (90%-95% efficiency) variable flow condensing type fire tube hot water boilers (AERCO Benchmark, Cleaver Brooks Clearfire) sized equally for the total heating capacity. Boilers shall have their combustion air piped directly to the outside such that there are no open flame devices and the boilers and chillers can be located in a common mechanical equipment room.

Water expansion and air removal devices shall be provided in the Primary Heating Water System. Water pressure regulators located downstream of backflow preventers shall provide the makeup water requirements. All makeup water usage shall be metered and monitored through the EMS.

Chemical Treatment Systems shall be provided for the Hot Water Circulating System.

Hot Water Heating System piping shall be Schedule 40 Black Steel and insulated in accordance with ASHRAE Standards.

The Heating System shall operate automatically whenever the outside air temperature is 65° or less.

B. Cooling Systems:

The building shall be cooled by means of a Central Chiller Plant with chilled Water Circulating System serving chilled water coils located in air handling units and fan coil units.

Chilled water shall be generated by a single high efficiency, multiple (2) variable speed compressor(s), magnetic bearing water cooled centrifugal type chiller. A high efficiency air cooled chiller utilizing variable speed compressors and multiple independent refrigerant circuits shall be analyzed to the water cooled chiller system. For this alternative, a flat plate heat exchanger is recommended to separate the constant flow chiller loop using glycol from the variable flow building chilled water loop using clear water. The chiller shall use an environmentally safe refrigerant in accordance with The Clean Air Act.

Basemounted end suction centrifugal pumps, located in the new Mechanical Room, shall circulate the required quantities of chilled water, by piping systems, to air handling unit and/or fan coil unit cooling coils. A redundant circulating pump shall serve as a backup to the lead circulating pump. The chilled water pump shall utilize a variable speed drive and the chilled water plant shall operate as a variable primary (water cooled chiller) flow system. A differential pressure bypass shall maintain minimum chilled water flow through the chiller(s).

The capacity and part load performance of the chiller shall be selected to precisely and efficiently track the building load based on the hour by hour building load requirements.

An induced air cooling tower associated with the water cooled chiller shall utilize a variable speed fan to reject heat to the atmospheric heat sink. A water side economizer shall be considered to provide free cooling during low outdoor air conditions. A flat plate and frame heat exchanger in parallel with the water cooled chiller would utilize the condenser water system to generate chilled water. The cooling tower in this scenario would need to be a forced draft type. A remote sump located in the Mechanical Room is recommended for freeze protection since this system does not utilize a full free outside air economizer system and mechanical cooling will be needed during lower outdoor air temperature conditions.

Basemounted end suction centrifugal pumps for condenser water shall be located in the Mechanical Room.

Chilled water and condenser water pumps shall be trimmed with flexible connectors, suction diffusers, multipurpose valves, isolation valves, pressure gauges, and flow meters.

Water expansion and air removal devices shall be provided in the Chilled Water System. Water pressure regulators located downstream of backflow preventers shall provide the makeup water requirements for each system.

Makeup water usage for the chilled water and condenser water systems shall be independently metered and monitored through the EMS.

Independent Chemical Treatment Systems shall be provided for the chilled water and condenser systems.

Chilled water piping shall be welded Schedule 40 Black Steel and shall be insulated in accordance with ASHRAE Requirements. Condenser water piping shall be Schedule 40 Galvanized Steel with mechanical couplings. Condenser water piping shall be insulated.

The Chiller System (i.e., mechanical cooling) shall operate automatically whenever outside air temperature is above 50° F.

C. <u>Air Distribution Systems:</u>

Four Pipe Fan Coil Unit System with Dedicated Outdoor Air System (DOAS) shall serve the majority of the spaces including classroom areas. Air handling systems as described in Option 1 shall serve assembly type spaces, Gymnasium, Cafeteria, etc.

Individual vertical fan coil units with a low pressure ducted supply air system to ceiling supply air diffusers shall be provided for each room. These units shall be 100% recirculating air type with heating and cooling coils (i.e. 4-pipe) controlled to maintain the desired indoor temperature conditions (i.e. sensible heating and cooling only).

Heat Recovery Ventilation Air Units (100% outside air) shall be used as part of the Dedicated Outdoor Air System (DOAS) to dehumidify and heat the minimum amount of outside air as determined by the requirements set forth by ASHRAE Standard 62, The International Mechanical Code, the Educational Specifications and the makeup air requirements to maintain a slight positive building pressure. This conditioned/tempered outside air shall be directly injected into each classroom. Relief air shall be brought back to the heat recovery unit for energy reclamation via a ducted low pressure return air system, then discharged to the outside. Multiple heat recovery devices inside these units (heat wheels, flat plate heat exchangers) shall be employed to provide the necessary preconditioning (sensible and latent energy) of the outside air and free reheat (sensible energy) during the dehumidification mode. These units shall additionally be equipped with a supply fan, exhaust fan, filters, cooling/dehumidification coil, and heating coil. The heating and cooling medium shall be provided by the building's central cooling and heating plant.

The proposed vertical fan coil units would be located in equipment closets adjacent to the classroom being served. It is desired to locate multiple units in each equipment closet typically located at the common wall between classrooms. An extensive condensate collection system shall be required to connect all the terminal fan coil units.

Multiple fan-coil units may have to be grouped and located in common equipment rooms where mechanical closets are not practical. Fan coil units are not recommended to be located above ceilings of classrooms due to acoustical reasons.

To reduce energy usage it is recommended to cycle the units fan based on the demand for heating and cooling in lieu of running these low efficiency fans continuously during the occupied mode. ECM motors are also recommended.

< end of HVAC Option 2 >

OPTION 3: GEOTHERMAL WATER SOURCE HEAT PUMP WITH DEDICATED OUTDOOR AIR SYSTEM (DOAS)

Geothermal Water Source Heat Pumps: Water source heat pumps are single packaged reverse cycle heat pumps utilizing a closed re-circulating water loop into which units absorb or reject heat. Typical condenser water flow rates are based on three (3) gallons per minute (gpm) per ton of cooling (12,000 BTUH). Water source heat pump components include a complete refrigeration system consisting of a compressor, refrigerant to water heat exchanger, refrigerant to air heat exchanger, refrigerant expansion devices, and a refrigerant reversing valve.

Similar to fan coil units, water source heat pumps do not have the capacity to condition outside air. Therefore, a separate decoupled dedicated outdoor air system (DOAS) using heat recovery ventilation air unit(s), as described hereinbefore, shall be used in conjunction with geothermal water source heat pumps.

There are two (2) main types of heat pump units; water to air type and water to water type. As their name type implies water to air heat pumps use the geothermal water loop to exchange heat absorbed (cooling) or rejected (heating) from the air stream via the refrigeration system. Similarly water to water heat pumps utilize the refrigeration system to absorb heat from a re-circulating water system to create chilled water while rejecting this heat to the geothermal loop. During the heating mode the refrigeration system absorbs heat from the geothermal loop and coupled with the waste heat created by compressor inefficiency the combination of heat sources create low temperature heating water, typically about 120°F.

The system concept is also similar to the fan coil units, utilizing vertical type heat pump units located in equipment closets. For larger areas, (Gymnasium, Cafeteria) separate, independent conventional type air handling systems shall be used.

A disadvantage of any heat pump/decentralized system is its anticipated life expectancy is shorter (20-25 years) than conventional centralized equipment (25-30 years). Typically, when it reaches the end of its life expectancy, all units will need to be replaced, as these packaged type units are typically not as feasible to be rebuilt and life extended. The earth heat exchanger system has a guaranteed minimum life of 50 years.

Geothermal water to air heat pumps need to be used in conjunction with a decoupled dedicated outdoor air system. Water to air heat pumps shall be recirculating air type to provide sensible heating and cooling to the space where the DOAS shall provide dehumidified conditioned ventilated air to each space. The heat recovery units are the same as described for the fan coil unit option except they shall be 2-pipe (a single dual temperature coil) in lieu of 4-pipe (individual heating and cooling coils).

It is recommended that all dedicated outdoor air system units and all conventional air handling units (Gymnasium, Cafeteria) be provided with a two-pipe/dual temperature coil and be served by a dual temperature system using geothermal water to water heat pumps. Water to water heat pumps shall generate either chilled water (45°F) or low temperature heating water (120°F) which through a separate 2-pipe loop shall provide heating or cooling to the dual temperature heating/cooling coil. A high efficiency condensing boiler incorporated into this dual temperature loop is recommended to provide supplemental heating capacity when needed (morning warm-up, redundancy). As an alternative, dedicated outdoor air system units can be self-contained compressurized geothermal type units.

Geothermal heat pumps take advantage of using the earth as the loop's heat sink. Approximately 5'0" below the earth's surface, a relatively constant 55°-57°F temperature is maintained. Due to the extended temperature operating range, the piping system shall be insulated and the loop shall be provided with a high efficiency condensing boiler which can provide supplemental heating to the loop while protecting the loop (i.e., clear water) from freezing conditions.

The proposed closed loop earth heat exchanger system utilizes the closed loop, vertical well concept with plastic tubing installed in a Ubend configuration within an approximately 400 to 450 foot deep well which is filled with a grout type material. Based on the geology of the area it is anticipated that an air rotary drilling system shall be used and the soil thermal conductivity shall be in the 1.5 – 1.8 range. It is anticipated that each vertical well shall be capable of approximately 1.5 – 2.0 tons of heat exchange depending on actual soil and grout thermal conductivities. It is anticipated that between 225 to 250 bore holes located in a 15 foot by 15 foot grid would be required (based on ± 100,000 gsf). It is recommended that the earth heat exchanger water loop utilize clear water with a supplemental high efficiency boiler to provide the necessary freeze protection and supplemental heat, if needed (morning warm-up).

A base mounted end suction pump with standby for the geothermal and dual temperature system shall be located in the Mechanical Room. Variable speed pumping and individual unit solenoid valves shall be utilized to minimize pump energy. Individual constant volume in-line circulating pumps shall be used for the load side of water to water heat pumps.

Geothermal and dual temperature pumps shall be trimmed with flexible connectors, suction diffusers (strainers for in-line pumps), multipurpose valves, isolation valves, pressure gauges and flow meters.

Water expansion and air removal devices shall be provided in the Geothermal and Dual Temperature Water System. Water pressure regulators located downstream of backflow preventers shall provide the make-up water requirements. Makeup water usage for the Geothermal and Dual Temperature System shall be independently metered and monitored through the EMS.

Chemical Treatment Systems shall be provided for the Geothermal and Dual Temperature Water Circulating System.

Geothermal and Dual Temperature Water Heating System piping shall be Schedule 40 Black Steel and insulated in accordance with ASHRAE Standards.

< end of HVAC Option 3 >

OPTION 4: HYBRID GEOTHERMAL SYSTEM:

A. General:

A hybrid geothermal system can be used in conjunction with a conventional variable air volume system (Option 1) or four-pipe fan-coil unit (Option 2). Basically the air distribution systems remain the same; however, the heating and cooling plant would use a combination of water to water geothermal heat pumps and conventional high efficiency condensing boilers and high efficiency chiller to optimize the energy efficiency of the generation of heating and cooling especially during Spring/Fall seasons (or during warm winter conditions). A single chiller would supplement the geothermal system during peak cooling periods while the boilers would supplement the geothermal system during peak heating periods.

B. Hot Water Heating Plant:

The proposed Heating System is low temperature hot water. The building shall be heated by means of a Hot Water Circulating System servicing hot water heating coils located in air handling units, terminal heating units, baseboard radiation, unit heaters and convectors. A low temperature heating water distribution loop operating at 115° F supply, 100° F return is proposed to serve classroom fan coil units or terminal control units (VAV boxes), air handling units, dedicated outdoor air units and all terminal heating units.

The low temperature heating water loop allows waste heat from interior room mechanical cooling requirements to be reclaimed and boosted in temperature to serve perimeter fan coil units during the heating mode and/or for free reheat if dehumidification is required. This shall be described more in depth under the geothermal heat pump system description.

Generation equipment shall include three (3) or four (4) high efficiency variable flow fire tube type condensing boilers sized equally for the total heating capacity. These boilers shall be located in the Mechanical Room. Boilers shall be the high efficiency condensing type and shall be controlled in lead/lag fashion to maintain the supply water temperature setpoint. The boilers shall have their combustion air piped directly to the outside such that there are no open flame devices and heating and cooling equipment can be located in a common mechanical room. The boiler's fuel source shall be natural gas. A new gas service shall be required to support the demand loads.

Base mounted end suction distribution system centrifugal pumps, located in the new Mechanical Room, shall circulate the required quantities of low temperature hot water, by piping systems, to air handling, DOAS units, terminal heating devices (cabinet unit heaters, baseboard radiation, convectors, etc.) and room terminal control units (i.e. VAV boxes)/fan coil units. A redundant circulating pump shall serve as a back-up to the lead circulating pump.

The heating water loop shall be variable flow and shall provide heating water to baseboard radiation, VAV box heat coils, fan coil units, DOAS units, and miscellaneous terminal heating units. The heating water pumps(s) shall utilize a variable frequency drive to vary pump speed based on the system's differential pressure. The differential pressure operating setpoint shall be automatically reset based on analyzing control valve positions. Constant hot water circulation by means of centrifugal in-line circulating pumps shall provide the necessary freeze protection of preheat coils. A redundant circulating pump shall serve as a back-up to the lead circulating pumps.

The Heating System shall operate automatically whenever the outside air temperature is 65° or less.

C. Cooling Systems:

The building shall be cooled by means of a Central Chiller Plant with chilled Water Circulating System serving chilled water coils located in air handling units, dedicated outside air units, and/or fan coil units.

Chilled water shall be generated by a single variable speed dual compressor magnetic bearing centrifugal type water-cooled chiller. An induced draft type cooling tower associated with the chiller shall be used to reject condenser heat to the atmosphere heat sink. The chiller shall be supplemented by a geothermal system using water to water heat pumps to reject condenser water heat to the building or earth heat sink. This shall be described in more depth under the geothermal heat pump system description. As an alternative, an air cooled chiller utilizing variable speed compressors and multiple independent refrigeration circuits can be utilized (and drained during the winter). The chiller shall use an environmentally safe refrigerant (R134A) in accordance with The Clean Air Act. The Mechanical Room shall be provided with a Refrigerant Monitoring System and shall be interlocked with the Ventilation System for refrigerant purging.

Base-mounted end suction centrifugal pumps, located in the Mechanical Room, shall circulate the required quantities of chilled water, by piping systems, to air handling units, dedicated outdoor air system units and/or fan coil unit cooling coils. A redundant circulating pump shall serve as a back-up to the lead circulating pump.

The capacity of the high efficiency chiller used in conjunction with water-to-water heat pumps shall be evaluated on peak and part load performance. The capacity and performance of this chiller and quantity of water to water heat pumps shall be selected to precisely and efficiently track the building load based on the hour-by-hour building load requirements to maximize energy efficiency, part load performance and turn down ratio while providing the most cost efficient solution. Variable flow primary pumping strategies coupled with equipment staging shall efficiently distribute the minimum cooling energy needed to offset the building loads. Small in-line type centrifugal pumps shall insure a constant flow through individual water to water heat pumps while a building distribution pump shall provide a varying chilled water flow where needed to the building.

Base-mounted end suction centrifugal pumps for the condenser water system and chilled water distribution shall be located in the mechanical equipment room.

All chilled water and condenser water pumps shall be trimmed with flexible connectors, suction diffusers, multipurpose valves, isolation valves, pressure gauges, and flow meters.

Water expansion and air removal devices shall be provided in the Chilled Water System. Water pressure regulators located downstream of backflow preventers shall provide the make-up requirements for each system.

Independent Chemical Treatment Systems shall be provided for the chilled water and condenser systems.

Makeup water usage for the chilled water and condenser water systems shall be independently metered and monitored through the EMS.

Chilled water piping shall be Schedule 40 Black Steel and shall be insulated in accordance with ASHRAE Requirements.

Condenser water piping shall be standard weight galvanized steel piping with mechanical couplings.

The Chilled Water System (i.e. mechanical cooling) shall operate automatically whenever the outside air temperature is 55°F or above.

GEOTHERMAL WATER-TO-WATER HEAT PUMP SYSTEM

D. General:

A geothermal water-to-water heat pump is capable of generating chilled water (42°F) when operating in the cooling mode and capable of generating low temperature hot water (120°F) when operating in the heating mode.

The use of flat plate and frame heat exchangers may be necessary to simplify the operation (balancing and control) of the system.

E. Cooling Mode:

During the cooling mode, the water-to-water heat pumps shall be incrementally energized based on building load to generate (42° F) chilled water. A flat plate and frame heat exchanger shall separate the heat pump chilled water loop (load side) from the building chilled water loop (45° F). When simultaneous heating is not required, waste condenser water (source side) heat shall be rejected to the ground heat sink. As additional cooling is required, the high efficiency chiller shall be energized. The chilled water distribution pump shall deliver chilled water throughout the building where needed. Heat pump and chiller sequencing shall be determined through flow metering and BTU usage/generation as determined by the Energy Management System.

The proposed geothermal water-to-water heat pumps shall be designed as two (2) equal capacity banks using multiple equally sized water-to-water heat pumps (or heat pump chiller) in each bank. The source side of each water-to-water heat pump shall be provided with a solenoid valve hard wired to the heat pump controller. Both banks of water-to-water heat pumps shall be capable of operating in the cooling mode during peak cooling demands.

F. Heating Mode:

During the heating mode, the water-to-water heat pumps shall incrementally be energized based on building load to generate low temperature heating water serving the building.

A flat plate and frame heat exchanger shall separate the heat pump heating water loop (load) from the building low temperature heating water loop (115° F). When the heat pumps are in the heating-only mode, heat is absorbed from the ground and circulated to the source side of the water-to-water heat pump. The heat pump, operating in reverse refrigerant cycle, uses the source water as the evaporator and load water as the condenser to generate low temperature heating water (120° F).

As described in the cooling mode, each water-to-water heat pump shall be provided with a solenoid valve hard wired to its unit controller on the source side and a constant volume in line centrifugal pump on the load side.

The high efficiency condensing boilers shall provide supplemental heat when needed. If the source water from the earth ever became too cold, possibly creating a freezing condition, the heat pump system shall be de-energized and all heating energy shall be provided by the central boiler system.

An override shall allow the supply water temperature to be reset higher (up to 140° F) which would disable the heat pumps and use boilers exclusively for morning warm up and/or below outdoor air design conditions (10°F) when additional heat is needed.

G. Simultaneous Heating / Cooling Mode:

Based on the various exposures of a building and internal cooling loads of interior spaces, there may be hours of operation when mechanical cooling is required for interior classrooms, while heating will simultaneously be required for perimeter classrooms and offices.

The water-to-water heat pump system takes advantage of this requirement by using waste heat generated by mechanical cooling of interior spaces and using the waste heat for perimeter spaces. In essence, the perimeter of the building becomes the heat rejection heat sink and the interior of the building becomes the heat absorption heat sink; thus, the ground loop is not required and bypassed. This design creates a heat recovery fly wheel effect where heat/energy is transported and used where needed within the building.

By using a plate and frame heat exchanger to separate the “source” circulating water loops, either heat pump bank can operate in the heating or cooling mode. The heat exchanger allows the condenser water (source) from the HP bank operating in the cooling mode to cool down, while heating the source side of the heat pump bank. By utilizing this waste heat, the coefficient of performance (COP) increases during the heating mode. For instance, using 40° F water from the earth to generate 120° F heating water, the temperature difference between the source (40° F) and load (120° F) is 80° F with a corresponding COP of 3.8 to 4.0 (380% to 400% efficient).

By using the 95° F condenser water heat for the heat pump bank operating the cooling mode, the source water for the heating mode heat pumps may warm to 60°s F (source), thus with 120° F (load), the COP increases to 5.0 (500% efficient) and with 75° F (source) water, the COP increases to 6.0 (600% efficient). The water temperature and corresponding efficiency shall be dependent upon how many heat pumps are functioning in the cooling mode versus the heating mode. The more units operating the cooling mode versus the heating mode increases the source water temperature and thus the heating efficiency.

The coefficient of performance is defined as useful energy out versus energy in. That is to say, with a COP of 6, there are 6 BTU’s of useful heat for every 1 BTU input. Since the input is waste heat from cooling, there is additional system efficiency achieved. A conventional combustion type boiler system (80% efficient) has a COP of .8 as for every 1 BTU of energy in, only .8 BUT’s of energy are usable, as the other .2 BTU’s are waste heat discharged to the atmosphere through the chimney as flue gas.

< end of HVAC Option 4 >

BUILDING AUTOMATIC TEMPERATURE CONTROLS/ENERGY MANAGEMENT SYSTEM

It is recommended that the building be provided with a BACNET Direct Digital Control System and be tied into the County Energy Management System. It is recommended that the system have full direct digital controls, including space terminal unit controls, which is consistent with the County Standard. All controls shall be electric/electronic actuation. All control and monitoring points shall be consistent with the County's current Standards and shall be reviewed with the Facilities Management Department during Design.

Automatic Temperature Controls shall be capable of operating per the sequence of operation, including when the Energy Management System is manually overridden.

The Basic Design Criteria shall be as follows:

1. Cooling Mode:
   - Outdoor Temperature: 95°F DB, 78°F WB
   - Indoor Temperature: 75°F DB, 65% RH or less
2. Heating Mode:
   - Outdoor Temperature: 10°F DB
   - Indoor Temperature: 70°F DB
3. Chilled Water System (at 95 deg F Ambient):
   - 45°F Supply Water Temperature
   - 60°F Return Water Temperature
4. Heating Water System (at 10 deg F Ambient):
   - Conventional:
     - 140°F Supply Water Temperature
     - 120°F Return Water Temperature
   - Hybrid Geothermal:
     - 120°F Supply Water Temperature
     - 90°F Return Water Temperature
5. Ventilation Rates (ASHRAE Standard 62):
   - Classrooms:
     - 10 CFM per person minimum
     - .12 CFM/sq.ft.
   - All other areas:
     - 5 CFM per person minimum
     - .06 CFM/sq.ft.
6. Water Source Heat Pump:

   Geothermal Loop – variable 40°F minimum to 90°F

   maximum supply water Temperature

Central Heating Plant: The building central heating system shall be energized to operate whenever outside air temperature is 65°F or less. When indexed on, the distribution pump shall be energized and vary its flow through the variable speed controller to maintain its system differential pressure set-point. The operating differential pressure setpoint shall be automatically reset by analyzing all heating control valve positions.

Through integral sequencing software by the boiler manufacturer, the boilers shall be staged in lead-lag and rotational fashion to maintain system supply water set-point.

The heating water temperature supply shall be reset (linear type) based on outside air temperature.

Central Chilled Water Plant: The building central chilled water system shall be energized to operate whenever outside air temperature is 50° F or above. The chilled water system shall be variable primary flow where the system pump shall vary in speed to maintain the system differential pressure setpoint. This setpoint shall be automatically reset based on analyzing all the chilled water control valve positions. A system bypass valve shall be controlled to maintain flow through the chiller(s). When activated, the chillers and chilled water pumps shall be energized in lead-lag fashion. For water cooled chillers, the condenser water pump and cooling tower shall be energized with the chiller. Condenser water supply temperature shall be reset based on outdoor air wet and dry bulb conditions.

The chiller shall be controlled through its internal control panel to maintain discharge evaporator water temperatures. It is recommended that all chilled water control valves be the pressure independent (PIC) type similar to “Delta-P” or “Griswold”.

Variable Air Volume Terminal Control Units shall be controlled by room temperature sensors (direct digitally controlled). The room temperature sensors shall modulate the quantity of supply air (from the air handling unit) via a modulating damper integral to the terminal control unit. When additional heat is required, the room temperature sensor shall modulate the terminal room unit’s heating coil valve.

For Constant Volume Air Handling Units, a room temperature sensor shall modulate the associated air handling units’ cooling coil valve and outside air economizer controls to provide the necessary cooling. When the mixed air temperature falls below its setpoint, the control valve shall modulate to maintain 55°F temperature off the coil. When heating is required, the room temperature sensor modulates the unit’s heating coil control valve. Constant volume air handling units shall be provided with a heat recovery device to precondition (sensible and latent heat) the outside air and a heat recovery device to provide free reheat (sensible heat) when operating in a dehumidification/cooling mode. Supply and relief fans shall be provided with variable speed drives and shall vary in fan speed to match the space load.

For variable Air Volume Air Handling Units, a supply duct temperature sensor sensing the discharge air temperature shall modulate preheat coil valve or chilled water valve in conjunction with air economizer control to maintain constant supply air temperature. A heat recovery device shall be used to precondition the outside air required for ventilation purposes.

Preheat coil circulating pumps shall be energized and run continuously whenever outside air temperature is less than 40°F.

Duct static pressure sensors strategically located downstream in the supply duct shall vary supply air fan speed to maintain its set-point.

The return air fan speed shall vary so as to maintain a constant volumetric difference between supply air and return air (i.e. fan tracking). Relief/exhaust air system air flow rates shall be slightly less than outside air flow rates to maintain a slight positive building pressure.

All air handling units shall be provided with safety features such as low limit control, freeze stat, supply and return air smoke detectors, and high static pressure sensors (for variable air volume units only). All air handling units shall be provided with energy conservation features such as economizer cycles, night setback, and morning warm-up cycles of operation. Space carbon dioxide sensors shall be used for control of outdoor air (demand controlled ventilation or DCV) for high occupancy spaces currently classified as 25 or more occupants.

Space relative humidity sensors shall be used throughout the building and shall automatically index the dehumidification control mode if its maximum setpoint condition is reached.

Supply air discharge air temperature set-points shall be reset based on the space within the zone requiring the greatest cooling.

Fan-Coil Units shall be controlled by room temperature sensors. Cooling coil and heating coil control valves shall modulate to maintain room temperature set-point.

Heat Pump Units shall be controlled by room temperature sensors. Reversing valves shall be positioned to either heating or cooling and the compressor shall cycle (on/off) to maintain room temperature set-point.

Dedicated outdoor air units shall provide 100% outside air to individual spaces. An enthalpy (sensible and latent heat) heat recovery wheel shall pre-condition the outside air stream. A heating or cooling/dehumidification coil shall heat or sub-dehumidify the outside air stream. When operating in a dehumidification mode, a free reheat (sensible heat) heat exchanger (typically a plate heat exchanger) shall provide the necessary free reheat to prevent sub-cooling the spaces while enhancing the efficiency of the heat wheel. A face and bypass damper control shall be provided for the reheat heat recovery unit and a variable speed motor shall control the enthalpy heat recovery wheel. The heat wheel shall be stopped during the economizer outside air conditions and for frost control. Air flow measuring stations shall be utilized to monitor supply, return, relief and outside air systems.

<End of Proposed Mechanical System Narrative>

Electrical Design Narrative

PROPOSED ELECTRICAL DISTRIBUTION SYSTEM

The main distribution switchboard and all the original Federal Pacific equipment is recommended to be replaced as it has reached the end of its expected useful life. Also, the replacement parts for this equipment can be expensive and/or difficult to obtain. The Siemens equipment appears to be in good condition, although thermal imaging is recommended to adequately determine this.

Surge protection is recommended for the incoming service entrance, as well as cascaded surge protection devices on panelboards serving non-linear computer loads. Dedicated panelboards with 200% rated neutrals are recommended for this application. A separate neutral conductor is recommended to be installed for each computer circuit in order to reduce the effects of harmonics caused by non-linear loads.

PROPOSED EMERGENCY DISTRIBUTION SYSTEM

The existing generator has not reached its anticipated useful life. However, the capacity of the existing system is not sufficient to serve both life safety and the optional standby loads currently required by HCPSS to be on the generator. These loads include the kitchen refrigerator/freezer, telecommunications equipment and/or select HVAC equipment. A larger natural gas generator (approximately 150kW), and automatic transfer switches are recommended as part of the renovation.

PROPOSED LIGHTING

Lighting systems that meet adopted energy codes for lighting power density as well as controllability are recommended. Multi-level switching is recommended in classrooms to accommodate A/V presentations. Emergency lighting within classrooms is recommended to be wired through an emergency relay for A/V presentations.

Lighting controls will be required to incorporate full automatic shutoff of building lighting systems. This can be accomplished via local vacancy detectors or via contactors controlled via the building EMCS system with timed, local override. Daylight harvesting will be incorporated, as applicable, to meet the current energy code.

LED lighting is recommended at egress doors, connected to an emergency standby source per code and controlled via photocell. The building mounted exterior lighting is recommended to be replaced with full cutoff type fixtures. The original pole mounted HID fixtures are recommended to be replaced as they have exceeded their anticipated useful life.

PROPOSED FIRE ALARM SYSTEM

Recent code revisions require the installation of voice evacuation notification for the fire alarm system. Modifications to device locations and wiring will be required to accommodate anticipated space layout reconfigurations as well as a building addition. Therefore, a new system is recommended.

PROPOSED TELECOMMUNICATIONS SYSTEM

The telecommunications system is recommended to be updated as required to meet current state of Maryland and the HCPSS standards. The system shall be star-wired and consist of category six cabling for both telephone and data. The system will provide all components for a complete operable Local Area Network (LAN). A multi-strand composite fiber optic backbone will be used to link the Main Distribution Frame (MDF) with Intermediate Distribution Frame (IDF) rooms. IDF rooms will be provided and strategically located as required to limit cabling lengths to 250 linear feet. Network switches will be provided for racks as an add alternate.

The System shall be star-wired and consist of Category 6 cabling for both telephone and public address. The existing PA and clock system will be expanded as required to accommodate devices in the new additions. Voice outlets will be terminated in dedicated patch panels to provide the ability to convert to voice over IP (VoIP) in the future.

Video drops will be provided in classrooms at the teacher's wardrobe cabinet. CATV distribution will be interactive two-way distribution, consisting of broad-band coaxial cabling (RG-11u and RG-6u). All components, such as splitters and line amplifiers, will be provided as required for integration into the existing building CATV system.

Epson short throw interactive projectors will be provided in each classroom. Inputs will include DVD/CATV from the teacher's cabinet, as well as VGA from the teacher's low outlet. An IR sensor will be provided in the ceiling for remote control of the tuner and DVD in the teacher's cabinet. Audio from input sources will be distributed within the classroom via four local ceiling mounted speakers. The volume control will be located in the cabinet.

PROPOSED SECURITY SYSTEM

The intrusion detection may be reused with modifications and expansions as required to suit the revised space configuration and building addition. New access control and video surveillance cameras are recommended to be provided per current HCPSS standards. IP video surveillance cameras will be located to provide coverage inside building corridors and points of entry, as well as on the exterior of the building, with pan-tilt-zoom capability. An Alphone video intercom will be provided between the front entry and Administration Area for visitor access.

GENERAL ELECTRICAL SYSTEM STANDARDS

All systems and components will be designed in accordance with the following:

- Howard County Board of Education - Educational Specifications for this project.
- All applicable national, state, and local requirements.
- Maryland State Interagency Committee for Public School Construction Standards.
- Americans with Disabilities Act (ADA) Requirements.
- American National Standards Institute (ANSI).
- Institute of Electrical & Electronic Engineers (IEEE).
- National Electrical Code (NEC).
- National Electrical Manufacturer's Association (NEMA).
- National Electrical Safety Code (NESC).
- National Fire Protection Association (NFPA).
- Underwriters Laboratories (UL).
- International Building Code (IBC).
- Illuminating Engineering Society (IES).
- American Society of Testing and Materials (ASTM).
- American Society of Mechanical Engineers (ASME).

<End of Proposed Electrical System Narrative>

Sustainable ‘Green’ Design Goals

For scheme 1, the renovated school and additions should achieve a ‘Certified’ level from the LEED (Leadership in Energy and Environmental Design) rating system, making this facility a ‘Green’ school.

Simply stated, a ‘Green’ school is a building designed to conserve energy, water, and materials, thus reducing negative impacts on human health and the environment. A ‘Green’ learning environment provides natural daylight, enhanced classroom acoustics, improved indoor air quality, thermal comfort, and opportunities to integrate green features into the school's curriculum.

An ‘in progress’ LEED scorecard is shown below which summarizes the credits most likely obtainable at this time. As the project continues to evolve, new credits may be possible while others may become increasingly difficult to engineer or too costly to provide. At this time we have identified 48 likely credits (with an additional ’18 possible credits’) allowing for the loss of some and still complying with the goal of a LEED ‘Certified’ Building.

LEED Scorecard
Wilde Lake Middle School - Scheme 1
Howard County Public School System

LEED — LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN
tca | architects
LEED for SCHOOLS 2009

SS Sustainable Sites — Possible Credits: 24

Yes	Maybe / No	Item	Description
R		Prereq 1	**Construction Activity Pollution Prevention**
R		Prereq 2	**Environmental Site Assessment**
1		Credit 1	**Site Selection**
4		Credit 2	**Development Density & Community Connectivity** (4 credits)
	X	Credit 3	Brownfield Redevelopment
	4	Credit 4.1	**Alternative Transportation,** Public Transportation Access (4 credits)
1		Credit 4.2	**Alternative Transportation**, Bicycle Use
2		Credit 4.3	**Alternative Transportation**, Low Emitting & Fuel Efficient Vehicles (2 credits)
	2	Credit 4.4	**Alternative Transportation,** Parking Capacity (2 credits)
	X	Credit 5.1	Site Development, Protect or Restore Habitat
1		Credit 5.2	**Site Development**, Maximize Open Space
1		Credit 6.1	**Stormwater Design**, Quantity Control
	1	Credit 6.2	**Stormwater Design,** Quality Control
	X	Credit 7.1	Heat Island Effect, Non-Roof
1		Credit 7.2	**Heat Island Effect**, Roof
	X	Credit 8	Light Pollution Reduction
	X	Credit 9	Site Master Plan
1		Credit 10	**Joint Use of Facilities**
12	7		Total Sustainable Sites Credits

WE Water Efficiency — Possible Credits: 11

Yes	Maybe / No	Item	Description
R		Prereq 1	**Water Use Reduction,** 20% Reduction
4		Credit 1	**Water Efficient Landscaping**, Reduce by 50% (4 credits)
	X	Credit 2	Innovative Wastewater Technologies (2 credits)
3		Credit 3	**Water Use Reduction**, 30%, 40% Reduction (4 credits)
	X	Credit 4	Process Water Use Reduction
7	0		Total Water Efficiency Credits

EA Energy and Atmosphere — Possible Credits: 33

Yes	Maybe / No	Item	Description
R		Prereq 1	**Fundamental Commissioning of the Building Energy Systems**
R		Prereq 2	**Minimum Energy Performance**
R		Prereq 3	**Fundamental Refrigerant Management**
✳ 7	3	Credit 1	**Optimize Energy Performance**, 12-48% New / 8-44% Exist. (19 credits)
	X	Credit 2	On-Site Renewable Energy, 1-13% (7 credits)
2		Credit 3	**Enhanced Commissioning** (2 credits)
	X	Credit 4	Enhanced Refrigerant Management
2		Credit 5	**Measurement & Verification** (2 credits)
	X	Credit 6	Green Power (2 credits)
11	3		Total Energy and Atmosphere Credits

MR Materials and Resources — Possible Credits: 13

Yes	Maybe / No	Item	Description
R		Prereq 1	**Storage & Collection of Recyclables**
1		Credit 1.1	**Building Reuse,** Maintain 75%, 95% of Existing Walls, Floors & Roof (2 credits)
1		Credit 1.2	**Building Reuse,** Maintain 50% of Interior Non-Structural Elements
2		Credit 2	**Construction Waste Management**, Divert 50, 75% from Disposal (2 credits)
	X	Credit 3	Materials Reuse, 5%,10% (2 credits)
2		Credit 4	**Recycled Content**, 10%, 20% (post-consumer + 1/2 pre-consumer) (2 credits)
2		Credit 5	**Regional Materials**, 10%, 20% Extracted, Processed & Manufactured Regionally(2 credits)
	X	Credit 6	Rapidly Renewable Materials
	1	Credit 7	**Certified Wood**
8	1		Total Materials and Resources Credits

EQ Indoor Environment Quality — Possible Credits: 19

Yes	Maybe / No	Item	Description
R		Prereq 1	**Minimum IAQ Performance**
R		Prereq 2	**Environmental Tobacco Smoke (ETS) Control**
R		Prereq 3	**Minimum Acoustical Performance**
	X	Credit 1	Outdoor Air Delivery Monitoring
	X	Credit 2	Increased Ventilation
1		Credit 3.1	**Construction IAQ Management Plan,** During Construction
1		Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy
1		Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants
1		Credit 4.2	**Low-Emitting Materials**, Paints & Coatings
1		Credit 4.3	**Low-Emitting Materials**, Flooring Systems
1		Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products
	1	Credit 5	**Indoor Chemical & Pollutant Source Control**
1		Credit 6.1	**Controllability of System,** Lighting
	1	Credit 6.2	**Controllability of System,** Thermal Comfort
	1	Credit 7.1	**Thermal Comfort,** Design
	1	Credit 7.2	**Thermal Comfort,** Verification
	X	Credit 8.1	Daylight & Views, Daylight 75%, 90% of Classrooms, 75% all other spaces (3 credits)
	X	Credit 8.2	Daylight & Views, Views for 90% of Spaces
	X	Credit 9	Enhanced Acoustical Performance
	X	Credit 10	Mold Prevention
7	4		Total Indoor Environment Quality Credits

ID Innovation and Design Process — Possible Credits: 6

Yes	Maybe / No	Item	Description
1		Credit 1.1	**Innovation in Design,** Exemplary Performance SSc5.2
1		Credit 1.2	**Innovation in Design,** Green Cleaning
	1	Credit 1.3	**Innovation in Design,** Low Mercury Lighting
	X	Credit 1.4	Innovation in Design
1		Credit 2	**LEED Accredited Professional**
	X	Credit 3	School as a Teaching Tool
3	1		Total Innovation and Design Process Credits

RP Regional Priority — Possible Credits: 4

Yes	Maybe / No	Item	Description
	1	Credit 1	**Regional Priority,** SSc4.1
	X	Credit 2	Regional Priority, SSc5.1
	1	Credit 3	**Regional Priority,** SSc6.2
	X	Credit 4	Regional Priority, WEc2
	X	Credit 5	Regional Priority, EAc1 (36%)
	X	Credit 6	Regional Priority, EAc2 (1%)
0	2		Total Regional Priority Credits

48 Total Credits (18 'Maybe' Credits)

✳ Refer to page 44 for more information.

Key to Possibility of Earning Credit: [R] = Required [#] = Yes [#] = Maybe [X] = No

Project Credit Totals: Certified 40–49 Silver 50–59 Gold 60–79 Platinum 80–112

Detailed Cost Estimate

Wilde Lake Middle School

11 Oct 13

Scheme 1 - Light Renovation and Addition

DIV.	CATEGORY	SF	$/SF	TOTAL
1	GENERAL CONDITIONS	L.S.	$ 457,402	$ 457,402
2	SITE WORK	94,830	$ 24.50	$ 2,323,335
	DEMOLITION	1	$ 295,000	$ 295,000
3	CONCRETE	94,830	$ 6.41	$ 608,077
4	MASONRY	94,830	$ 13.94	$ 1,321,906
5	METALS	94,830	$ 12.27	$ 1,163,278
6	CARPENTRY	94,830	$ 3.85	$ 364,673
7	THERMAL & MOISTURE	94,830	$ 9.42	$ 893,435
8	DOORS & WINDOWS	94,830	$ 8.86	$ 840,559
9	FINISHES	94,830	$ 13.95	$ 1,322,600
10	SPECIALTIES	94,830	$ 3.29	$ 311,796
11	EQUIPMENT	94,830	$ 0.75	$ 71,123
12	FURNISHINGS	94,830	$ 5.24	$ 496,863
13	SPECIAL CONSTRUCTION	94,830	$ 3.90	$ 369,837
14	CONVEYING SYSTEMS	N/A	N/A	N/A
15	MECHANICAL	94,830	$ 58.15	$ 5,514,365
16	ELECTRICAL	94,830	$ 36.48	$ 3,459,398
CONSTRUCTION COST SUBTOTAL			$ 208.94	$ 19,813,646
	RELOCATABLES **	7	$ 150,000	$ 1,050,000
	PHASING COSTS	4	$ 35,000	$ 140,000
	CONTINGENCY	10%		$ 2,100,365
	PREMIUM for OFF-HOURS WORK	1%		$ 231,040
	ESCALATION TO CONSTRUCTION	4%		$ 933,402
				$ -
	TOTAL CONSTRUCTION COST		$ 255.92	$ 24,268,452

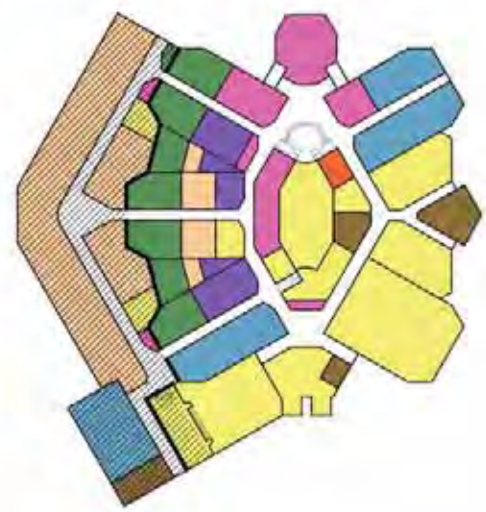
Project Duration **27 Months**

** Cost is to relocate existing portable classrooms. No money is included to remove the portables from site at the end of the project.

Summary of Scheme 2
Major Renovations and Addition to Existing School

Scheme 2 improves existing circulation problems and undersized teaching stations while working within the existing structural constraints. This plan raises the existing slab in many areas to remove the need for ramps along the main corridors. Classrooms are moved to the new addition to maximize the amount of instructional spaces with natural daylight and views to the outside.

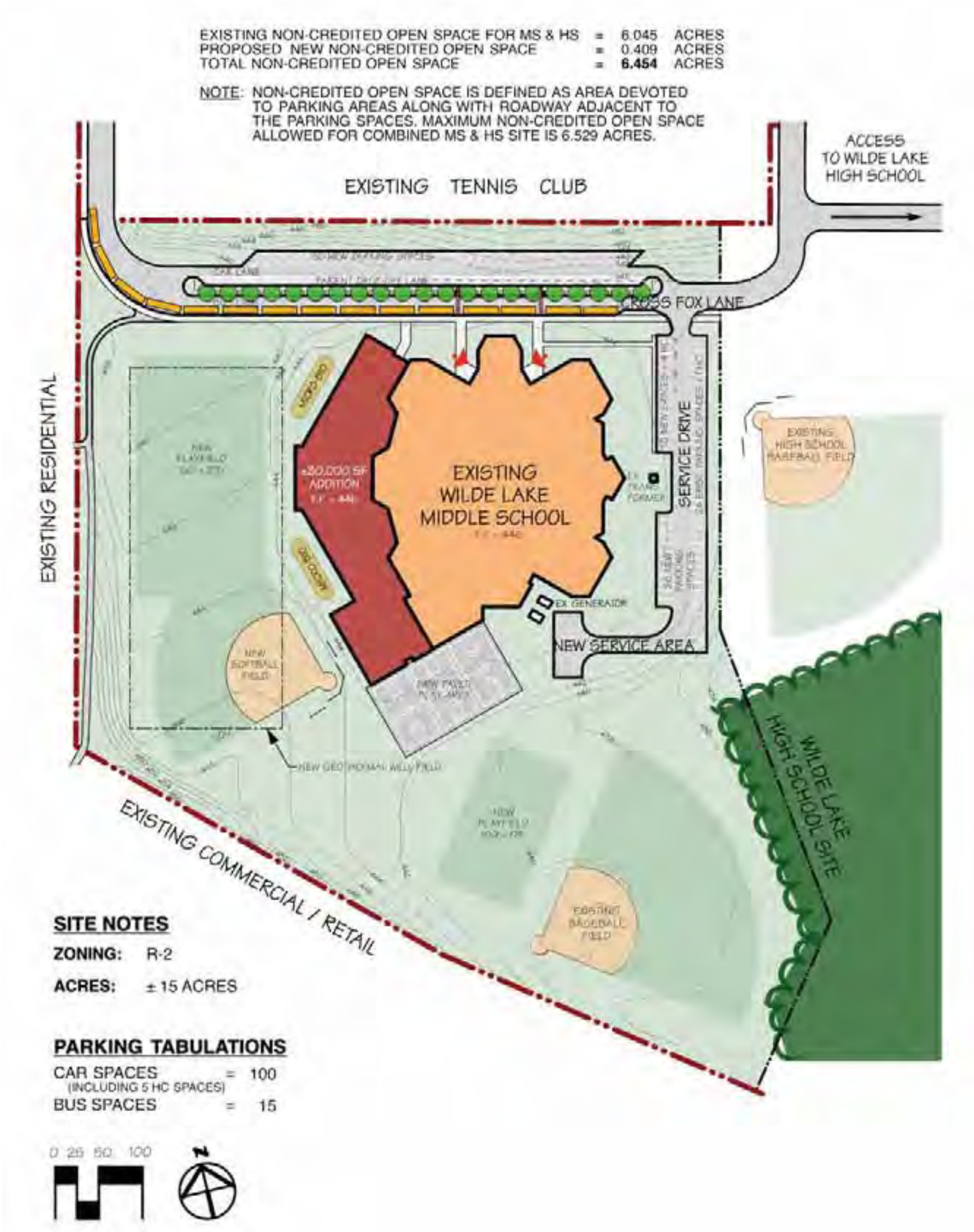
Area of Light Renovation	± 19,730 gsf
Area of Major Renovation	± 50,800 gsf
Area of New Addition	± 30,000 gsf
Total Area	**± 100,530 gsf**
Construction Duration (occupied)	27 months
Building Subtotal	$18,380,032
Demolition Subtotal	$ 475,000
Sitework Subtotal	$ 2,664,045
Construction Cost Subtotal	**$21,519,077***
Relocatables for Occupied Construction	$ 450,000
Phasing Costs	$ 140,000
Premium for Off-Hour Work	$ 729,600
Cost Estimate Contingency (10%)	$ 2,210,908
Escalation Contingency (4%)	$ 1,001,983
Construction Cost Grand Total	**$ 26,051,568**



Scheme 2 Design Attributes:

- Most classrooms and the music suite will be located in the newly constructed addition.
- The majority of classrooms will be located along exterior walls allowing for windows providing natural daylight. Skylights will be added to learning stations that do not have an exterior wall. Daylight and views have proven positive results in a student's ability to learn and will also provide LEED credits. This scheme will be able to meet the minimum requirements of the LEED credit for daylight and views.
- Lower classroom level will be raised ±18" to match the finish floor of the main entrance and the cafeteria, thus eliminating the need for the existing ramps in the corridors (see Structural Constraints of Existing Building diagram on page 29).
- Building circulation will be improved by minimizing the length of corridor circulation and providing continuous corridor loops throughout the classroom wing.
- Staff supervision of corridors will be improved by reducing the number of angles in the corridor layouts and providing long lines of vision throughout.
- Cafeteria will be enlarged to meet educational program requirements. New addition will include a Stage with a ramp that will meet the ADA accessible path requirements.
- Mechanical system will utilize geothermal technology.
- School will not have access to playfields for duration of construction (± 27 months).
- School should achieve USGBC LEED 'Certified' certification.

Site Plan


EXISTING NON-CREDITED OPEN SPACE FOR MS & HS = 6.045 ACRES
PROPOSED NEW NON-CREDITED OPEN SPACE = 0.409 ACRES
TOTAL NON-CREDITED OPEN SPACE = 6.454 ACRES
NOTE: NON-CREDITED OPEN SPACE IS DEFINED AS AREA DEVOTED TO PARKING AREAS ALONG WITH ROADWAY ADJACENT TO THE PARKING SPACES. MAXIMUM NON-CREDITED OPEN SPACE ALLOWED FOR COMBINED MS & HS SITE IS 6.529 ACRES.
ACCESS TO WILDE LAKE HIGH SCHOOL
EXISTING TENNIS CLUB
CROSS FOX LANE
EXISTING RESIDENTIAL
EXISTING WILDE LAKE MIDDLE SCHOOL
SERVICE DRIVE
EX GENERATOR
NEW SERVICE AREA
EXISTING HIGH SCHOOL BASEBALL FIELD
WILDE LAKE HIGH SCHOOL SITE
EXISTING COMMERCIAL / RETAIL
EXISTING BASEBALL FIELD
SITE NOTES
ZONING: R-2
ACRES: ± 15 ACRES
PARKING TABULATIONS
CAR SPACES = 100
(INCLUDING 5 HC SPACES)
BUS SPACES = 15
0 25 50 100

Floor Plan


LEGEND
= ADMINISTRATIVE SPACES
= GRADES 6-8
= SCIENCE LABS
= SPECIAL EDUCATION
= CENTRAL SUPPORT SPACES
= ARTS & TECHNOLOGY
= BUILDING SERVICES
= STUDENT SUPPORT SPACES
= AREA OF ADDITION
ABBREVIATIONS
B BOYS' TOILET ROOM
CC CUSTODIAL CLOSET
CR CLASSROOM
E ELECTRICAL CLOSET
G GIRLS' TOILET ROOM
S STORAGE ROOM
T TOILET ROOM
MDF MAIN DISTRIBUTION FRAME ROOM
IDF INTERMEDIATE DISTRIBUTION FRAME ROOM
SE SPECIAL EDUCATION
0 10 20 40
N
Existing Builing = 70,530 GSF
Area of Addition = ± 30,000 GSF
Area of Proposed Plan = ± 100,530 GSF

Architectural Design Narrative

Scheme 2 optimizes the space available within the existing Wilde Lake Middle School building while working within the structural constraints of the building. Unlike Scheme 1, the majority of the building will undergo major renovations, which will entail raising the finish floor of portions of the building (see page 6) to remove the need for ramps, removing existing walls, and reconfiguring entire areas of the building in order to improve the circulation patterns and departmental adjacencies. Major renovation will better facilitate current HCPSS technology, educational standards and program requirements into this facility.

The floor plan entails ±25,530 SF of light renovation, ±45,000 SF of major renovation, plus a new addition of ±30,000 GSF for a total of ±100,530 GSF and increases the school's capacity to 662 students. Floor areas that are presently 18-inches below the main finish floor level of the building will be infilled, bringing them up to the same elevation as the main finish floor level and eliminating the need for ramps in the corridors.

The Gymnasium and Kitchen will receive light renovations; however, the adjacent Cafeteria and Locker room areas will be enlarged.

The Administrative Area, Health Suite, Guidances Suite, Art Room, Technology Education suite, Home Economic classroom, Media Center and support spaces will receive major renovations to increase the size of the spaces. Unlike Scheme 1, some of these departments will be completely reconfigured or moved to another area of the building, virtually eliminating spacial deficiencies, optimizing circulation patterns and encouraging greater inter-departmental communication and interaction.

The new addition will house all of the general Classrooms, providing them with natural daylight and views. A new Stage, Music Suite, World Language and Gifted/Talented classrooms, and new mechanical room will also be included in the addition. All spaces in the addition will meet the HCPSS middle school educational program requirements for square footage. A new mechanical and electrical room will be constructed for the new systems.

The existing circulation pattern of the school will be improved by connecting three corridors on the western side of the building to a new corridor in the addition and creating a looped circulation pattern.

The existing lower floor level in the western wings of the building will be raised to match the main floor level of the rest of the existing building, thus eliminating the need for ramps to access the addition.

The organization of the floor plan will eliminate the fragmentation of school departments that presently exists.

A preliminary LEED analysis (Leadership in Energy and Environmental Design) shows that the building in Scheme 1 should achieve a "LEED Certified" level under the latest version of "LEED for Schools" as published by the United States Green Building Council (USGBC). See page 63.

Construction of Scheme 2 will be done in phases since the school will need to remain occupied during the 27± months.

<End of Architectural Design Narrative>

Civil Design Narrative

ZONING NT (New Town)

DRIVES, WALKS AND PARKING

Cross Fox Lane will be widened and reconfigured to provide two different pathways for the bus traffic and the car traffic. A center island with trees and a low masonry wall will separate the two traffic patterns. Pedestrians will be led to one of two controlled crossings of the bus lane in front of the main entrance of the building.

New walkways will be provided to connect all the existing site elements with each other and the residential community to the west of the site.

Parking will be provided along the north side of Cross Fox Lane and along both sides of the reconfigured service drive for a total of 100 car parking spaces on site.

UTILITIES

Water - Existing 6" service enters building at mechanical room near service drive.

Sanitary Sewer - Existing sanitary lines exit the building near the main entrance and run westward parallel to Cross Fox Lane.

Storm Drain - Existing stormwater leaves the site at the southeast corner of the property towards the wooded area.

Stormwater Management - New bioretention areas will need to be constructed to accommodate the treatment of the water for the new addition and new impervious paving.

Gas - Existing service enters building at mechanical room near service drive.

ADDITIONAL INFORMATION

Landscape Plan - Proposed planting will consist only of what is necessary to vegetatively stabilize the disturbed areas of the site. Plantings will be necessary for the stormwater management facility in order to meet requirements of the 2000 Maryland Stormwater Design Manual and the 2007 update. Taking this into consideration, additional landscape material proposed for the school site as part of the addition will be kept to a minimum in order to accommodate the school's desire to minimize maintenance.

Grading Permit - Since there will be more than 5,000 square feet of disturbance, a grading permit will be required.

Wetlands/Waterways - An environmental survey has not been performed at this time, but no existing wetlands are known to be on the site.

Forest Conservation - This requirement is not applicable within Columbia.

Columbia Association - A series of meetings will be required with the Village of Wilde Lake to review the Site Plan. In addition, a public hearing will be required with the Planning Board for approval of the Site Plan. The planning Board hearing is required for any Site Plan disturbing over 5,000 square feet of area. The County will also require the Planning Board Notice to be sent to the County Council members along with the Columbia Association and the Howard Hughes Corporation.

<End of Civil Design Narrative>

Structural Design Narrative

Structural steel framing will be used for all new construction except for the new stage addition which will be masonry wall bearing. Foundation will consist of conventional spread footings. Building will be reinforced concrete slab on grade. Exterior walls will consist of brick faced insulated masonry cavity wall construction. Roof system will consist of steel deck on open web steel joists.

<End of Structural Design Narrative>

Mechanical and Plumbing Design Narrative

PROPOSED HVAC SYSTEM ALTERNATIVES

GENERAL:

The proposed HVAC Systems to be analyzed during Design Development consist of a high efficiency conventional four-pipe Heating/Cooling Distribution System, a Geothermal Water Source Heat Pump System and a Hybrid type of System using an Earth Heat Exchanger (Geothermal) in conjunction with a Conventional Heating/Cooling System.

The Office/Administration Area, Media, Gymnasium and Cafeteria which function twelve (12) months a year, and/or may function during non-educational times shall be zoned such that they can operate independently from the rest of the school. All other areas shall be separately zoned based on use and function.

The proposed four (4) HVAC systems alternative systems recommended to be analyzed include:

Option 1: Four-pipe high efficiency variable air volume system with heat recovery and free cooling outdoor air economizer cycle.

Option 2: Four-pipe fan coil units used in conjunction with a decoupled dedicated outdoor air system (DOAS) with integral heat recovery for ventilation.

Option 3: Geothermal water source water to air and water to water heat pumps used in conjunction with a decoupled dedicated outdoor air system (DOAS) with integral heat recovery for ventilation.

Option 4: Hybrid Geothermal water to water heat pumps used in conjunction with conventional high efficiency boilers and chillers.

---> For detailed description of 4 HVAC options see Scheme 1 on pages 44-57 <---

BUILDING AUTOMATIC TEMPERATURE CONTROLS/ENERGY MANAGEMENT SYSTEM:

---> For detailed description see Scheme 1 on pages 58-60 <---

Electrical Design Narrative

---> For detailed description see Scheme 1 on pages 61-62 <---

Sustainable 'Green' Design Goals

For scheme 2, the renovated school and additions should achieve a 'Certified' level from the LEED (Leadership in Energy and Environmental Design) rating system, making this facility a 'Green' school.

Simply stated, a 'Green' school is a building designed to conserve energy, water, and materials, thus reducing negative impacts on human health and the environment. A 'Green' learning environment provides natural daylight, enhanced classroom acoustics, improved indoor air quality, thermal comfort, and opportunities to integrate green features into the school's curriculum.

An 'in progress' LEED scorecard is shown below which summarizes the credits most likely obtainable at this time. As the project continues to evolve, new credits may be possible while others may become increasingly difficult to engineer or too costly to provide. At this time we have identified 48 likely credits (with an additional '19 possible credits') allowing for the loss of some and still complying with the goal of a LEED 'Certified' Building.

LEED — LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN

tca | architects

LEED for SCHOOLS 2009

LEED Scorecard
Wilde Lake Middle School - Scheme 2
Howard County Public School System

SS Sustainable Sites — Possible Credits: 24

R		Prereq 1	**Construction Activity Pollution Prevention**
R		Prereq 2	**Environmental Site Assessment**
1		Credit 1	**Site Selection**
4		Credit 2	**Development Density & Community Connectivity** (4 credits)
	X	Credit 3	Brownfield Redevelopment
	4	Credit 4.1	**Alternative Transportation,** Public Transportation Access (4 credits)
1		Credit 4.2	**Alternative Transportation**, Bicycle Use
2		Credit 4.3	**Alternative Transportation**, Low Emitting & Fuel Efficient Vehicles (2 credits)
	2	Credit 4.4	**Alternative Transportation,** Parking Capacity (2 credits)
	X	Credit 5.1	Site Development, Protect or Restore Habitat
1		Credit 5.2	**Site Development**, Maximize Open Space
1		Credit 6.1	**Stormwater Design**, Quantity Control
	1	Credit 6.2	**Stormwater Design,** Quality Control
	X	Credit 7.1	Heat Island Effect, Non-Roof
1		Credit 7.2	**Heat Island Effect**, Roof
	X	Credit 8	Light Pollution Reduction
	X	Credit 9	Site Master Plan
1		Credit 10	**Joint Use of Facilities**
12	7		Total Sustainable Sites Credits

WE Water Efficiency — Possible Credits: 11

R		Prereq 1	**Water Use Reduction,** 20% Reduction
4		Credit 1	**Water Efficient Landscaping**, Reduce by 50% (4 credits)
	X	Credit 2	Innovative Wastewater Technologies (2 credits)
3		Credit 3	**Water Use Reduction**, 30%, 40% Reduction (4 credits)
	X	Credit 4	Process Water Use Reduction
7	0		Total Water Efficiency Credits

EA Energy and Atmosphere — Possible Credits: 33

R		Prereq 1	**Fundamental Commissioning of the Building Energy Systems**
R		Prereq 2	**Minimum Energy Performance**
R		Prereq 3	**Fundamental Refrigerant Management**
✳ 7	3	Credit 1	**Optimize Energy Performance**, 12-48% New / 8-44% Exist. (19 credits)
	X	Credit 2	On-Site Renewable Energy, 1-13% (7 credits)
2		Credit 3	**Enhanced Commissioning** (2 credits)
	X	Credit 4	Enhanced Refrigerant Management
2		Credit 5	**Measurement & Verification** (2 credits)
	X	Credit 6	Green Power (2 credits)
11	3		Total Energy and Atmosphere Credits

MR Materials and Resources — Possible Credits: 13

R		Prereq 1	**Storage & Collection of Recyclables**
1		Credit 1.1	**Building Reuse,** Maintain 75%, 95% of Existing Walls, Floors & Roof (2 credits)
	X	Credit 1.2	Building Reuse, Maintain 50% of Interior Non-Structural Elements
2		Credit 2	**Construction Waste Management**, Divert 50, 75% from Disposal (2 credits)
	X	Credit 3	Materials Reuse, 5%,10% (2 credits)
2		Credit 4	**Recycled Content**, 10%, 20% (post-consumer + 1/2 pre-consumer) (2 credits)
2		Credit 5	**Regional Materials**, 10%, 20% Extracted, Processed & Manufactured Regionally(2 credits)
	X	Credit 6	Rapidly Renewable Materials
	1	Credit 7	**Certified Wood**
7	1		Total Materials and Resources Credits

EQ Indoor Environment Quality — Possible Credits: 19

R		Prereq 1	**Minimum IAQ Performance**
R		Prereq 2	**Environmental Tobacco Smoke (ETS) Control**
R		Prereq 3	**Minimum Acoustical Performance**
	X	Credit 1	Outdoor Air Delivery Monitoring
	X	Credit 2	Increased Ventilation
1		Credit 3.1	**Construction IAQ Management Plan,** During Construction
1		Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy
1		Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants
1		Credit 4.2	**Low-Emitting Materials**, Paints & Coatings
1		Credit 4.3	**Low-Emitting Materials**, Flooring Systems
1		Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products
	1	Credit 5	**Indoor Chemical & Pollutant Source Control**
1		Credit 6.1	**Controllability of System,** Lighting
	1	Credit 6.2	**Controllability of System,** Thermal Comfort
	1	Credit 7.1	**Thermal Comfort,** Design
	1	Credit 7.2	**Thermal Comfort,** Verification
1	1	Credit 8.1	**Daylight & Views**, Daylight 75%, 90% of Classrooms, 75% all other spaces (3 credits)
	X	Credit 8.2	Daylight & Views, Views for 90% of Spaces
	X	Credit 9	Enhanced Acoustical Performance
	X	Credit 10	Mold Prevention
8	5		Total Indoor Environment Quality Credits

ID Innovation and Design Process — Possible Credits: 6

1		Credit 1.1	**Innovation in Design,** Exemplary Performance SSc5.2
1		Credit 1.2	**Innovation in Design,** Green Cleaning
	1	Credit 1.3	**Innovation in Design,** Low Mercury Lighting
	X	Credit 1.4	Innovation in Design
1		Credit 2	**LEED Accredited Professional**
	X	Credit 3	School as a Teaching Tool
3	1		Total Innovation and Design Process Credits

RP Regional Priority — Possible Credits: 4

	1	Credit 1	**Regional Priority,** SSc4.1
	X	Credit 2	Regional Priority, SSc5.1
	1	Credit 3	**Regional Priority,** SSc6.2
	X	Credit 4	Regional Priority, WEc2
	X	Credit 5	Regional Priority, EAc1 (36%)
	X	Credit 6	Regional Priority, EAc2 (1%)
0	2		Total Regional Priority Credits

48 — Total Credits (19 'Maybe' Credits)

✳ Refer to page 44 for more information.

Key to Possibility of Earning Credit: [R |] = Required [# |] = Yes [| #] = Maybe [| X] = No

Project Credit Totals: Certified 40–49 Silver 50–59 Gold 60–79 Platinum 80–112

Detailed Cost Estimate

OAK CONTRACTING LLC

Wilde Lake Middle School

11 Oct 13

Scheme 2 - Major Renovation and Addition

DIV.	CATEGORY	SF	$/SF	TOTAL
1	GENERAL CONDITIONS	L.S.	$ 484,895.00	$ 484,895
2	SITE WORK	100,530	$ 26.50	$ 2,664,045
	DEMOLITION	1	$ 475,000	$ 475,000
3	CONCRETE	100,530	$ 6.91	$ 694,892
4	MASONRY	100,530	$ 14.44	$ 1,451,628
5	METALS	100,530	$ 12.77	$ 1,283,464
6	CARPENTRY	100,530	$ 3.85	$ 386,592
7	THERMAL & MOISTURE	100,530	$ 9.42	$ 947,137
8	DOORS & WINDOWS	100,530	$ 8.86	$ 891,083
9	FINISHES	100,530	$ 13.95	$ 1,402,098
10	SPECIALTIES	100,530	$ 3.29	$ 330,538
11	EQUIPMENT	100,530	$ 0.75	$ 75,398
12	FURNISHINGS	100,530	$ 5.24	$ 526,728
13	SPECIAL CONSTRUCTION	100,530	$ 3.90	$ 392,067
14	CONVEYING SYSTEMS	N/A	N/A	N/A
15	MECHANICAL	100,530	$ 58.15	$ 5,846,237
16	ELECTRICAL	100,530	$ 36.48	$ 3,667,275
CONSTRUCTION COST SUBTOTAL			$ 214.06	$ 21,519,077
	RELOCATABLES **	3	$ 150,000	$ 450,000
	PHASING COSTS	4	$ 35,000	$ 140,000
	CONTINGENCY	10%		$ 2,210,908
	PREMIUM for OFF-HOURS WORK	3%		$ 729,600
	ESCALATION TO CONSTRUCTION	4%		$ 1,001,983
				$ -
	TOTAL CONSTRUCTION COST		$ 259.14	$ 26,051,568

Project Duration **27 Months**

** Cost is to relocate existing portable classrooms. No money is included to remove the portables from site at the end of the project.

Summary of Scheme 3
New Replacement School

Scheme 3 looks at the possibility of constructing a new replacement school alongside the existing school. The new school building will be based on the HCPSS prototype middle school design. This would be the 6th time the prototype was constructed; other middle schools include Bonnie Branch, Lime Kiln, Ellicott Mills, Folly Quarter and MS No.20 (currently under construction).

Area of First Floor	68,700 gsf
Area of Second Floor	27,138 gsf
Total Area of Prototype Middle School	**95,838 gsf**
Construction Duration	27 months
Building Subtotal	$19,591,942*
Sitework Subtotal	$ 3,701,800
Construction Cost Subtotal	**$23,293,742**
Site Phasing & Demolition of Existing Building	$ 722,403
Cost Estimate Contingency (5%)	$ 1,200,807
Escalation for Bid Date Contingency (4%)	$ 1,008,678
Construction Cost Grand Total	**$ 26,225,630**
Upgrading Prototype Design to Net Zero	$ 4,500,000**
Less Grant from MD Energy Administration	(- $ 2,500,000)
Construction Cost Total for Net Zero Building	**$ 28,225,630**

Notes:

* Bid-Day Construction Cost from Middle School No.20.

** Net Zero Energy Building requires an enhanced building design to greatly reduce energy needs through efficiency gains such that the balance of the energy needs can be supplied with renewable technologies (i.e. solar PV panels).

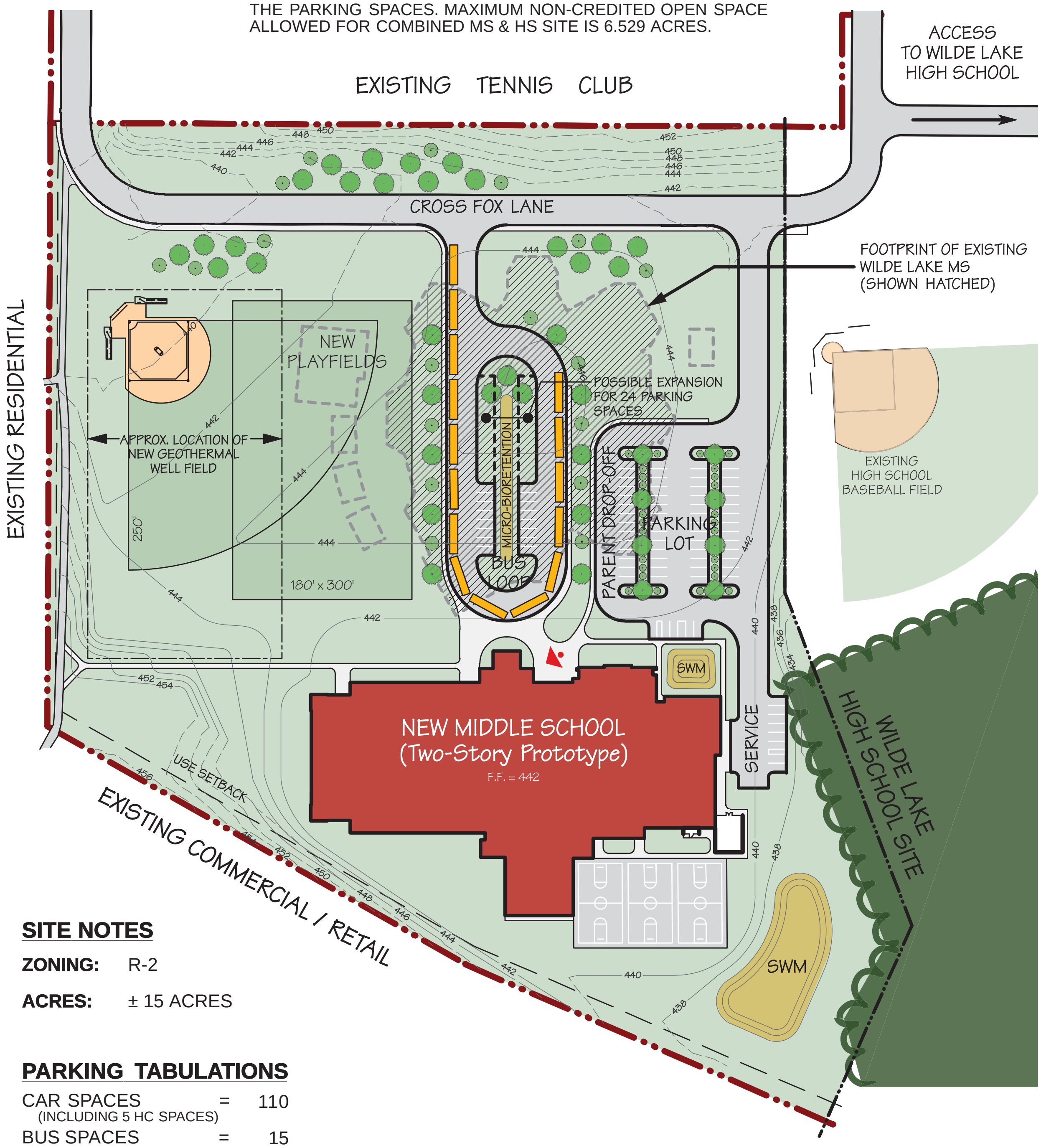
Scheme 3 Design Attributes:

- This project has been accepted into the Net Zero Energy School Grant Program offered by Maryland Energy Administration (MEA) and Public School Construction Program (PSCP). Building systems will be designed such that over the course of a year, the energy consumed will equal the energy produced on site; thus net zero.
- Building indicated is the current HCPSS 662 student capacity middle school prototype (MS#20).
- This scheme will provide natural daylight to 90% of occupied spaces and earn two LEED credits.
- Highly efficient mechanical system will utilize geothermal technology.
- Floor plan includes Recreation and Parks spaces per the prototype design. This square footage will be redesigned to account for existing educational programs at Wilde Lake Middle School that are not in the prototype design (see Space Analysis of Existing Building on pages 21-23).
- School will not have access to playfields for duration of construction (± 27 months).
- Site design for this scheme will allow students to enter building directly from parent drop-off without crossing the bus-loop and to access playfields directly from gymnasium without crossing the service drive.
- Project will need to get a variance from Columbia Association to provide the appropriate amount of paving for all the vehicular circulation on site. The process of obtaining such a variance is estimated to take a year.
- School should achieve USGBC LEED 'Gold' certification.

Site Plan

EXISTING NON-CREDITED OPEN SPACE FOR MS & HS	=	6.045	ACRES
PROPOSED NEW NON-CREDITED OPEN SPACE	=	1.039	ACRES
TOTAL NON-CREDITED OPEN SPACE	=	**7.084**	ACRES

NOTE: NON-CREDITED OPEN SPACE IS DEFINED AS AREA DEVOTED TO PARKING AREAS ALONG WITH ROADWAY ADJACENT TO THE PARKING SPACES. MAXIMUM NON-CREDITED OPEN SPACE ALLOWED FOR COMBINED MS & HS SITE IS 6.529 ACRES.



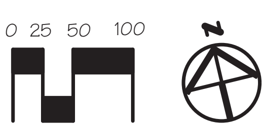
SITE NOTES

ZONING: R-2

ACRES: ± 15 ACRES

PARKING TABULATIONS

CAR SPACES (INCLUDING 5 HC SPACES)	=	110
BUS SPACES	=	15



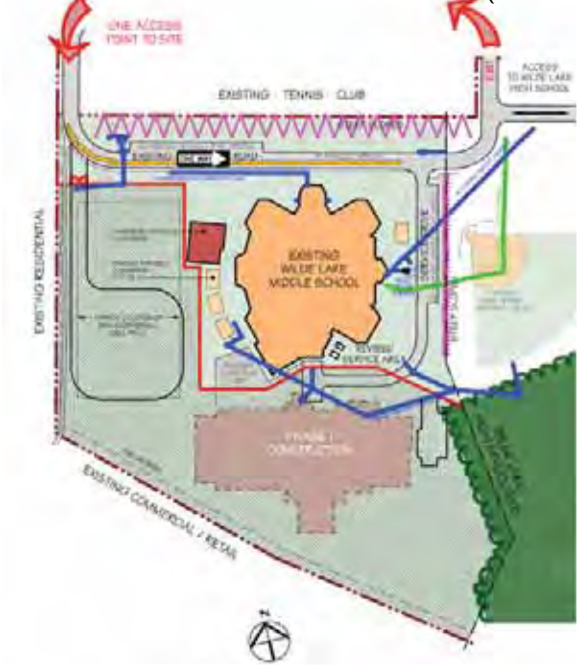
* THIS SCHEME EXCEEDS THE MAXIMUM AMOUNT OF NON-CREDITED OPEN SPACE. A VARIANCE WILL BE REQUIRED.

Floor Plans

First Floor	=	68,700 GSF
Second Floor	=	27,138 GSF
Area of Proposed Plan	=	95,838 GSF

Conceptual Site Phasing Diagrams

(27 month duration)

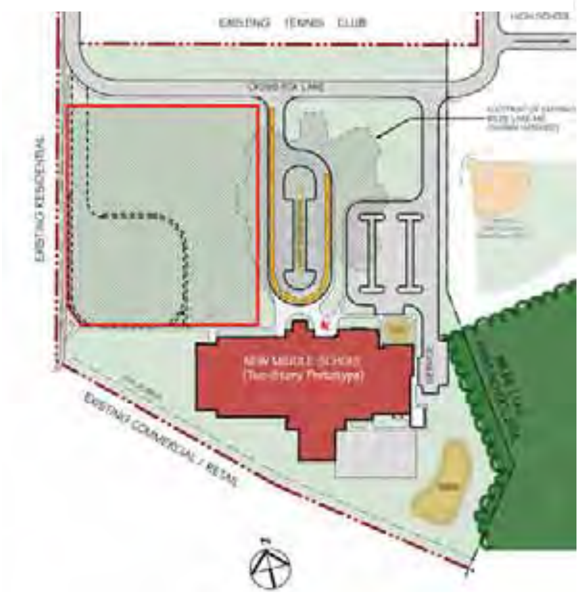


Phase 1

Relocate existing stormwater piping.
Provide temporary service area.
Drill geothermal wells.
Construct new school.
Construct temporary bus loop and parking area.
No playfields during this phase
and reduced paved play area.

Phase 2

Demolish existing school.
Construct new bus loop and parking lot.
No playfields during this phase.



Phase 3

Remove temporary bus loop and parking area.
Install and stabilize new playfields.
No playfields during this phase.

Final Site Plan

Civil Design Narrative

ZONING NT (New Town)

DRIVES, WALKS AND PARKING

Cross Fox Lane will no longer serve as a drop-off lane for cars and busses. The perpendicular parking spaces will be removed and the width of the road will be reduced to that of a standard one-way road. Access to both the new bus loop and new parking lot will be from Cross Fox Lane.

New walkways will be provided to connect all the new site elements with each other and the residential community to the west of the site.

Parking will be provided in a new parking lot, along the service drive and within the bus loop for a total of 110 car parking spaces on site.

UTILITIES

Water - Existing 6" service enters building at mechanical room near service drive.

Sanitary Sewer - Existing sanitary lines exit the building near the main entrance and run westward parallel to Cross Fox Lane.

Storm Drain - Existing stormwater leaves the site at the southeast corner of the property towards the wooded area.

Stormwater Management - New bioretention areas will need to be constructed to accommodate the treatment of the water for the new addition and new impervious paving.

Gas - Existing service enters building at mechanical room near service drive.

ADDITIONAL INFORMATION

Landscape Plan - Proposed planting will consist only of what is necessary to vegetatively stabilize the disturbed areas of the site. Plantings will be necessary for the stormwater management facility in order to meet requirements of the 2000 Maryland Stormwater Design Manual and the 2007 update. Taking this into consideration, additional landscape material proposed for the school site as part of the new building will be kept to a minimum in order to accommodate the school's desire to minimize maintenance.

Grading Permit - Since there will be more than 5,000 square feet of disturbance, a grading permit will be required.

Wetlands/Waterways - An environmental survey has not been performed at this time, but no existing wetlands are known to be on the site.

Forest Conservation - This requirement is not applicable within Columbia.

Columbia Association - A new middle school will require an Environmental Concept Plan showing proposed stormwater management devised for the impervious areas. Upon County approval of the Environmental Concept Plan a Site Development Plan will be required for County processing. The total process is approximately one year from original submission of the Environmental Concept Plan. The non-credited open space area will be increased from the recorded area in the Final Development Plan documents due to the new site plan, which results in re-recording and amending the Final Development Plan criteria documents. Amending the Final Development Plan criteria will require a meeting with the Howard Hughes Corporation at an early stage in the process. This Final Development Plan process will take approximately one year to complete.

<End of Civil Design Narrative>

Architectural Design Narrative

Scheme 3 assumes that the existing Wilde Lake Middle School building will be demolished and replaced with a new building based on the HCPSS middle school prototype design. The prototype is a two-story building. Lime Kiln M.S. and Bonnie Branch M.S. represent the first generation of the prototype design. These schools were evaluated once occupied and the design was modified for Ellicott Mills M.S. and Folly Quarter M.S. The design was once again reviewed and modified for both changes in curriculum and the implementation of geothermal mechanical system before construction began on the latest prototype middle school at Oxford Square (Middle School No.20).

The prototype has a first floor area of 68,700 square feet and a second floor area of 27,138 for a total of 95,838 gross square feet. The school capacity is 662 students.

The prototype plan features major support spaces including the Administrative Area, Health Suite, Gymnasium, Cafeteria and Media Center that are centrally located near the intersection of two major circulation spines running north/south and east/west. The north/south corridor connects on both ends to vertical circulation stairwells and elevator, effectively maximizing building circulation efficiency. New construction will allow for all the latest HCPSS technology specifications to be fully integrated into the design.

The prototype floor plan includes Department of Recreation and Parks spaces, which are not currently provided at WLMS. The prototype floor plan also lacks some existing educational programs found at WLMS, such as Academic Life Skills (ALS), Black Student Achievement Program (BSAP), Alternative Education Programs (AEPS), and English for Speakers of Other Languages (ESOL). Therefore, some design modifications will be made to the prototype design in order to incorporate these educational programs that are currently at WLMS into the prototype building footprint.

State legislation mandates that a newly constructed building must achieve a 'Gold' rating under the latest version of LEED for Schools as published by the United States Green Building Council (USGBC).

Since the new building will be constructed while the existing WLMS is occupied, the school will lose access to the playfields and will need to use the fields on the adjacent high school site.

Upon completion of the new school building, the existing building will be demolished and replaced with a new bus loop and car parking lot / parent drop-off area. This will allow bus and vehicular traffic to be separated providing pedestrian safety. New playfields will be constructed over the new geothermal field.

<End of Architectural Design Narrative>

Structural Design Narrative

Structural steel framing will be used except for the gymnasium, cafeteria, and adjacent areas which will be masonry wall bearing. Foundation will consist of conventional spread footings. First floor will be reinforced concrete slab on grade. Second floor will be composite steel framing with decking and concrete fill. Exterior walls will consist of brick faced insulated masonry cavity wall construction. Roof system will consist of steel deck on open web steel joists.

<End of Structural Design Narrative>

Mechanical System Narrative

DESIGN CRITERIA

Codes and Standards

- 2012 International Building Code (IBC)
- 2012 International Mechanical Code (IMC)
- 2012 International Energy Conservation Code (IECC)
- 2009 International Fire Code (IFC)
- 2009 National Standard Plumbing Code
- 2009 National Fuel Gas Code
- NFPA 13: Standard for the Installation of Sprinkler Systems, latest edition
- NFPA 90A: Standard for the Installation of Air Conditioning and Ventilating Systems, latest edition
- ASHRAE 2009 through 2012 Handbooks

Design Standards

Outdoor Temperatures:
- Summer: 95°F DB, 78°F WB
- Winter: 0°F DB

Indoor Temperatures (per HCPSS "Guidelines for Energy Conservation"):
- General Space Cooling for Air Conditioned Spaces: 76°F DB (occupied)
- General Space Cooling for Heated and Ventilated Spaces: 10°F DB warmer than ambient (occupied)
- General Space Heating: 70°F DB (occupied), 55°F DB (unoccupied)
- Utility Space Heating: 65°F DB (occupied)

Duct Design Criteria:
- Medium Pressure Supply and Exhaust: maximum 0.2" per 100' static pressure loss, maximum 2,000 feet per minute velocity; this criteria shall apply to ductwork between air-handling units and Variable Air Volume (VAV) terminal units.
- Low Pressure Supply: maximum 0.08" per 100' static pressure loss, maximum 1,000 feet per minute velocity; these criteria shall apply to ductwork between VAV terminal units and air devices and to all supply ductwork connected to a constant volume system.
- Return and General Exhaust: maximum 0.08" per 100' static pressure loss, maximum 1,000 feet per minute velocity; this criteria shall apply between air devices and return or exhaust fans.
- Ductwork shall be galvanized steel unless indicated otherwise. Shower exhaust shall be aluminum.

Air-handling Unit Sizing Criteria:
- Coil Face Velocity: maximum 500 feet per minute
- Angle Filter Face Velocity: maximum 300 feet per minute
- Flat Filter Face Velocity: maximum 500 feet per minute

Air-handling Unit Filtration Criteria:
- Pre-filters: 30 percent efficient
- Final filters: 85 percent efficient (for compliance with LEED IEQc5)

MECHANICAL SYSTEMS

Heating and Cooling System

The heating and cooling system will be a hybrid type geothermal heat pump system. It will utilize heat pump loop water from a geothermal heat exchanger borehole field, located on site, to serve the HVAC equipment in the building. A modular water-to-water heat pump unit will also be served by the loop water and will benefit from system heat gain in order to produce heating water. This hybrid type system will provide the energy savings characteristic of a standard geothermal system while accommodating the more conventional HVAC distribution system amenable to the building's design. Additionally, the system will reduce general maintenance cost by utilizing in-house personnel for maintaining and servicing equipment as well as reducing the quantity of parts that must be maintained in the Owner's inventory.

HVAC Systems

The building will be divided into multiple heating, ventilating, and air conditioning (HVAC) zones. The following zones will use different distribution system types due to both the physical space availability and the space functions.

- Administration
  Roof-mounted VAV heat pump unit, equipped with water-cooled compressors will be connected directly to the geothermal system, serving VAV terminal units with hydronic heating coils. Heating water for terminal unit coils will be generated by the water-to-water heat pump.

- Media Center
  Roof-mounted VAV heat pump unit, equipped with water-cooled compressors will be connected directly to the geothermal system, serving VAV terminal units with hydronic heating coils. Heating water for terminal unit coils will be generated by the water-to-water heat pump. Carbon dioxide room sensors will control the unit's outdoor air (OA) quantity.

- Gymnasium
  Roof-mounted, gas-fired, heating and ventilating (H&V) unit will be provided and will operate as a single-zone, constant volume (CV) system. A carbon dioxide room sensor will control the unit's outdoor air (OA) quantity.

- Cafeteria
  Roof-mounted heat pump unit, equipped with water-cooled compressors will be connected directly to the geothermal system. Unit will operate with single-zone, VAV controls in compliance with ASHRAE 90.1. A carbon dioxide room sensor will control the unit's outdoor air (OA) quantity.

- General Ed, Tech Ed, and Music Classrooms
  Roof-mounted VAV heat pump unit, equipped with water-cooled compressors will be connected directly to the geothermal system, serving VAV terminal units with hydronic heating coils. Heating water for terminal unit coils will be generated by the water-to-water heat pump.

- Science
  Science laboratories will be served by the same heat pump units that serve the adjacent general education classrooms; however, the terminal units will be CV type. No air from the laboratories will be returned to the heat pump unit due to concerns with contaminating the general education classrooms. All air supplied to these rooms will be exhausted by dedicated, roof-mounted fans.

- <u>Locker Rooms</u>
  Locker Rooms will have roof-mounted, gas-fired energy recovery unit (ERU) with fixed-plate heat exchanger. Unit will heat and ventilate the rooms in this zone with a constant volume of supply and exhaust air.

- <u>Miscellaneous Unoccupied Rooms</u>
  Hydronic, cabinet or propeller unit heaters will be provided. Heating water for unit heaters will be generated by the water-to-water heat pump.

BUILDING AUTOMATION CONTROL SYSTEM

The entire control system will be a direct digital control (DDC) system. Control system components will be fully native BACnet with electric or electronic actuation. A personal computer shall be provided in the school's maintenance office to view control system data.

<End of Mechanical Design Narrative>

Plumbing Design Narrative

Stormwater

The school roof drainage system will consist of roof drains piped into a stormwater piping system that will exit the building at various locations with the civil engineer's stormwater management system. Some roof drainage may be handled by downspout/rain leaders based on roof configuration. A complete roof drainage overflow system will be provided to avoid excess weight load on the building structure. All piping will be cast-iron to reduce noise in the building.

Sanitary and Vent

Sanitary piping leaving the building will be coordinated with the civil engineer for proper distribution to Howard County sewer mains. All sanitary and vent piping in the building will be designed to meet local plumbing code requirements. This school will require some special sanitary and vent piping systems based on material that is being discharged into the sewer system. They include the following:

- Equipment and sinks that may be discharging grease into the system from the kitchen will need to be piped separately to a grease interceptor that will be located outside. The discharge from interceptor will connect to sewer mains.
- Sanitary and vent piping that is handling waste from science sinks and equipment will utilize acid-resistant piping material and be connected to an acid neutralization tank before connecting into the sanitary mains.
- All sinks in the art classrooms will be equipped with solid interceptors to collect any paint or debris from getting into the main sanitary piping system.

Domestic Water

Generally all water piping four inches and larger will be copper with no-lead soldered joints. The larger incoming water service main (6-inch or 8-inch) will be cement-lined ductile iron piping acceptable for potable water systems. Domestic water piping distribution systems in the building will consist of cold water, hot water, and hot water recirculation. A domestic water service will be located in the Mechanical Room and will include a reduced pressure principal backflow preventer.

Domestic water heaters shall be provided in the Mechanical Room to serve all areas of the building. The water heater system will be provided with all necessary components, including an expansion tank, recirculation pumps, and a water temperature controller. Domestic water will be generated at 140° F, with a dedicated 140° F loop supplied to the kitchen area. A thermostatic mixing valve will blend hot water to a 110° F temperature, for distribution to all other portions of the building. An individual point of use water temperature controller will be provided at each handwashing sink and lavatory.

Natural Gas

Natural gas service will be provided. The service meter and pressure reducing station will be located outside of the Mechanical Room. Gas distribution piping will be located above finished ceilings to various areas of the building, such as the Gymnasium and Kitchen. Gas will be supplied to the domestic water heaters.

Plumbing Fixtures

All plumbing fixtures will be institutional grade with a maximum 1.6 gallon flush on water closets, 1.0 pint on urinals, and 0.5 gallons per minute on faucets. Plumbing fixtures will comply with ADA requirements and utilize water conservation features. All systems will be provided in accordance with local plumbing code requirements.

Fire Protection System

An incoming fire service entrance will be provided in the Mechanical Room. The service entrance will be complete with a double-check backflow preventer, alarm check valve, and piping connection to the fire department connection. A fire line will be routed to zone valve assemblies located throughout the building. Branch sprinkler piping will be configured to accommodate the building's architectural layout, with sprinkler heads provided throughout. A flow test will need to be performed to determine if a fire pump will be needed.

<End of Plumbing System Narrative>

Electrical Design Narrative

PROPOSED ELECTRICAL SERVICE AND DISTRIBUTION

The electrical service will be a 2,500-ampere, 277/480 volt, 3-phase, 4-wire service by BGE. A service entrance will be located in a dedicated electrical room served from a power company-supplied transformer.

Separate computer power panels will be provided via K13 rated transformers. These panels will have 200 percent neutral bus to account for harmonic distortions. Power connections with a disconnect switch will be provided in the mechanical rooms for all mechanical equipment. Phase loss protection will be provided for all 3-phase motors, and transient voltage surge suppression provided at the service entrance and distribution panels.

PROPOSED EMERGENCY POWER

Three natural gas generators will be installed, with outputs of 175 kW and two at 250 kW with outputs at 277/480 volts. The first generator will serve a "life safety" automatic transfer switch, transformer and panels for emergency loads such as fire alarm panels, selected network communications equipment and receptacles, security panels, and emergency egress lighting in corridors and classrooms. This generator will also serve a "standby" automatic transfer switch, transformer and panels for equipment loads such as heat trace and any required heating equipment. The second and third generators will serve a "standby mechanical equipment" automatic transfer switch, panels and transformers for building heating equipment.

PROPOSED FIRE ALARM SYSTEM

The voice evacuation type fire alarm system will accommodate the needs of the new school. New devices will comply with ADA requirements. The specified manufacturer is Edwards System Technology.

PROPOSED LIGHTING

Classrooms will have recessed lighting fixtures with multiple light level controls. They will be two or three lamp 28W T8 4100K fluorescent fixtures in quantity to meet a 50 foot-candle average at the task plane. Switching will be both multi-level and zoned as appropriate for the room's use. Other high-efficiency compact fluorescent and (ceramic) metal halide fixtures will be provided in specialty areas. Exit signs will be red LED type.

PROPOSED LIGHTING CONTROLS

The general control strategy for the building utilizes occupancy sensors wherever possible for interior lighting and mechanical contactors for exterior lighting. Emergency lighting circuits shall remain on in public spaces until the building is locked by the security system, at which time they will be shut off via mechanical contactors. A manual override switch shall be provided adjacent to the security panel to manually activate the emergency lighting in the event of failure of the security panel.

Daylight harvesting shall be utilized where significant energy savings can be achieved from the vertical glazing or operable skylights, typically in classrooms and selected office spaces. Additional control strategies for specific spaces are listed below.

Classroom lighting shall be controlled by the following devices and programming settings:

1. Manual Control: Teachers shall have access to manual controls in two zones; the row of lights along the teaching wall, and the remaining lights in the room. Both zones shall be provided with low voltage switches to access dimming setpoints at 0 percent, 50 percent, or 100 percent.
2. Automatic Control: Lights must be turned on manually upon entering the room. Ceiling-mounted 360-degree dual-technology occupancy sensors shall turn off lights within the room after 15 minutes of inactivity. Occupancy sensors shall only be responsible for turning lights off.
3. Daylight Harvesting: Each classroom will have two zones of daylight harvesting; the row closest to the windows and the next row farther away. Each zone shall dim independently based on an output signal from the ceiling mounted photocell.

Office lighting shall be controlled by the following devices and programming settings:

1. Manual and Automatic Controls (small offices): A dual-relay line voltage wall station occupancy sensor. The sensor shall be manual on by selecting one or both of the “on” buttons, providing flexibility of lighting at 0 percent, 50 percent, and 100 percent relative light output. Sensor shall be factory set to turn off lighting after 15 minutes.
2. Manual and Automatic Controls (larger offices): A corner-mount occupancy sensor shall be provided, typically in the corner adjacent to the latch side of the door (the occupancy sensor should not be able to see out the door if the door is propped open). This occupancy sensor shall be set to turn off lighting after 15 minutes. Two manual toggle switches shall be provided at the door for control of the lighting at 0 percent, 50 percent, and 100 percent relative light output.

Gymnasium lighting shall be controlled by the following devices and programming settings:

1. Manual Control: Line voltage key switches shall be provided at the entry doors to the gymnasiums for control of all of the lighting within each room.
2. Automatic Control: Mechanical contactors connected to the building security system shall be provided to satisfy the automatic control requirements for these spaces.
3. Daylight Harvesting: The gymnasium will have four zones of daylight harvesting.

Media Center lighting shall be controlled by the following devices and programming settings:

1. Manual Control: Manual switches shall be provided to control the lighting in three zones. For the lights surrounding each projection screen, additional low voltage override switches shall be provided on the face of the adjacent column to allow for these lights to be independently turned off during the use of the projection screen.
2. Automatic Control: Mechanical contactors connected to the building security system shall be provided on the line side of the switches to automatically shut off the lighting in case the lighting within the space was left on after hours.
3. Daylight Harvesting: The media center will have three zones of daylight harvesting.

Restroom lighting shall be controlled by the following devices and programming settings:

1. Manual Control: None in group restrooms. Manual override switch within wall station occupancy sensor for private toilet rooms.
2. Automatic Control: Group restrooms shall have ceiling mounted occupancy sensors that will automatically turn lighting on upon entry and automatically turn off after being unoccupied for 15 minutes. Private restrooms shall have wall station occupancy sensors which shall be programmed to require a manual initiation to turn lighting on, but shall automatically turn off after being unoccupied for 15 minutes.

Storage room lighting shall be controlled by the following devices and programming settings:

1. Manual and Automatic Control: Small closets and storage rooms shall have a single wall station occupancy sensor, programmed to require manual activation to turn the lights on and shall automatically turn lights off after 15 minutes. Larger spaces shall have ceiling mounted occupancy sensors without manual override devices. Lighting shall turn on and off automatically.

Mechanical, electrical and telecom room lighting shall be controlled by the following devices and programming settings:

1. Manual Control: Line voltage toggle switches are provided at each entrance to the space. Automatic controls shall not be provided for these spaces due to concerns for safety during maintenance.

Exterior lighting shall be controlled by the following devices and programming settings:

1. Automatic Control: Lighting shall be controlled by a signal from the building automation system through mechanical contactors. Contactors shall be equipment with Hand-Off-Automatic control pushbuttons to allow manual override.

PROPOSED SECURITY SYSTEMS

The new security system design will include device outlet boxes, conduit and raceways for the installation of contact switches, control unit, card readers, connections to electric strikes, override switches, motion detectors, and new cameras. New DVR, monitors, a 32-inch in main office and a 26-inch in the principal's office, will be provided. The system will be connected to the new emergency power system. The head-end security equipment will be housed in the new MDF.

An HCPSS-approved security contractor will provide the security system. The HCPSS head administrative and security office will monitor the system.

PROPOSED TELECOMMUNICATION SYSTEMS

Classroom Technology - Classrooms will be equipped with dedicated computer receptacles connected to separate "clean-power" computer panels. The teacher's desk receptacles will also be connected to this "clean-power" source.

The general classroom design will include a VCR/DVD tuner combination device, audio amplifier/mixer, wireless microphone device and audio override relays. All of these devices will be housed in the teacher's wardrobe. The general classroom will also contain a wall-mounted LCD projector, screen, computer hook-ups, speakers and necessary wiring to connect to the projector, turner combination, speakers, mixer, and wireless microphone as one system. The outlet configurations will be in accordance with the latest HCPSS standards.

Data and Video System - The new network system design will include device outlet boxes, conduit and raceways, and conduit sleeves for the installation of network cabling. Cabling will include copper Category 6 UTP station and multimode fiber optic backbone cables. The building will have fully functional wireless connectivity throughout with no dead zones. The system will include the hardware, controllers, switches, transceivers and cabling.

The CATV distribution system will meet HCPSS technology requirements including outlets and cabling to the teachers' workstation and high/low LCD projector outlets. The system will distribute over broadband coaxial cables. The CATV cable distribution system will connect to the classroom wall mounted LCD projectors through TV tuners located in the teacher's wardrobe cabinet. The video controller shall be in the MDF. The system will support an electronic bulletin board for distribution of messages or announcements to television sets school wide.

Telephone System - The new telephone system design will include device outlet boxes, conduit and raceways, and conduit sleeves for the installation of cabling and equipment.

The telecommunications system will be provided by an HCPSS-approved information technology contractor.

Intercommunication, Public Address and Master Clock Systems - The intercom system will include device outlet boxes, conduit, and cabling for installation of call switches in each instructional area with ceiling speakers. Speakers will be provided in corridors, workrooms, selected offices and other occupied spaces. The intercom system will have a minimum of four administrative consoles. Cabling will be as specified by the manufacturer. The system will be integrated with the security, fire alarm, phone, café and gym sound systems. The master clock portion will be used for system clocks in the corridors, café, gym, media center, selected offices and classrooms.

An HCPSS-approved systems contractor will provide the intercom, public address and master clock systems.

Sound Systems - Individual sound systems for the cafeteria and gymnasium with transmitter for hearing impaired shall be provided. These systems will be complete with new speakers, microphone jacks, auxiliary jacks, and wall mounted equipment cabinets.

An HCPSS-approved systems contractor will provide the sound systems.

<End of Electrical System Narrative>

Energy Statement

Energy conservation is an important goal for the HCPSS middle school prototype design. Many energy saving techniques are incorporated into the building to achieve energy efficiency and compliance with LEED energy requirements. These techniques include the following:

- Mechanical systems will exceed the energy efficiency requirements mandated by ASHRAE standard 90.1.
- Energy recovery will be used to pre-condition outdoor ventilation air where appropriate and permitted per IMC.
- Mechanical systems (pumps and fans) will include variable frequency drives to allow systems to operate at lower capacities when building loads are reduced. Premium efficiency motors will be specified for all fans and pumps and all non-variable frequency drive motors over 10 hp will be power-factor corrected to 90 percent minimum.
- Air-handling unit systems will incorporate dry-bulb economizer control allowing the use of "free cooling" when outdoor air temperature and humidity conditions permit. Systems will include MERV 13 filtration to improve indoor air quality.
- Mechanical systems will be designed to maximize indoor air quality by effectively mixing and delivering fresh air to building occupants. Air-handling unit systems will include airflow monitoring stations on outdoor air connections to assure the delivery of outdoor air.
- Designated areas will include carbon dioxide monitoring to reset the quantity of outdoor air required during periods of reduced occupancy.
- Environmentally friendly refrigerants will be specified for mechanical equipment to meet ozone depletion and global warming thresholds.
- Mechanical systems will be designed to allow occupants to control temperature within their zone and will meet the requirements of ASHRAE Standard 55.
- Building commissioning will be provided to assure that systems operate as designed.
- The HVAC system will be controlled by the latest generation of computerized energy management equipment.
- A ground-source geothermal system will provide a higher energy efficiency compared with standard direct-expansion (DX) systems.
- The HVAC system is divided into many occupancy zones for efficient year-round and after-hours use.
- Specifications will exclude materials that lead to poor indoor air quality.
- Low-flow fixtures will be specified to reduce overall building water usage. Specific strategies will include 2-position flush valves for water closets, high efficiency type urinals, low-flow aerators and low-flow shower heads.

<End of Energy Statement>

Sustainable 'Green' Design Goals

For scheme 3, the new school should achieve a 'Gold' level from the LEED (Leadership in Energy and Environmental Design) rating system, making this facility a 'Green' school.

Simply stated, a 'Green' school is a building designed to conserve energy, water, and materials, thus reducing negative impacts on human health and the environment. A 'Green' learning environment provides natural daylight, enhanced classroom acoustics, improved indoor air quality, thermal comfort, and opportunities to integrate green features into the school's curriculum.

An 'in progress' LEED scorecard is shown below which summarizes the credits most likely obtainable at this time. As the project continues to evolve, new credits may be possible while others may become increasingly difficult to engineer or too costly to provide. At this time we have identified 79 likely credits (with an additional '10 possible credits') allowing for the loss of some and still complying with the goal of a LEED 'Gold' Building.

LEED — LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN

tca | architects

LEED for SCHOOLS 2009

LEED Scorecard
Wilde Lake Middle School - Scheme 3
Howard County Public School System

SS — Sustainable Sites — Possible Credits: 24

R		Prereq 1	**Construction Activity Pollution Prevention**
R		Prereq 2	**Environmental Site Assessment**
1		Credit 1	**Site Selection**
4		Credit 2	**Development Density & Community Connectivity** (4 credits)
	X	Credit 3	Brownfield Redevelopment
4		Credit 4.1	**Alternative Transportation,** Public Transportation Access (4 credits)
1		Credit 4.2	**Alternative Transportation**, Bicycle Use
2		Credit 4.3	**Alternative Transportation**, Low Emitting & Fuel Efficient Vehicles (2 credits)
	2	Credit 4.4	**Alternative Transportation**, Parking Capacity (2 credits)
	X	Credit 5.1	Site Development, Protect or Restore Habitat
1		Credit 5.2	**Site Development**, Maximize Open Space
1		Credit 6.1	**Stormwater Design**, Quantity Control
1		Credit 6.2	**Stormwater Design,** Quality Control
	X	Credit 7.1	Heat Island Effect, Non-Roof
1		Credit 7.2	**Heat Island Effect**, Roof
	X	Credit 8	Light Pollution Reduction
	X	Credit 9	Site Master Plan
1		Credit 10	**Joint Use of Facilities**
17	2		Total Sustainable Sites Credits

WE — Water Efficiency — Possible Credits: 11

R		Prereq 1	**Water Use Reduction,** 20% Reduction
4		Credit 1	**Water Efficient Landscaping**, Reduce by 50% (4 credits)
	X	Credit 2	Innovative Wastewater Technologies (2 credits)
3		Credit 3	**Water Use Reduction**, 30%, 40% Reduction (4 credits)
	X	Credit 4	Process Water Use Reduction
7	0		Total Water Efficiency Credits

EA — Energy and Atmosphere — Possible Credits: 33

R		Prereq 1	**Fundamental Commissioning of the Building Energy Systems**
R		Prereq 2	**Minimum Energy Performance**
R		Prereq 3	**Fundamental Refrigerant Management**
19		Credit 1	**Optimize Energy Performance**, 12-48% New / 8-44% Exist. (19 credits)
7		Credit 2	**On-Site Renewable Energy,** 1-13% (7 credits)
2		Credit 3	**Enhanced Commissioning** (2 credits)
	X	Credit 4	Enhanced Refrigerant Management
2		Credit 5	**Measurement & Verification** (2 credits)
	2	Credit 6	**Green Power** (2 credits)
30	2		Total Energy and Atmosphere Credits

MR — Materials and Resources — Possible Credits: 13

R		Prereq 1	**Storage & Collection of Recyclables**
	X	Credit 1.1	Building Reuse, Maintain 75%, 95% of Existing Walls, Floors & Roof (2 credits)
	X	Credit 1.2	Building Reuse, Maintain 50% of Interior Non-Structural Elements
2		Credit 2	**Construction Waste Management**, Divert 50, 75% from Disposal (2 credits)
	X	Credit 3	Materials Reuse, 5%,10% (2 credits)
2		Credit 4	**Recycled Content**, 10%, 20% (post-consumer + 1/2 pre-consumer) (2 credits)
2		Credit 5	**Regional Materials**, 10%, 20% Extracted, Processed & Manufactured Regionally(2 credits)
	X	Credit 6	Rapidly Renewable Materials
1		Credit 7	**Certified Wood**
7	0		Total Materials and Resources Credits

EQ — Indoor Environment Quality — Possible Credits: 19

R		Prereq 1	**Minimum IAQ Performance**
R		Prereq 2	**Environmental Tobacco Smoke (ETS) Control**
R		Prereq 3	**Minimum Acoustical Performance**
	1	Credit 1	**Outdoor Air Delivery Monitoring**
	X	Credit 2	Increased Ventilation
1		Credit 3.1	**Construction IAQ Management Plan,** During Construction
1		Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy
1		Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants
1		Credit 4.2	**Low-Emitting Materials**, Paints & Coatings
1		Credit 4.3	**Low-Emitting Materials**, Flooring Systems
1		Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products
	1	Credit 5	**Indoor Chemical & Pollutant Source Control**
1		Credit 6.1	**Controllability of System,** Lighting
	1	Credit 6.2	**Controllability of System,** Thermal Comfort
	1	Credit 7.1	**Thermal Comfort,** Design
	1	Credit 7.2	**Thermal Comfort,** Verification
2		Credit 8.1	**Daylight & Views**, Daylight 75%, 90% of Classrooms, 75% all other spaces (3 credits)
	X	Credit 8.2	Daylight & Views, Views for 90% of Spaces
	X	Credit 9	Enhanced Acoustical Performance
	X	Credit 10	Mold Prevention
9	5		Total Indoor Environment Quality Credits

ID — Innovation and Design Process — Possible Credits: 6

1		Credit 1.1	**Innovation in Design,** Exemplary Performance SSc5.2
1		Credit 1.2	**Innovation in Design,** Green Cleaning
1		Credit 1.3	**Innovation in Design,** Exemplary Performance EAc1
1		Credit 1.4	**Innovation in Design,** Exemplary Performance EAc2
1		Credit 2	**LEED Accredited Professional**
	1	Credit 3	**School as a Teaching Tool**
5	1		Total Innovation and Design Process Credits

RP — Regional Priority — Possible Credits: 4

1		Credit 1	**Regional Priority,** SSc4.1
	X	Credit 2	Regional Priority, SSc5.1
1		Credit 3	**Regional Priority,** SSc6.2
	X	Credit 4	Regional Priority, WEc2
1		Credit 5	**Regional Priority,** EAc1 (40%)
1		Credit 6	**Regional Priority,** EAc2 (1%)
4	0		Total Regional Priority Credits

79 — Total Credits (10 'Maybe' Credits)

Key to Possibility of Earning Credit: [R][ ] = Required [#][ ] = Yes [ ][#] = Maybe [ ][X] = No

Project Credit Totals: Certified 40–49 Silver 50–59 Gold 60–79 Platinum 80–112

Detailed Cost Estimate

OAK CONTRACTING LLC

Wilde Lake Middle School

11 Oct 13

Scheme 3 - New Replacement School

DIV.	CATEGORY	SF	$/SF	TOTAL
1	GENERAL CONDITIONS	L.S.	$ 964,570	$ 964,570
2	SITE WORK **	95,838	$ 38.63	$ 3,701,800
	DEMOLITION **	70,530	$ 9.25	$ 652,403
3	CONCRETE	95,838	$ 10.85	$ 1,039,700
4	MASONRY	95,838	$ 23.94	$ 2,294,000
5	METALS	95,838	$ 18.84	$ 1,805,446
6	CARPENTRY	95,838	$ 1.98	$ 190,000
7	THERMAL & MOISTURE	95,838	$ 10.22	$ 979,870
8	DOORS & WINDOWS	95,838	$ 10.38	$ 995,000
9	FINISHES	95,838	$ 12.60	$ 1,207,695
10	SPECIALTIES	95,838	$ 3.93	$ 376,700
11	EQUIPMENT	95,838	$ 0.86	$ 82,500
12	FURNISHINGS	95,838	$ 4.61	$ 442,000
13	SPECIAL CONSTRUCTION	95,838	$ 3.73	$ 357,446
14	CONVEYING SYSTEMS	1	$ 60,000	$ 60,000
15	MECHANICAL	95,838	$ 49.54	$ 4,747,860
16	ELECTRICAL	95,838	$ 42.25	$ 4,049,156
Bid Day CONSTRUCTION COST SUBTOTAL from MS #20			$ 249.86	$ 23,946,145
	RELOCATABLES	N/A	N/A	N/A
	PHASING COSTS	2	$ 35,000	$ 70,000
	CONTINGENCY	5%		$ 1,200,807
	PREMIUM for OFF-HOURS WORK	0%		$ -
	ESCALATION TO CONSTRUCTION	4%		$ 1,008,678
				$ -
	TOTAL CONSTRUCTION COST		$ 273.65	$ 26,225,630

Project Duration **27 Months**

** Cost for thesecatagories have been revised from MS #20 to reflect the scope of the sitework shown on the Wilde Lake Middle School site plan