ACTION

HOWARD COUNTY
PUBLIC SCHOOL SYSTEM

BOARD OF EDUCATION OF HOWARD COUNTY
MEETING AGENDA ITEM

TITLE: New Elementary School #42 Schematic Design Report **DATE:** July 9, 2015

PRESENTER(S): Scott W. Washington, Director, School Construction

Robyn Toth, Associate Principal, TCA Architects

VISION 2018 GOAL: ☒ Students ☐ Staff ☐ Families and Community ☐ Organization

OVERVIEW:
The New Elementary School #42, which will be located on the Oxford Square school site, adjacent to Thomas Viaduct Middle School, will be an adaptation of the 788 seat prototype elementary school design. This prototype elementary school plan, which is based on the General Elementary Educational Specifications for New Schools, dated August 2003 will be the fourth iteration of this model. The decision to proceed with the larger school was the direct result of the continual population growth being experienced along the Route 1 corridor.

In addition to completing a detailed comparison between both the 2003 and 2010 General Educational Specifications for New Elementary Schools, the design team has worked collaboratively with the planning committee and Howard County Public School System staff to ensure appropriately updated documents that capture both programmatic and systemic changes that will serve the current needs of the elementary school.

The design and construction of the building is intended to achieve another LEED (Leadership in Energy and Environmental Design) 'Gold' designation.

RECOMMENDATION/FUTURE DIRECTION:
It is recommended that the schematic design report for Elementary School #42 be approved as submitted.

SUBMITTED BY:

Scott W. Washington, Director
School Construction

APPROVAL/CONCURRENCE:

Renee A. Foose, Ed.D.
Superintendent

Camille B. Jones
Chief Operating Officer

Bruce Gist
Executive Director
Facilities, Planning and Mgmt.

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View of Media Center for prototype elementary school

Schematic Design Report

ELEMENTARY SCHOOL #42

Howard County Public School System

9 JULY 2015

Annapolis, Maryland

Specializing in the design of educational facilities

Elementary School #42
Schematic Design Report

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9 July 2015

Table of Contents

Appendix
Original prototype design as constructed for Bushy Park Elementary School is provided for reference:

Planning Advisory Committee

Planning Committee

Heide Balter	HCPSS, Ducketts Lane Elementary School, Principal
Elizabeth Bradbury	HCPSS, Elkridge Elementary School, Teacher
Robert Bruce	HCPSS, Veterans Elementary School, Principal
Stacey Dunn	Parent of HCPSS student
Heather Dyer	HCPSS, Elementary Math Resource Teacher
Lisa Goldberg	HCPSS, Elkridge Elementary School, Teacher
Dan Hagan	J. Vinton Schafer & Sons, Inc., Sr. Project Manager
Carol Hahn	HCPSS, Bellows Spring Elementary School, Principal
Anne Hickey	HCPSS, Early Intervention Services, Instructional Facilitator
Dan Keiser	HCPSS, Construction Program Manager
Dan Lubeley	HCPSS, Manager of Design and Preconstruction
Courtney Madden	HCPSS, Instructional Team Leader, Math/Science/Health
Laurel Marsh	HCPSS, Longfellow Elementary School, Principal
Dennis McDonald	HCPSS, Bellows Spring ES, 4th GradeTeam Leader/Teacher
Kristin Mentz	Parent of HCPSS student
Gloria Mikolajczyk	MSDE, School Facilities Architect
Debbie Misiag	HCPSS, Special Education Services, Elementary School
Dr. Barbara Moore	Howard County Government, Recreational Licensed Child Care Division, Superintendent,
Ron Morris	HCPSS, Administrative Director, Elementary
Douglas Pindell	HCPSS, Purchasing, Director
Sophia Quirk	HCPSS, Bellows Spring ES, Technology, Team Leader
Brian Ralph	HCPSS, Food and Nutrition Services, Director
David Ramsay	HCPSS, Pupil Transportation Director
Kristie Sachs	HCPSS, Bellows Spring Elementary School, Teacher
Angela Shiplet	Parent of HCPSS student
John Skrynecki	HCPSS, Bellows Spring Elementary School, Teacher
Bill Stolis	HCPSS, Bus Area Manager
Terry Street	HCPSS, Emergency/Management, Safety Specialist
Reny Toledo	HCPSS, Technology, AV and Network Support
Tonya VanDerlinde	HCPSS, Deep Run Elementary School, Teacher
Caroline Walker	HCPSS, Title 1 Program, Curriculum Director
Scott Washington	HCPSS, Director of School Construction
Laura Wetherald	Howard County Government, Bureau of Recreation and Administrative Services, Chief

Architects

Robyn Toth, AIA	Principal, Project Manager, LEED AP
Mike Lahowin, AIA	Principal, LEED AP

Design Team

ARCHITECT	TCA Architects	Annapolis, MD
CIVIL ENGINEER	Fisher, Collins & Carter	Ellicott City, MD
STRUCTURAL ENGINEER	Morabito Consultants	Sparks Glencoe, MD
M/E/P ENGINEER	James Posey Associates	Baltimore, MD
IT CONSULTANT	Educational Systems Planning	Annapolis, MD
DAYLIGHTING ENGINEER	EMO Energy Solutions	Falls Church, VA
ROOFING CONSULTANT	Restoration Engineering	Fairfax, VA
ACOUSTICAL ENGINEER	Miller, Beam & Paganelli	Reston, VA
FOODSERVICE DESIGN	Nyikos Associates	Gaithersburg, MD
CONSTRUCTION MANAGER	J.Vinton Schafer & Sons	Abingdon, MD

Project Description

Elementary School #42 will be constructed adjacent to the newly constructed Thomas Viaduct Middle School. Elementary School #42 will be an adaptation of the original two-story prototype elementary school design. The original design was based on the "General Elementary Educational Specifications for New Schools" adopted by the Board of Education in August 2003, but has been modified in response to current codes and the current elementary school educational specification for the Howard County Public School System (HCPSS).

The prototype elementary school plan is a two-story building designed to accommodate a population of 788 students in kindergarten through fifth grade.

The 'Space Analysis' section of this report contains a complete listing of elementary school spaces including all program spaces found in the original 788 student prototype design and compares the size of each space in the original prototype to the size of each space in the Elementary School #42 design.

It is the intent that the design and construction of this new elementary school achieve a Leadership in Energy and Environmental Design (LEED)'Gold' designation making this facility yet another 'Green' school for HCPSS. The 2009 version of 'LEED for Schools' released by the U.S. Green Building Council (USGBC) will provide the necessary goals and requirements to obtain LEED Certification. (See page 6 for Sustainable 'Green' Design Goals.)

The Planning Process

In May 2015, the Planning Advisory Committee attended two meetings with the project architect and the HCPSS school planning and construction staff to review the site design and evaluate possible floor plan modifications to the original two-story prototype elementary school design (last built as Bushy Park Elementary School) in response to elementary school capacity needs in this area of the county as well as the current educational needs for elementary schools as stated in the "General Elementary Educational Specifications for New Schools" adopted by the Board of Education in 2010.

Planning meetings were held at Thomas Viaduct Middle School. The meetings focused on re-familiarizing the committee with the prototype floor plan and the proposed site design layout. During the course of the these meetings, the committee participated in a thorough discussion of the building layout, and contributed helpful input refining the building design. Refer to page 13 for a summary of significant modifications to the prototype floor plans.

To assist with the cost and construction aspect of the design, the construction manager participated in the planning process.

Due to the Committee's consensus regarding the site design and floor plan refinements, a third planning meeting was not necessary.

Project Facts

Total size of site	8.019 acres
On site car parking provided	110 cars
On site bus parking provided	18 busses
Building Square Footage	117,222 gsf
Student Capacity	788 Students

Project Schedule

Planning Meetings Completed	19 May 2015
Schematic Design presented to Board of Education for Review and Approval	9 July 2015
Design Development presented to Board of Education for Review and Approval	Oct 2015
Construction Documents presented to Board of Education for Review and Approval	April 2016
Project out for Bids: (1 1/2 months)	June 2016
Bids Received	July 2016
Construction Starts	Sept 2016
Construction Completed (20 months)	May 2018
School Opens	August 2018

Sustainable 'Green' Design Goals

It is the intent that the design and construction of this new school achieve a LEED 'Gold' certification, 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.

In order to measure and compare how 'Green' a building is, the USGBC, founded in 1993, has developed industry standards with design and construction rating systems and guidelines for many different building types.

One such rating system is the USGBC 2009 Edition of "LEED for SCHOOLS" to which the design will closely adhere. Final LEED certification levels are based on the number of credit points obtained in the "LEED for SCHOOLS" rating system. The four levels of certification from lowest to highest are: Certified, Silver, Gold, and Platinum.

We have included an 'in progress' LEED scorecard 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 60 likely credits (with an additional '12 possible credits') allowing for the loss of some and still complying with the goal of a LEED 'Gold' Building.

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LEED Scorecard
Elementary School #42
Howard County Public School System
July 2015

SS Sustainable Sites — Possible Credits: 19

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)
	☒	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)
	☒	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
	☒	Credit 7.1	Heat Island Effect, Non-Roof
1		Credit 7.2	**Heat Island Effect**, Roof
	1	Credit 8	**Light Pollution Reduction**
	☒	Credit 9	Site Master Plan
1		Credit 10	**Joint Use of Facilities**
15	5		Total Sustainable Sites Credits

WE Water Efficiency — Possible Credits: 8

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

EA Energy and Atmosphere — Possible Credits: 15

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)
	☒	Credit 2	On-Site Renewable Energy, 1-13% (7 credits)
2		Credit 3	**Enhanced Commissioning** (2 credits)
	1	Credit 4	**Enhanced Refrigerant Management**
2		Credit 5	**Measurement & Verification** (2 credits)
	☒	Credit 6	Green Power (2 credits)
11	4		Total Energy and Atmosphere Credits

MR Materials and Resources — Possible Credits: 7

R		Prereq 1	**Storage & Collection of Recyclables**
	☒	Credit 1.1	Building Reuse, Maintain 75%, 95% of Existing Walls, Floors & Roof (2 credits)
	☒	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)
	☒	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)
	☒	Credit 6	Rapidly Renewable Materials
1		Credit 7	**Certified Wood**
7	0		Total Materials and Resources Credits

EQ Indoor Environment Quality — Possible Credits: 14

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**
	☒	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)
	☒	Credit 8.2	Daylight & Views, Views for 90% of Spaces
	☒	Credit 9	Enhanced Acoustical Performance
	☒	Credit 10	Mold Prevention
13	1		Total Indoor Environment Quality Credits

ID Innovation and Design Process — Possible Credits: 6

1		Credit 1.1	**Innovation in Design,** Maximize Open Space
1		Credit 1.2	**Innovation in Design,** Green Cleaning Program
1		Credit 1.3	**Innovation in Design,** Low Mercury Lighting
	1	Credit 1.4	**Innovation in Design,** Process Energy Savings: Energy Efficient Elevator
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: 2

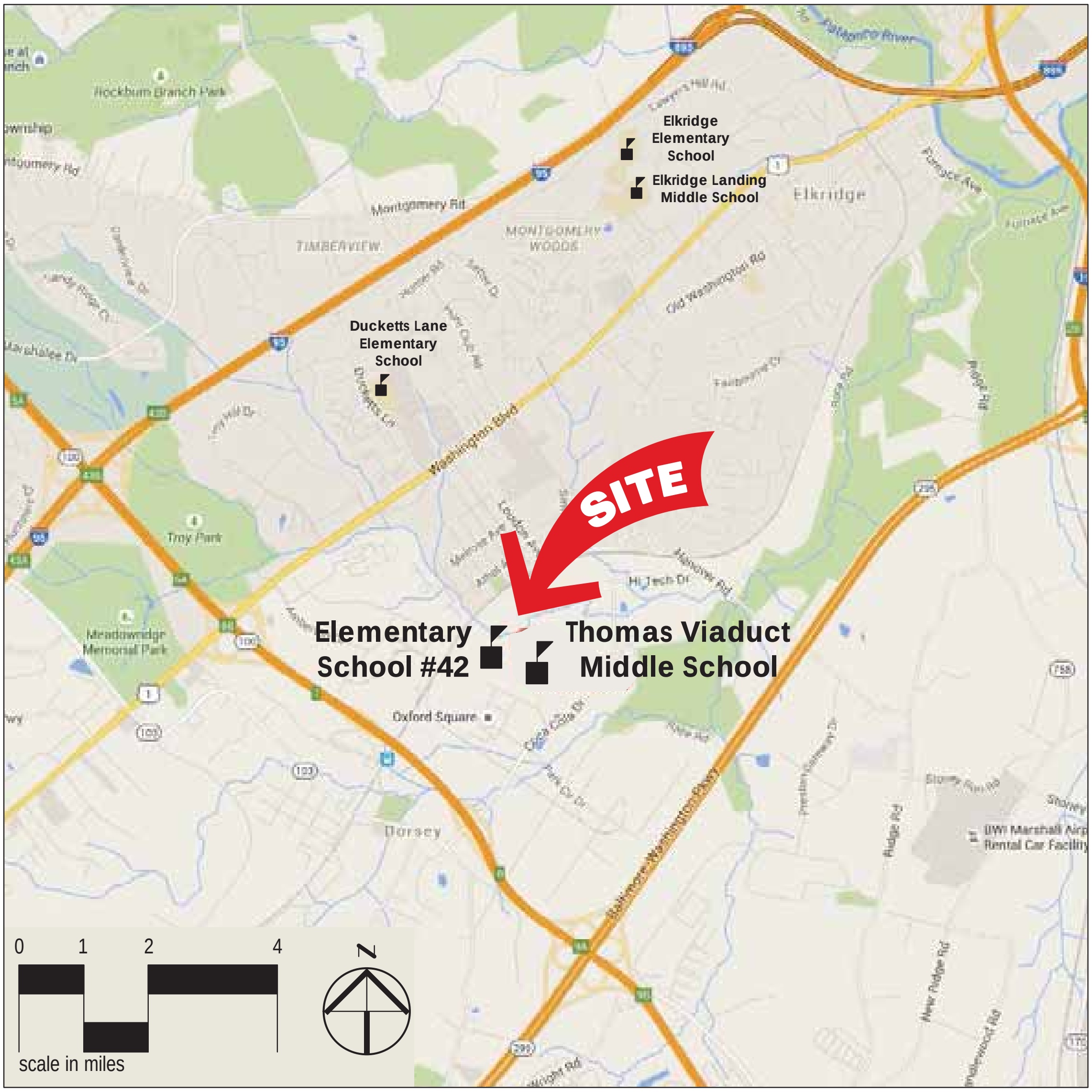
1		Credit 1	**Regional Priority,** Alternative Transportation / Public Transportation Access
1		Credit 2	**Regional Priority,** Storm Water Design / Quality Control
	☒	Credit 3	Regional Priority
	☒	Credit 4	Regional Priority
	☒	Credit 5	Regional Priority
	☒	Credit 6	Regional Priority
2	0		Total Regional Priority Credits

60 **Total Credits (12 'Maybe' Credits)**

Key to Possibility of Earning Credit: R = Required; # (left box) = Yes; # (right box) = Maybe; ☒ = No

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

Vicinity Map



The new 8.019 acre elementary school site is located within the newly planned community of Oxford Square in Hanover, Maryland adjacent to the newly constructed Thomas Viaduct Middle School on Banbury Drive. The combined elementary and middle school site will be 28.219 acres.

Public water, sewer and natural gas serve the site.

Site Context

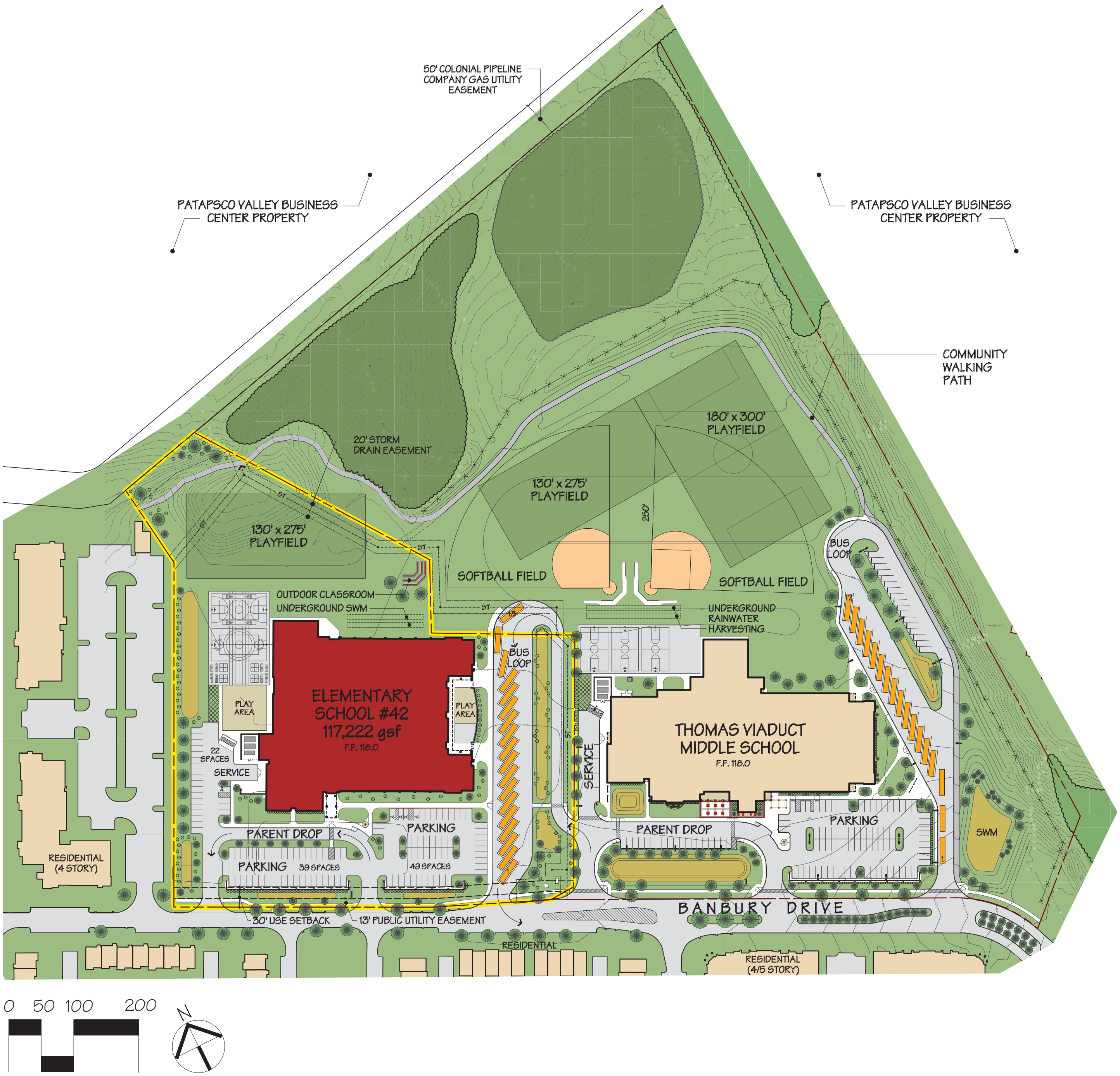
Site plan graphic courtesy of Preston Scheffenacker Properties

The elementary school site is located in the planned community of Oxford Square. Oxford Square is comprised of 111 acres: 33 acres of which are set aside for open space; approximately 20 acres were used for the development of Thomas Viaduct Middle School; 8 acres will be developed for the elementary school and the remaining 50 acres will be developed for the community. There are two separate entrance roads into Oxford Square from Coca Cola Drive, as indicated on the lower right corner of the graphic above. Oxford Square will consist of high-density residential housing, office buildings containing first floor retail and dining establishments, a community center and town meeting hall. Construction of the development began with ‘Phase 1’ in 2012.

The entire community, including the school site, is zoned TOD [Transit Oriented Development] and is being designed to meet the requirements for the Howard County’s Green Neighborhood certification.

Refer to page 10 for a more detailed description of the elementary school site.

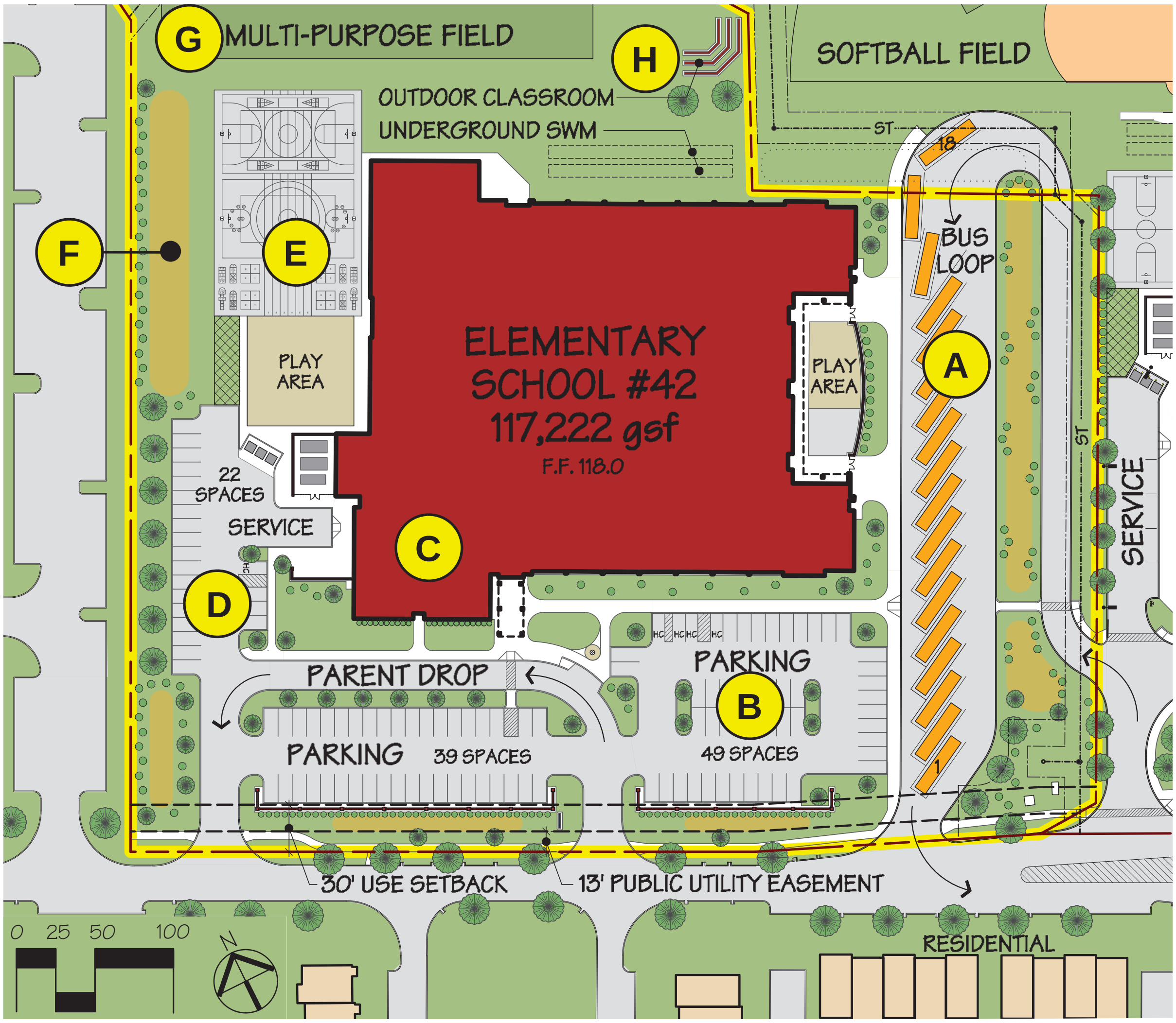
Overall View of Elementary and Middle School Site



Parking Tabulations

Thomas Viaduct Middle School	=	119 car spaces
Elementary School #42	=	110 car spaces
Total Parking Spaces on site	=	229 car spaces

Enlarged Elementary School Site Plan



Proposed Site Plan Notes

Key features of the proposed site plan are listed below and identified by circled letters above.

A. School bus parking for 18 busses. The bus driveway is separate from the parent drop-off driveway to reduce vehicular congestion on site.

B. To provide as much car parking on site as possible, 110 parking spaces have been provided among three areas on the site.

C. Parent drop-off and pickup area adjacent to the main entrance with an ample queuing area to eliminate interference with the main parking lot.

D. Service drive with emergency vehicle access to the paved play area.

E. Paved play area adjacent to gymnasium and cafetorium.

F. Potential locations for stormwater management bio-retention facilities in addition to the underground stormwater management facility.

G. Playfields have been located adjacent to the gymnasium, cafetorium, and locker rooms, such that students will not have to cross vehicular roads or driveways to access.

H. Potential location for outdoor classroom area.

Floor Plan Features

In addition to minor code revisions, the floor plans maintain the following spatial relationships developed for the original prototype design:

Access and Circulation

Main Entrance
The main entrance is more prominent architecturally than the other secondary entrances around the building making it easy to locate and, given that there is only one main entrance, easier to monitor visitors to the school. The main office reception area is located immediately inside this entrance.

Corridor Arrangement
A conscious effort was made to develop a corridor pattern that young children would find easy to understand, staff would find easy to supervise, and travel distances between all portions of the school would be as minimal as possible. The main corridor provides easy access to the cafetorium, gymnasium, media center, and public restrooms for after-hours use. This corridor also provides access to two stairs, an elevator, and secondary corridors leading to the classroom wings, all of which can easily be locked during after-hours use.

The **administrative suite** is located adjacent to the main entrance with a view of the bus loop and parent drop-off areas and is convenient to areas of the school used by the youngest children. This suite is directly adjacent to the **health suite** which has its own entrance from the corridor, and is in close proximity to the **staff dining** and **parent volunteer** rooms. Proximity to the kitchen and cafetorium was also a consideration in the location of the staff dining room. The **staff lounge** is located on the second floor just steps from the stair closest to the administrative suite. The intentional separation of the staff lounge and dining areas helps distribute staff spaces which are convenient to teachers on each floor.

The **guidance** and **psychologist** offices are located in an easy-to-reach first floor location, convenient to the main office, yet with a distinct identity, as desired.

Classrooms are located in the two-story portion of the school and arranged so that each grade level could have its own distinct area. All classrooms are located on exterior walls with windows and are all self-enclosed from each other. **Storage rooms** and **resource rooms or extended learning area/staff workroom** are located at corridor intersections to provide easy movement of students and staff to these areas from as many classrooms as possible.

Early childhood, kindergarten, and first and second grade classrooms are each provided with their own toilet room and are located on the first floor so they are easily reached from the main entrance. Two pairs of classrooms on the second floor have been provided with toilets allowing the flexibility of locating a few primary grade classrooms upstairs if necessitated by a larger primary enrollment. The early childhood/kindergarten area can also be reached from a convenient secondary entrance which adjoins the parent drop off area and has direct access to its own outdoor play area.

Third, fourth, and fifth grade classrooms are all located on the second floor, easily reached by four stairs and two elevators located at each corner of the two story wing.

The **mini-auditorium** has been centrally located on the second floor to provide an area for large group instruction and presentations. This location is also equidistant from all four stairs for easy access from the first floor classrooms.

Floor Plan Features continued...

The **special education classrooms** have been integrated on each floor convenient to all grade levels.

The **media center** is the symbolic, as well as actual, center of the school. It is located on the first floor, is fully enclosed, and is visible from the second floor art studios and the 'fine arts' corridor above. Natural daylight from above brightens this two-story high space and the rooms surrounding it on both floors, which otherwise, would be windowless interior spaces. The media center is surrounded by its support spaces: the **technology resource room, media production, media storage rooms,** and the **media office** can be fully secured from the corridor with lockable doors during after-hours school use.

The **computer lab** and **reading resource room** have been located on the first floor off a quiet classroom corridor and near a stair for ease of access by students of all grades.

The **art studios** and **music classrooms** have been grouped together on the second floor opposite each other in a location we have been calling 'Fine Arts Corridor'. The corridor of related arts spaces is easily reached from the two centrally located stairs on the main corridor below. These interior spaces share the natural daylight being provided over the media center and are acoustically separated from each other and the surrounding classrooms by the careful placement of storage rooms which serve as acoustical buffers. The committee also felt a second floor music location would be more convenient, on a day-to-day basis, for instrumental music students who are third, fourth, and fifth graders whose classrooms are on the same floor.

The **alternative education classroom/observation room** is located on the second floor since students who participate in these programs are more often found in third through fifth grades. Like the staff lounge, the alternative education classroom is located just steps from the stair closest to the administrative suite and guidance office for easy administrative access.

The **gifted and talented resource rooms** and the **ESOL rooms** have been located on both floors for ease of access by students of all grades.

The **gymnasium** has been located so that it is entered from the main corridor which is centrally located and provides easy access for after-hours use. Direct access has been provided from the gym to the outdoor paved play area.

The **cafetorium** has been located for easy access by after-hours users and in close proximity to the elevator and stairs serving the music rooms for use of the platform. For after-lunch recess there is direct access to the outdoor paved play area and playground as well as convenient access to the gymnasium and restrooms. The **platform ramp** and **chair storage room** will be accessed directly from the cafetorium.

The **kitchen** will have two serving lines which are accessed from inside the cafetorium. The kitchen's location is also convenient to the service area for the efficient reception of supplies and for the removal of trash.

The **custodial areas** are placed on a corridor near the service entrance and adjacent to the **mechanical and electrical rooms. Custodial closets and storage rooms** have been distributed throughout the school and placed next to restrooms for plumbing economy.

The **recreation and parks activity room** and related spaces are located near the main entrance at the front of the school with access directly from the exterior as well as from the adjacent corridor.

Modifications to Prototype Floor Plans

Specific revisions requested by the Planning Committee are listed below and are identified by the circled numbers on the proposed floor plans on pages 14 and 15.

1. Enlarged **administrative suite** to accommodate the addition of a **testing room**, a **records room** and a larger **conference room** in response to the 2010 Educational Specifications. Also enlarged **health suite** to provide shower and additional square footage as required for the regional early childhood center (RECC) program.
2. Removed student cubby alcove from each **classroom** which provided each student with a 8" wide x 12" deep opening. Added 12" wide x 24" deep double-tiered student cubbies along back wall of each classroom which will accommodate 32 students per classroom.
3. Added a second **ESOL room** for the primary grades in response to the 2010 Educational Specifications.
4. Enlarged the **guidance office** in response to the 2010 Educational Specifications.
5. Reconfigured spaces to provide two **resource rooms** and multiple **storage rooms** in response to the 2010 Educational Specifications. Added an operable wall between the resource rooms to provide the flexibility for these spaces to function as a regular classroom-sized space when needed. Relocated **staff toilet** rooms and **custodial closet** for direct access from corridors.
6. Added a sixth **kindergarten** classroom by eliminating the early childhood (EC) OT/PT therapy spaces (see note 8) and relocating the **EC speech room** (see note 10). As a result, the early beginnings (EB) office has been reconfigured to accommodate eight staffers.
7. Designated two of the four early childhood classrooms as **RECC classrooms**. Increased the size of the toilet rooms to provide floor space for a hydraulic cot in response to the 2010 Educational Specifications.
8. Relabelled large **OT/PT therapy room** as a shared space between two programs: early childhood and special education in response to the 2010 Educational Specifications. Added a **storage room** with direct access from the therapy room.
9. Enlarged each student cubby in the **kindergarten** and **early childhood classrooms** to an 8” wide x 24" deep opening. These cubbies will not be stacked.
10. Reduced size of **kindergarten classroom** to match size of other kindergarten classrooms.
11. Removed built-in countertops to provide the flexibility for this room to function as either a computer lab with laptops or as a second **gifted and talented (G/T) space**.
12. Enlarged the **tech resource room** in response to the 2010 Educational Specifications.
13. Relocated entrance to **toilet room** with shower to fulfill the requirements of LEED credit 4.2 Alternative Transportation - Bicycle Storage and Changing Rooms.
14. At the request of Recreation and Parks (R&P) the following changes have been made: provided four forward-folding basketball backboards to the gymnasium in lieu of the six wall mounted backboards from the prototype design; removed operable wall from the **R&P activity room**; relocated door to create an exterior **R&P storage room**, and moved the R&P spaces in the cafetorium closer to the gymnasium.
15. Enlarged the **alternative education office** so that it could also function as a reading room with a one-way mirror along wall of adjacent space. The mirror will allow staffers in the **observation room/alternative education classroom** to view instruction in the reading room.
16. Assigned **storage room** to the special education department.
17. Enclosed the **extended learning area** in response to the 2010 Educational Specifications. In addition, reconfigured the extended learning area and **staff workroom** to provide direct access to the **custodial closet** from the corridor.
18. Eliminated ESOL office and seminar room to provide space for a **special education extended learning room** in response to the 2010 Educational Specifications.
19. Enlarged the **ensemble rooms** in response to the 2010 Educational Specifications by reducing the size of the **music rooms** and the oversized G/T classroom.

For a complete description of the plans refer to the ‘Floor Plan Narrative’ on page 11.

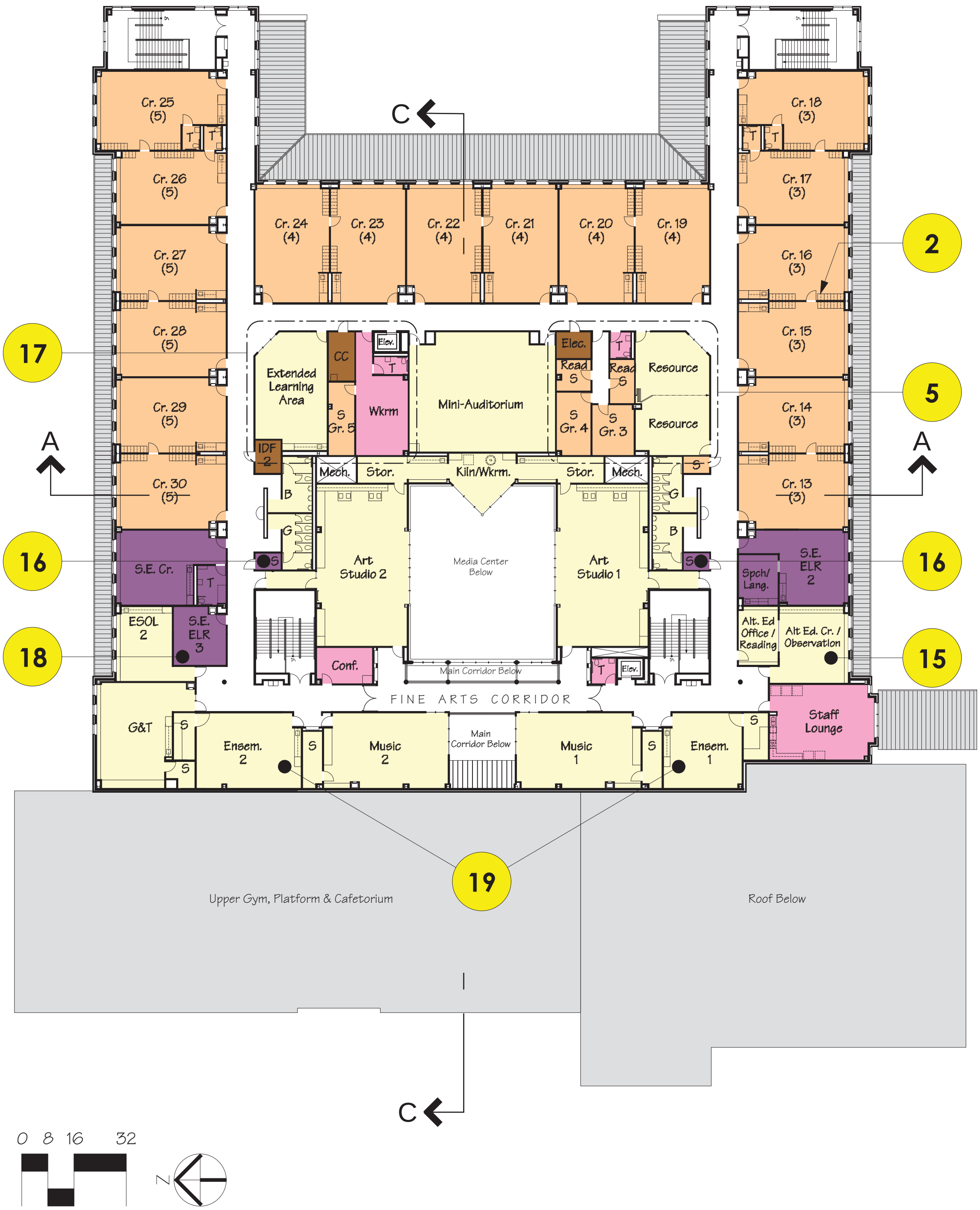
Proposed First Floor Plan

Floor Area

First Floor	=	72,711 GSF
Second Floor	=	44,511 GSF
Total Building	=	117,222 GSF

\# Refers to notes on page 13.

Proposed Second Floor Plan

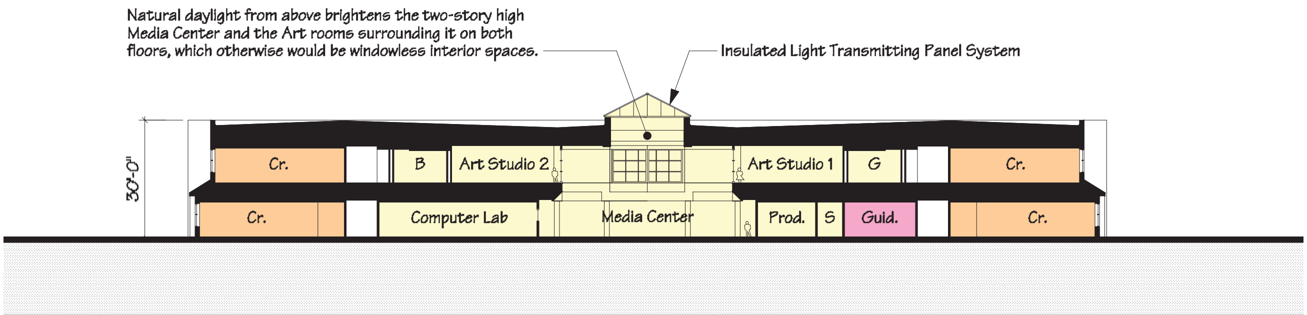


Floor Area

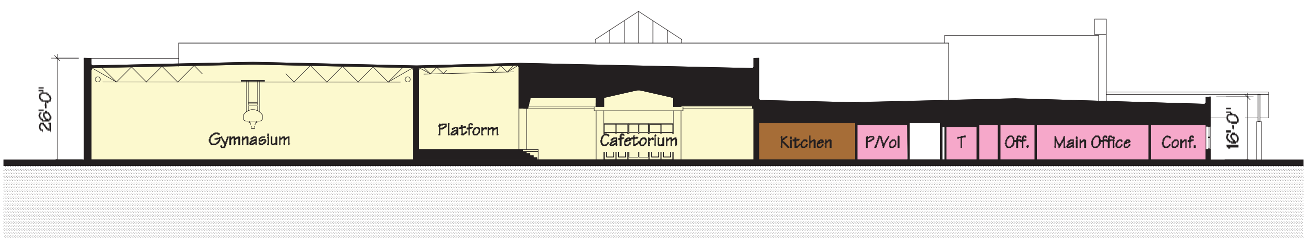
First Floor	=	72,711 GSF
Second Floor	=	44,511 GSF
Total Building	=	117,222 GSF

Refers to notes on page 13.

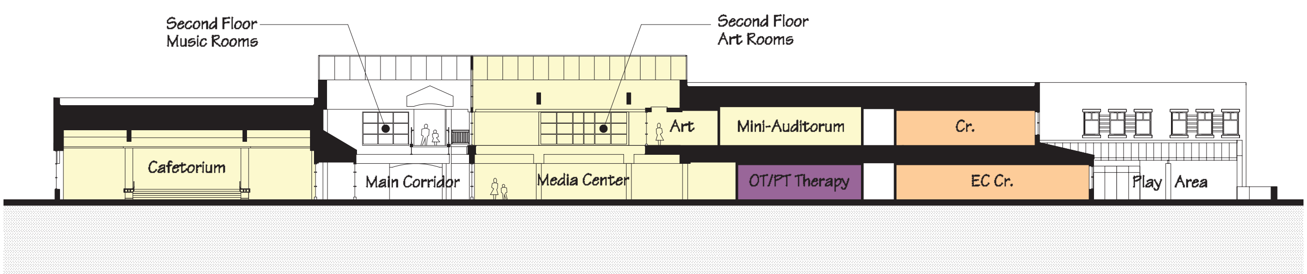
Building Sections



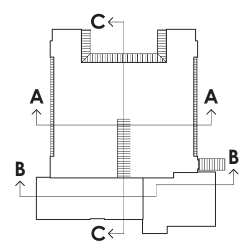
Building Section A-A



Building Section B-B



Building Section C-C



Key Plan

View as one walks westward on Banbury Drive

Architectural Character

The community of Oxford Square will include residential housing with a traditional design aesthetic. That being said, and after working through several iterations of the exterior design of Thomas Viaduct Middle School with the developer, traditional building materials and design elements will be incorporated into the exterior facade of the new elementary school for compatibility with the surrounding community and the adjacent Thomas Viaduct Middle School.

The exterior walls will be comprised of several colors of modular face brick (2-1/4"H. x 8"L.) in running bond pattern where the original prototype design utilized closure sized face brick (4"H. x 8"L.). Steep slope roof surfaces will be covered with prefinished standing seam metal roofing to match Thomas Viaduct Middle School. The parapet walls at the flat roof areas will be capped with an exterior insulation finish system to provide the appearance of a precast concrete cornice. Finally, the exterior windows will be prefinished aluminum (project-out sash) with mullion subdivisions similar in scale to the adjacent middle school and the exterior entrance frames will be a prefinished aluminum storefront product.

The rendering above shows the new elementary school in the distance as one approaches Thomas Viaduct Middle School, which is shown in the foreground.

Interior Views from the Original Prototype Design

Main Entrance Canopy

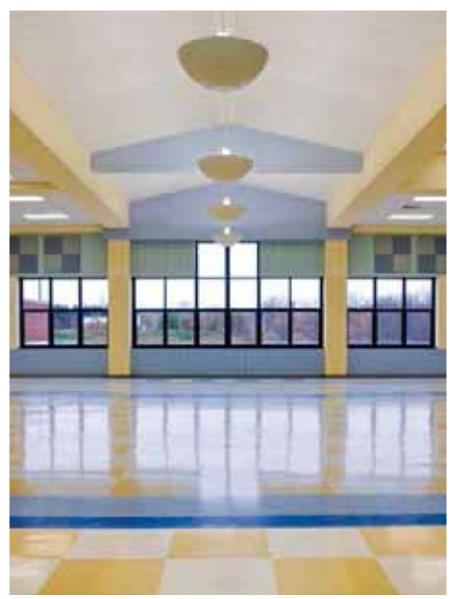
Media Center

Gymnasium

Cafetorium Entrance

Main Corridor

Fine Arts Corridor



Cafetorium

Space Analysis

Note: The 788 Capacity Prototype design was based on the Elementary Educational Specifications adopted in 2003.

	788 Capacity Prototype			Elementary School #42		
	Area(s)	SF	Total Net	Area(s)	SF	Total Net
Administration			**3,149**			**3,626**
Secretarial/Reception (incl. closet)	1	632	632	1	602	602
Principal's Office (incl. closet)	1	192	192	1	197	197
Principal's Lavatory	-	-	-	1	48	48
Asst. Principal's Office (incl. closet)	2	142	283	2	146	291
Conference Rm. (1st and 2nd Floor)	2	199	397	2	270	540
Parent Volunteer Room (incl. storage)	1	168	168	1	169	169
Work Preparation Room	1	274	274	1	336	336
Staff Lounge (first and second floor)	2	528	1,056	2	520	1,040
Adult Lavatory (first and second floor)	3	49	147	4	53	211
Records Room	-	-	-	1	106	106
Testing Room	-	-	-	1	86	86
Alternative Education			**697**			**716**
Classroom (Observation)	1	547	547	1	503	503
Office (Reading)	1	150	150	1	213	213
Cafetorium / Kitchen			**6,887**			**6,904**
Student Dining	1	3,821	3,821	1	3,821	3,821
Platform	1	1,143	1,143	1	1,172	1,172
Chair Storage	1	261	261	1	263	263
Kitchen and Serving	1	1,177	1,177	1	1,168	1,168
Dishwashing Area	1	216	216	1	214	214
Dry Storage	1	113	113	1	112	112
Locker/Lavatory	1	38	38	1	45	45
Kitchen Office	1	66	66	1	66	66
Laundry Room	1	52	52	1	43	43
Classrooms Grades 1-5			**30,022**			**29,291**
Classroom Grades 1-2 (with lavatory)	12	820	9,840	12	816	9,787
Classroom Grades 3-5	18	777	13,986	18	777	13,992
Lavatory	4	50	200	4	52	209
Staff Workroom	4	355	1,420	1	447	447
Extended Learning Area	4	834	3,336	1	736	736
Storage	9	138	1,240	11	153	1,678
Resource Room	-	-	-	6	407	2,442
Computer Lab			**875**			**875**
Computer Lab (G&T 2)	1	875	875	1	875	875
Custodial			**537**			**539**
Office	1	100	100	1	100	100
Cust. Closets	5	61	307	3	106	318
Exterior Storage	1	130	130	1	121	121
Early Childhood CR's			**4,522**			**4,511**
Classrooms (incl. RECC)	4	981	3,924	4	977	3,907
Shared Storage (for each pair of CR's)	2	105	210	2	96	191
Lavatory	4	56	224	4	63	251
Early Childhood Exterior Storage	1	164	164	1	162	162

Space Analysis (continued)

Note: The 788 Capacity Prototype design was based on the Elementary Educational Specifications adopted in 2003.

	788 Capacity Prototype			Elementary School #42		
	Area(s)	SF	Total Net	Area(s)	SF	Total Net
Early Childhood Early Beginnings			**224**			**233**
Office	1	224	224	1	233	233
Early Childhood Speech/Language			**153**			**233**
Speech Therapy Room	1	153	153	1	233	233
Early Childhood OT/PT Rooms			**687**			**0**
Large Therapy Room	1	513	513	-	-	-
Small Therapy Room	1	111	111	-	-	-
Storage	1	63	63	-	-	-
ESOL			**684**			**843**
Classroom (incl. storage)	1	407	407	2	422	843
Seminar Room	1	158	158	-	-	-
Office	1	119	119	-	-	-
Gifted & Talented			**987**			**837**
Classroom	1	876	876	1	776	776
Storage	1	111	111	1	61	61
Guidance			**165**			**246**
Guidance Office	1	165	165	1	246	246
Health Suite			**655**			**754**
Waiting / Treatment Area	1	140	140	1	202	202
Rest Area	1	189	189	1	189	189
Office	1	94	94	1	89	89
Examination	1	98	98	1	126	126
Lavatory	1	84	84	1	98	98
Storage	1	50	50	1	50	50
Kindergarten			**4,669**			**5,475**
Kindergarten (with lavatory)	5	901	4,505	6	854	5,121
Storage	-	-	-	2	96	192
Kindergarten Exterior Storage	1	164	164	1	162	162
Library / Media Center			**5,854**			**5,991**
Main Reading Room	1	3,755	3,755	1	3,755	3,755
Technology Resource Room (incl. storage)	1	575	575	1	639	639
Office	1	207	207	1	207	207
Media Production	1	479	479	1	470	470
Storage	2	193	385	2	228	455
MDF & IDF	3	151	453	3	155	465
Mini Auditorium			**1,573**			**1,573**
Mini Auditorium	1	1,573	1,573	1	1,573	1,573
Music			**3,202**			**3,376**
General Music Rooms	2	921	1,842	2	857	1,714
Ensemble Rooms	2	469	938	2	630	1,259
Shared Storage	4	106	422	4	101	403

Space Analysis (continued)

Note: The 788 Capacity Prototype design was based on the Elementary Educational Specifications adopted in 2003.

	788 Capacity Prototype Area(s)	SF	Total Net	Elementary School #42 Area(s)	SF	Total Net
Physical Education			**6,302**			**6,205**
Gymnasium	1	5,493	5,493	1	5,493	5,493
Storage	2	270	540	2	247	494
Office	1	113	113	1	118	118
Staff Lavatory	1	67	67	-	-	-
Lavatories (exterior access)	2	44	89	2	50	100
Psychological Services			**164**			**164**
Psychologist's Office	1	164	164	1	164	164
Reading Resource			**413**			**413**
Reading Resource Area	1	341	341	1	341	341
Storage	1	72	72	1	72	72
Special Education K-5			**2,622**			**2,239**
Classrooms (large)	1	987	987	1	631	631
Classrooms (small / ELR)	3	457	1,371	3	379	1,136
Lavatory (with changing table)	2	103	206	2	103	206
Storage	1	58	58	4	67	266
S.E. Occupational/Physical Therapy			**663**			**737**
Classroom (RECC & S.E.)	1	663	663	1	737	737
S.E. Speech/Language Therapy			**192**			**180**
Speech Language Therapy Room	1	192	192	1	180	180
Visual Art			**3,446**			**3,446**
Studios	2	1,371	2,742	2	1,371	2,742
Storage & Kiln Room	1	704	704	1	704	704

	788 Capacity Prototype	Elementary School #42
Subtotal Net Sq. Ft.	**79,344**	**79,407**

	788 Capacity Prototype Area(s)	SF	Total Net	Elementary School #42 Area(s)	SF	Total Net
Recreation & Parks			**2,487**			**1,829**
Activity Room (w/ kitchen area)	1	1,869	1,869	1	1,317	1,317
Children's Lavatory (in activity room)	1	49	49	1	59	59
Office	1	152	152	1	157	157
Storage	3	95	285	2	103	205
Storage (Exterior Access)	1	132	132	1	91	91

Gross Area Grand Total Summary

	788 Capacity Prototype	Elementary School #42
Total Net Sq. Ft.	**81,831**	**81,236**
Gross Area Factor (Walls, Circulation, Toilets, Mech/Elec, Structure, Shafts, etc.)	**34,987**	**35,986**
Gross Area Grand Total	**116,818**	**117,222**

Architectural Design Narrative

Elementary School #42 is to be located next to Thomas Viaduct Middle School within the planned community of Oxford Square and will be an adaptation of the current prototype elementary school design.

The prototype elementary school plan is a two-story building design based on the "General Elementary Educational Specifications for New Schools" and is designed to accommodate a population which includes 788 students in kindergarten through fifth grade.

Like Dayton Oaks, Veterans, and Bushy Park, this latest elementary school will have a Recreation and Parks Suite.

It is the intent that the design and construction of this new elementary school achieve a LEED 'Gold' designation making this facility yet another 'Green' school for the Howard County Public School System. The 2009 version of 'LEED for Schools' released by the USGBC will provide the necessary goals and requirements to obtain LEED Certification.

Project Facts

Total size of site	8.019 acres
On site car parking provided	110 cars
On site bus parking provided	18 busses
Elementary School Building Square Footage	117,222 gsf
Student Capacity	788 Students

View of Front Elevation

Civil Engineering Narrative

The new Elementary School #42 will be located in the Oxford Square Subdivision.

Elementary School #42 will have direct access to Banbury Drive approximately 800 feet from its intersection with Coca Cola Drive.

The school site is 8.019 acres and is served with public water, public sewer and natural gas.

A bus loop is proposed adjacent to the east end of the school.

A parking lot is proposed at the front of the school which will accommodate parent drop-off and handicap access for the school.

A parking lot is also proposed adjacent to the west end of the school which also provides handicap access for the school.

A macadam walkway is proposed at the back of the property which will connect to the existing macadam walkway at the Thomas Viaduct Middle School. The macadam walkway will ultimately connect to the pathway system proposed around the perimeter of the Oxford Square Subdivision. A playfield is proposed at the back of the school.

The Oxford Square Subdivision has adopted a Green Neighborhood Plan.

Storm water management and water quality for impervious areas will be provided by utilizing bio-retention facilities and underground facilities.

Roofing System Narrative

“Low-sloped” roofing systems will consist of built-up roofing membranes over roofing insulation mainly due to their toughness and durability which will be especially important as numerous trades access the roof during construction, and as maintenance personnel access the roof thereafter. These systems will consist of four-ply asphalt and fiberglass felt built-up roofing membranes with a bright white SBS cap sheet over three layers of flat, rigid roofing insulation (R-30 total) over sloped steel roof decks. The base layer of insulation will be mechanically attached and all subsequent layers, and insulation crickets, will be set in hot asphalt. All asphalt bleed-out at cap sheet seams will be broadcast with bright white granules to provide a uniform appearance and continuous reflective roofing surface. A ‘No Dollar Limit’ 20 Year manufacturer’s warranty will be specified for all new built-up roofing systems.

“Steep-sloped” roofing systems will consist of pre-finished aluminum standing seam roofing panels over felt underlayment, self-adhering sheet membrane and nailable insulation board or plywood over sloped steel roof decks. Manufacturer’s 20 year finish and weather-tightness warranties will be specified for all metal roofing systems.

Roof drains fabricated entirely of cast iron (including domes/strainers) with all stainless steel hardware will be specified as the primary storm drainage system on all “low-sloped” roofing sections. Sheet metal overflow roof scuppers through parapet walls and/or overflow roof drains will be used as the secondary back-up system. Sheet metal gutters and downspouts will be specified to drain all “steep-sloped” roofing sections.

Pre-finished aluminum sheet metal will be specified for use at all gutters, gravel stops, wall copings, and other roof flashing locations where aesthetics are a concern. All other sheet metal flashings will be stainless steel and soldered watertight for leakproof performance. Flashings at all roof drains and vent pipes will consist of reinforced liquid flashing membrane; no lead flashings will be used.

Treated lumber will be specified for all wood nailers and curbs. All hardware securing or penetrating treated wood will be stainless steel.

Structural System Narrative

Foundation System

The foundation system for this structure is assumed to be conventional spread footings placed on original earth and controlled compacted fill. Footings shall be sized based on allowable soil bearing value as provided by the geotechnical engineer of record and shall be placed at a minimum of three feet below finished grade around the entire building perimeter. Foundation walls shall be block masonry walls filled with 3000 pounds per square inch grout and reinforced as required with waterproofing, drainage board, and gravel backfill.

First Floor Framing System

The lower level floor of this building structure shall consist of a four inch thick concrete slab on grade reinforced with 6" x 6"- W1.4 / W1.4 welded wire fabric poured over vapor barrier over four inches of porous gravel fill. Tongue in groove 24 gauge metal screeds shall be installed to serve as construction joints for this facility. In addition, 1-1/4" deep saw cut control joints shall be installed at fifteen feet on center maximum between all tongue in groove joints within eight hours of pouring the structural slabs.

Second Floor Framing System

The second floor of this building structure shall consist of three inches of normal weight concrete topping slab (fc'=4000 pounds per square inch) reinforced with 4"x4"-W4.0/W4.0 welded wire fabric poured over 2" x 20 gauge composite metal deck. This framed slab shall be supported by composite steel beams spaced at eight feet on center maximum supported by composite steel girders resting on interior and exterior wide flange steel columns.

Low Roof at Gym, Platform, Cafetorium, Kitchen, Activities Room, and Main Office

The roof above the gym and platform shall be 1½" type "BA" acoustical painted metal deck. This deck shall be supported by long span steel joists spaced at six feet on center maximum. The long span steel joists shall be supported by interior and exterior masonry bearing walls. The remaining low roof shall be 1½" type" B" galvanized metal deck supported by conventional steel joists spaced at six feet on center maximum. Steel joists shall be supported by interior masonry walls and steel wide flange girders that are supported on steel tube columns. Additional steel support is required for roof top units, roof screen, and folding partition.

High Roof

Structural roof above second floor shall be 1 ½" type "B" galvanized metal deck supported by steel bar joist spaced at six feet on center. Steel joists shall be supported by steel joist girders that shall frame into interior wide flange columns. Additional structural steel shall be required for support of roof top units. A pre-engineered skylight will be framed over the two story media center.

Exterior Wall Construction

The exterior wall of the two story section of building shall consist of four inch brick veneer, cavity, and eight inch reinforced block. The exterior wall of the cafetorium shall be four inch brick veneer, cavity, and twelve inch reinforced block. The exterior wall at the gymnasium shall be four inch brick veneer, cavity, and sixteen inch reinforced block. All openings for window and doors shall be supported by galvanized steel lintels. All reinforced block walls shall be filled solid with 3000 pounds per square foot grout.

Lateral Force Resisting System

The lateral force resisting system for this building shall consist of block masonry shear walls which are located throughout the building structure. The masonry shear walls, where necessary, will be reinforced with vertical rebar filled with 3000 pounds per square inch grout, and anchored to the building's foundation system.

Design Criteria

GOVERNING CODE: IBC 2015

MATERIAL PROPERTIES	LIVE LOADS	WIND LOAD
f'c = 3000 psi (Footings)	Classrooms = 40 psf	Basic Wind Speed, V= 120 mph
f'c = 3500 psi (Slab on grade)	Corridors = 80 psf	Building Category III
f'c = 4000 psi (Framed slab)	Storage = 125 psf	Exposure Category = C
f'c = 4500 psi (Exterior slab on grade)	Stairs = 100 psf	
Fy = 50,000 psi		
Fy = 60,000 psi		

SNOW ROOF LOAD:
Ground Snow Load = 25 psf
Snow Exposure Factor = 0.9
Snow Load Importance Factor = 1.1
Snow Load Thermal Factor = 1.0
Flat Roof Snow Load
  PF = .7 (.9) (1.0) (1.1) (25) = 19.25 psf
  PF (MIIN) = 1.1 (20) = 22 psf
  Add 5 psf for rain on snow surcharge load
Roof = 30 psf (Min.)
  + Snowdrift Requirements

SEISMIC
Seismic Design Category to be determined by Geotechnical Engineer.

Mechanical System Narrative

DESIGN CRITERIA

Applicable Codes and Standards

2015 International Building Code (IBC)
2015 International Mechanical Code (IMC)
2015 International Energy Conservation Code (IECC)
2015 International Fire Code (IFC)
2015 National Standard Plumbing Code
2015 National Fuel Gas Code
ASHRAE Standard 55-2007 - Thermal Environmental Conditions for Human Occupancy
ASHRAE Standard 62.1-2010 - Ventilation for Acceptable Indoor Air Quality
ASHRAE Standard 90.1-2013 - Energy Standard for Buildings
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

Design Standards

HVAC system design will be based on the following conditions:

Outdoor Design Temperatures:

Summer: 95°F (Dry Bulb) / 78°F (Wet Bulb)
Winter: 0°F DB

Indoor Design Temperatures (per HCPSS "Guidelines for Energy Conservation"):

Occupied Cooling Setpoint:	76°F DB (+2 F) / 50% Relative Humidity (Maximum)
Occupied Heating Setpoint:	70°F DB (-2 F)
Unoccupied Cooling Setpoint:	85°F DB (+2 F)
Unoccupied Heating Setpoint:	55°F DB (-2 F)
Utility Spaces Setpoint: (Mechanical and Electrical Rooms, etc)	55°F DB Heating / 85°F DB Cooling
Stairwell Heating Setpoint:	65°F DB (-2 F) Occupied / 55°F DB (-2 F) Unoccupied

Building Occupancy Densities:

Architectural Furnishing Plans
Estimated Maximum Occupancy Densities Provided in IMC Chapter 4

Ventilation Rates:

Minimum Ventilation Rates:	IMC Chapter 4 and ASHRAE Standard 62.1-2010
Ceiling Supply Air Systems:	1.0 Ez (Zone Air Distribution Effectiveness)

Filtration Criteria:

Pre-filters:	30% efficient (including all fan coil unit systems)
Final filters:	85% efficient (for compliance with LEED IEQc5)

LIFE CYCLE COST ANALYSIS

A 20-year life-cycle cost analysis will be performed during the design development phase to confirm the final mechanical system selection for the facility. The following mechanical system options will be considered as part of this analysis:

- Horizontal four-pipe fan coil units for space conditioning and dedicated outdoor air systems with energy recovery for ventilation. The four-pipe distribution system will be served by gas-fired boilers and an air-cooled chiller.
- Four-pipe rooftop VAV air-handling units with single-duct VAV terminal units for both space conditioning and ventilation. The four-pipe distribution system will be served by gas-fired boilers and an air-cooled chiller.
- Water-cooled compressorized VAV rooftop units with single-duct VAV terminal units for both space conditioning and ventilation. A water-to-water heat pump unit will be provided for generating heating water for the VAV terminal units. A ground-coupled geothermal heat pump unit loop will be provided for supporting rooftop unit and water-to-water heat pump unit compressors.
- Ground-coupled geothermal heat pump unit system, consisting of vertical extended range type heat pump units for space conditioning and dedicated outdoor air systems with energy recovery for ventilation.

The following mechanical system described on the following pages is expected based on our experience with similar elementary school facilities. All mechanical system components will be designed in strict accordance with all applicable codes, regulations, and the design standards described previously.

MECHANICAL SYSTEMS

Heating and Cooling Systems

A four-pipe chilled water and heating water system is anticipated for Elementary School #42. This type of mechanical system provides the ability to have independent heating or cooling year-round, while delivering an extremely high level of overall building energy efficiency.

A single high-efficiency air-cooled chiller with approximately 260- to 280-tons of cooling capacity will be located within an equipment service yard area that is positioned adjacent to the main mechanical room. This equipment will generate chilled water for the school's four-pipe distribution system. A variable primary chilled water arrangement will be utilized. Chilled water will be piped from the chiller to a pair of chilled water distribution pumps, located within the mechanical room, and circulated throughout the school.

Production of heating water for the school's four-pipe distribution system will be accomplished by three 2,000 MBH input gas-fired condensing type boilers, located within the main mechanical room. A pair of heating water distribution pumps, located in the mechanical room, will circulate heating water throughout the school. A maximum heating water supply temperature of 140 degrees fahrenheit will be utilized, with this supply water temperature reset based on outdoor air temperature.

All chilled water and heating water pumping systems will be provided with N+1 redundancy, such that the operation of the school can be maintained in the event of a single pump failure. Pumping systems will utilize base-mounted end-suction type pumps, arranged in a lead/lag configuration. Variable frequency drives will be provided for reduced energy consumption during periods of reduced system demand. In addition to distribution pumps, other heating water and chilled water infrastructure components, including air separators, expansion tanks, and a chilled water buffer tank will be located within the main mechanical room.

HVAC Systems

- Classroom Areas

  Classroom areas throughout the school will be provided with four-pipe horizontal fan coil units for space conditioning. Fan coil units will be positioned above the classroom ceilings, with supply and return air ductwork extending from these units to the classroom served. The use of filter return grilles (rather than filters within the fan coil units) will be provided, minimizing above ceiling maintenance requirements.

  A series of rooftop dedicated outdoor air systems with enthalpy wheel energy recovery devices, chilled water cooling coils, and hot water heating coils will be provided for delivering conditioned ventilation airflow to the classroom areas served. Airflow supplied from these units will be dehumidified, conditioned, and delivered to each fan coil unit's return air ductwork. Exhaust airflow from classrooms, restrooms, and storage room areas will be routed through each dedicated outdoor air unit's enthalpy wheel for pre-conditioning of outdoor air.

  The feasibility and cost effectiveness of utilizing demand control ventilation within classroom areas will be evaluated during the design development phase. To accomplish this control strategy, a series of variable air volume (VAV) retrofit-type air terminal units will be installed within the conditioned outdoor air ductwork systems. Each classroom will be provided with a dedicated VAV air terminal unit, regulating the quantity of conditioned outdoor air delivered to each space based on the actual room carbon dioxide levels.

- Administration and Administrative Support Areas

  The administration and administrative support areas (including the guidance and health suite areas) will be provided with space conditioning through a variable refrigerant flow (VRF) system. This system will be complete with heat recovery type air-cooled compressors. The use of ceiling cassette type VRF terminal units is anticipated, promoting good access for filter replacement.

  A single rooftop dedicated outdoor air system with enthalpy wheel energy recovery device, direct expansion (DX) cooling coil, and hot water heating coil will be provided for delivering conditioned ventilation airflow to the administration area. Airflow supplied from this unit will be dehumidified, conditioned, and delivered directly to each space at a room neutral temperature. Exhaust airflow from offices, conference rooms, restrooms, and storage room areas will be routed through the dedicated outdoor air unit's enthalpy wheel for pre-conditioning of outdoor air.

- Rec and Park Activity Rooms

  Space conditioning and ventilation for the Rec and Park Activity Room areas will be extended from the VRF system and dedicated outdoor air unit serving the administration area. The use of above-ceiling ducted type VRF terminal units is anticipated for these areas due to the overall size of each room.

- Media Center

  A single-zone rooftop air-handling unit will be provided for space conditioning and ventilation within the media center area. This rooftop unit will be provided with a chilled water cooling coil, hot water preheat and heating coils, and airside economizer operation. Supply and return air fans will be equipped with variable frequency drives for reducing airflow quantities during periods of reduced cooling demand. A room carbon dioxide sensor will reduce minimum outdoor air quantities during periods of reduced space occupancy.

- Mini Auditorium

  A single-zone rooftop air-handling unit will be provided for space conditioning and ventilation within the mini auditorium area. This rooftop unit will be provided with a chilled water cooling coil, hot water preheat and heating coils, and airside economizer operation. Supply and return air fans will be equipped with variable frequency drives for reducing airflow quantities during periods of reduced cooling demand. A room carbon dioxide sensor will reduce minimum outdoor air quantities during periods of reduced space occupancy.

- Gymnasium

  A single-zone heating-only rooftop air-handling unit will be provided for space conditioning and ventilation within the gymnasium area. This rooftop unit will be provided with a hot water heating coil and airside economizer operation. Supply and return air fans will be equipped with variable frequency drives for airflow balancing purposes. A room carbon dioxide sensor will reduce minimum outdoor air quantities during periods of reduced space occupancy.

  In addition to the rooftop air-handling unit, a "summer ventilation" system will also be provided, consisting of multiple exhaust fans and companion outdoor air intakes for increased room air-change rates during the summer months.

- Cafetorium, Platform, and Serving Line
  Similar to the media center area, the cafetorium, platform, and serving line areas will be provided with a single-zone rooftop air-handling unit for space conditioning and ventilation. This rooftop unit will be provided with a chilled water cooling coil, hot water preheat and heating coils, and airside economizer operation. Supply and return air fans will be equipped with variable frequency drives for reducing airflow quantities during periods of reduced cooling demand. A room carbon dioxide sensor will reduce minimum outdoor air quantities during periods of reduced space occupancy. Excess outdoor air quantities will be transferred to the adjacent kitchen area for exhaust hood make-up.

- Kitchen
  Space conditioning for the kitchen area will be accomplished primarily through transfer airflow from the adjacent serving line and cafeteria areas. The use of a type II kitchen hood is anticipated, reducing the hood's exhaust airflow requirements and overall energy usage of the kitchen area. Refer to the kitchen design portions of this narrative for additional information on the kitchen hood and equipment.

- Stairwell Areas
  Space conditioning for the stairwell areas will be accomplished through a series of heating-only cabinet unit heaters.

BUILDING AUTOMATION CONTROL SYSTEM

A building automation system consisting of direct digital control (DDC) components will be provided for the school. Damper and valve components will be provided with electric or electronic actuation. DDC components will be utilized for all fan coil units and dedicated outdoor air systems. DDC interface with the room occupancy sensors provided for lighting control will be evaluated during the design development phase, allowing "occupancy based" space temperature reset and potential room ventilation control throughout each zone's occupied mode of operation.

All control system components will be interfaced with the central HCPSS energy management control system for remote monitoring and energy management routines. All system components will be designed to meet HCPSS automation standards and naming conventions.

Plumbing System Narrative

Storm Water Piping Systems

Storm water drainage, including roof drains, overflow drains, and storm water piping systems will be provided for the school. Above- and below-grade piping will be constructed from cast-iron, with no-hub piping connections provided only for above-grade piping components. All storm water piping systems will exit the building at various locations and coordinate with available site piping connections provided for the school.

Sanitary and Vent Piping Systems

Sanitary waste and vent piping systems are provided for supporting plumbing fixtures within the school. Similar to the storm water piping, above- and below-grade sanitary and vent piping will be constructed from cast-iron, with no-hub piping connections provided only for above-grade piping components. Vent piping will terminate at the roof level, with a minimum 25-foot separation provided between vent piping terminations and any outdoor air intake locations. Sanitary piping systems will exit the building at various locations and coordinate with available site piping connections provided for the school.

The following special sanitary and vent piping systems are anticipated:

- Equipment and sinks that may discharge grease into the sanitary system from the kitchen will be piped to an underground concrete grease interceptor. The discharge from this interceptor will be connected to site sanitary piping system.
- Sinks within the art classrooms will be provided with solids interceptors, collecting debris and preventing it from entering into the site sanitary piping system.

Domestic Water Piping Systems

A combination fire/water service will enter the building within the main mechanical room area. This service will be capable of supporting both the fire and water service demands of the new school. A new domestic water service, complete with basket strainer and dual reduced pressure zone backflow preventers will separate the domestic water and fire services prior to distributing water throughout the school. Domestic water piping will be distributed from this mechanical room area to plumbing fixtures and equipment located throughout the school.

A pair of gas-fired condensing type water heaters will be provided for generating domestic hot water for the school. Both 140-degrees fahrenheit (for the kitchen area only) and 110-degrees fahrenheit domestic hot water will be distributed throughout the school, with each piping loop complete with a dedicated hot water circulation pump and expansion tank.

Plumbing Fixtures

Institutional grade plumbing fixtures will be provided throughout the school. These fixtures will include floor-mounted water closets utilizing 1.6 gallon per flush valves, pint flush (0.125 gallon per flush) wall-hung urinals, and wall-hung lavatories with self-closing hot and cold water faucets that supply 0.35 gallons per minute. All plumbing fixtures will comply with the Americans with Disabilities Act (ADA).

Natural Gas Piping Systems

A natural gas service will be provided by BGE for the school. The gas service meter and pressure reducing station will be located within an equipment service yard area, located adjacent to the main mechanical room. Gas piping will serve the emergency generator, boilers, and domestic water heaters.

Fire Protection Systems

The entire building will be fully sprinklered. The building will be separated into several zones that will match the fire alarm pull zones for the building. Based on the municipal water pressure obtained during the design of the recently constructed Thomas Viaduct Middle School, the use of a fire pump is not anticipated. During the design development phase, this water pressure will be confirmed based on the results of a new fire flow test. All work will be specified to conform to standards of the National Fire Protection Association (NFPA) and will include requirements for performance verification through hydraulic calculations.

Electrical System Narrative

DESIGN CRITERIA

Applicable Codes and Standards

Americans with Disabilities Act Standards for Accessible Design, 2010
IEEE Standards, Power and Telecommunications
IESNA Lighting Handbook, 10th Edition
International Building Code (IBC), 2015 Edition
International Energy Conservation Code (IECC), 2015 Edition
Life Safety Code, NFPA 101, latest edition
Maryland Occupational Safety and Health Act (MOSH Act)
National Electrical Code (NEC) with local amendments, NFPA 70, 2011
National Electrical Manufacturers Association (NEMA), standards
National Fire Alarm and Signaling Code, NFPA 72, latest edition

General

The electrical systems for HCPSS Elementary School #42 will include work associated with the power, generator power, lighting and lighting controls and fire alarm systems. Electrical power will be provided for all technology systems designed and specified by the IT consultant. The electrical systems, in concert with the architectural and mechanical considerations, are intended to create spaces that are flexible, functional, energy efficient and respond to the needs of this facility. The electrical design will comply with applicable codes, regulations, standards, and authorities having jurisdiction. Sustainable technologies will be incorporated into the design to achieve the goal of LEED Gold certification.

Electrical Service

There will be an outdoor BGE pad-mounted utility transformer located near the service area of the school. (The front of the utility transformer will be within 20 feet from the service driveway.) A secondary service concrete-encased ductbank (with minimum eight ducts) will be run from the utility transformer to the CT section of the main switchboard in the main electrical room.

Power Distribution

Power will be distributed at 277/480 volts and 120/208 volts. The distribution system will consist of the following electrical equipment:

- Main switchboard
- Distribution panelboards
- Lighting panelboards
- Branch circuit panelboards
- Dry-type transformers
- Enclosed switches (safety switches/disconnects) and/or enclosed circuit breakers
- Combination starters and/or variable frequency drives for motor loads

The main electrical room will consist of a main switchboard, distribution panelboards, dry-type transformers, lighting panelboard, branch circuit panelboards, and generator-connected equipment. Generator-connected equipment will consist of automatic transfer switches, dry-type transformers, and branch circuit panelboards.

The main switchboard will be a 2000-ampere, 277/480-volt, three-phase, four-wire switchboard with a CT section, main section with a 2000 - ampere electronic-trip main circuit breaker, and distribution section with molded-case branch circuit breakers. The main switchboard will incorporate ground fault protection and surge protection.

Panelboards will be rated at 277/480 volts and 120/208 volts and serve as distribution, branch circuit, or lighting panels. There will be dedicated panelboards for lighting, mechanical loads, general receptacle loads, and "clean power" computer receptacle loads. Panelboards will have a copper bus structure. Panelboards will be sized with approximately 25 percent spare capacity and 25 percent spare breaker space. Computer panels will have a 200 percent rated neutral bus to account for harmonic distortion. A three-phase surge protective device (SPD) will be connected to (and mounted adjacent to) each respective computer panel.

The typical dry-type transformer will have a 480-volt delta primary and 208/120-volt, three-phase, four-wire, wye secondary. Transformers serving general receptacle panelboards will be general-purpose, energy-efficient type, complying with NEMA TP-1. Transformers serving computer panelboards will be UL K-13 type.

Lighting will be connected at 277 volts, single-phase. Mechanical equipment will be connected at either 120 volts, single-phase; 208 volts, single-phase; 208 volts, three-phase; 277 volts, single-phase; or 480 volts, three-phase, depending upon the load requirements. Motors one horsepower or higher will be connected at 480 volts, three-phase. General receptacles will be connected at 120 volts, singlephase. Each feeder and branch circuit will have a separate copper grounding conductor in the same raceway.

The wiring system will be copper conductors with THHN-THWN insulation installed in metallic conduit. The minimum size conduit will be 3/4 inches. Intermediate metal conduit (IMC) will be used for conduits that are three inches in diameter or larger, wiring to exterior equipment, first five feet of underground conduit extending outside of the building, and elbows penetrating floor slabs. Electrical metallic tubing (EMT) will be used for conduits that are two and a half inches in diameter or smaller. Polyvinylchloride (PVC) conduit will be used for underground feeders and circuits, except where IMC is required. Flexible metal conduit (FMC) will be used to connect to transformers. Liquid-tight flexible metal conduit (LFMC) will be used to connect to motors and other vibrating equipment. FMC and LFMC will be limited to a maximum six foot length.

Receptacle branch circuits will utilize number twelve wiring when the run is 50 feet or less, number ten wiring when the run is between 50 and 100 linear feet, and number eight wiring when the run is more than 100 linear feet in length. Power wiring will be installed in raceway/conduit. Type MC cable will be limited to a maximum six foot length to serve luminaires (lighting fixtures).

Classrooms will be equipped with computer receptacles at the teacher's desk, teacher's wardrobe, wall-mounted projector, student workstations, and "computer on wheels" charging station connected to "clean-power" computer panelboards.

Emergency Public Shelter Requirement

The Maryland Emergency Management Agency (MEMA) may designate Elementary School #42 as an emergency public shelter. Considering that recent projects for HCPSS have been designated as emergency public shelters, it is likely that Elementary School #42 will also be designated as an emergency public shelter.

Electrical equipment for the MEMA emergency public shelter will include an outdoor 1200A generator docking station (equal to Trystar GDS) with multiple cam-lock connectors per phase. The main electrical room will have a 1200A 277/480V distribution switchboard with two key-interlocked main circuit breakers, step-down transformer, and 120/208V distribution panelboard. This electrical equipment will be used to connect to electrical loads serving the gymnasium, cafeteria, kitchen, as well as mechanical loads required to support these spaces. These spaces will be designated by MEMA to be used as an emergency public shelter with the electrical loads connected to a temporary portable generator.

Per HCPSS requirements, mechanical equipment for the entire school will also be connected to the 1200A 277/480V distribution switchboard serving MEMA loads.

Generator Power Distribution

An outdoor natural-gas generator in a weatherproof enclosure will be installed in the service yard of the school. The generator will be rated at 277/480 volts, three-phase, four-wire. The basis-of-design generator manufacturer will be Cummins.

The generator will be sized at 150 kilowatts and be connected to two automatic transfer switches (ATS) located in the main electrical room.

- ATS #1 will be the "life safety" ATS and will serve emergency panelboard(s). Emergency panelboard(s) will provide power to emergency egress lighting in corridors and classrooms, and exit signs.

- ATS #2 will be the "standby" ATS and will serve the automatic temperature controls/energy management control system panels, kitchen refrigerator and freezer, data/voice communications equipment, intercom equipment, security equipment, fire alarm equipment, heat trace, sump pumps, and other equipment and devices as determined by HCPSS. The "standby" ATS will also serve selected receptacles in the principal's office, main office, health suite, corridors, gym, cafetorium, and kitchen.

Lighting

Building lighting will generally consist of recessed 2' x 2' troffer-type lensed luminaires (lighting fixtures). These luminaires will utilize light emitting diode (LED) light sources with electronic LED drivers. Building lighting will also include high-bay LED luminaires in the gymnasium, a combination of LED pendants and LED downlights in the media center and cafetorium, recessed LED downlights in selected areas, vandal-resistant LED luminaires in group toilet rooms, gasketed LED luminaires with smooth lenses (for easier cleaning) in the kitchen, industrial-type LED luminaires for support spaces with open ceilings, LED exit signs with red lettering, exterior perimeter building-mounted full-cutoff LED luminaires, and exterior polemounted full-cutoff LED luminaires at parking lots. The finish of exterior luminaires will be selected by the Architect.

The lighting design will comply with 2015 IECC, which states that the lighting power density (LPD) will not exceed 0.87 watts per square foot for the entire school. The selection of lighting fixtures for the building will be compliant with the energy code.

Lighting levels will be designed in accordance with the recommendations of the Illuminating Engineering Society of North America (IESNA). Maintained illumination values will be calculated using a total maintenance factor of 80 percent. Classrooms will have an average between 30 and 50 foot-candles at the task plane.

Lighting Controls

Switching of luminaires will be both multi-level and zoned as appropriate for each space. Occupancy sensors will be used for interior lighting. A relay/switching panel will be used to control exterior lighting.

Lighting controls in each classroom will include a dedicated lighting room controller (to be located in the ceiling space above the entrance door), two low-voltage lighting control stations, and ceiling occupancy sensor(s). The lighting control station at the entrance door will be three-button for OFF, 50 percent lighting level, and 100 percent lighting level. The lighting control station at the teacher's desk will be multi-button for OFF, 50 percent lighting level, 100 percent lighting level, audio/video (AV) modes, and raise/lower lighting level capability. AV mode #1 will have the front row OFF and the remaining luminaires at 50 percent lighting level. AV mode #2 will have the front row at 100 percent lighting level and the remaining luminaires at 50 percent lighting level. One luminaire in each classroom will be connected to an emergency lighting circuit (via transfer relay device) and will be automatically switched ON during a power outage.

Lighting controls in offices and similar spaces will include a lighting room controller (to be located in the ceiling space above an entrance door), entry lighting control station, and ceiling occupancy sensor(s). The lighting control station at the entrance door will be multi-button for OFF, 50 percent lighting level, 100 percent lighting level, and raise/lower lighting level capability.

Occupancy sensors in classrooms, instructional spaces, offices, workrooms, conference rooms, resource rooms, storage rooms, staff lounge, media center, cafetorium, activity room, and gymnasium will be set to "vacancy" mode, meaning that lighting in these spaces will need to be manually turned ON via local lighting control station.

Occupancy sensors in lobbies, corridors, stairways, and group toilets will be set to "occupancy" mode, meaning that lighting in these spaces will be automatically turned ON when occupied. Occupancy sensors in corridors will be spaced between 32 and 36 feet apart and controlling every 100-foot section of corridor

Automatic daylight controls (daylight photocell/sensor that automatically dims lighting when there is sufficient daylight in a space) for daylight harvesting will be utilized only where required per 2015 IECC. Daylight harvesting will be required in rooms where there is more than 150 watts of “general lighting” within sidelight or toplight “daylight zones”.

Technology System Narrative

Data Network General Description

The data network shall be an implementation of 10/100/1000 Mbit Ethernet over Category 6 copper UTP cable and Gigabit Ethernet over multimode fiber, complying with the Institute of Electrical Engineers' (IEEE) 802.3 standards for Ethernet. Backbone cabling between the main distribution frame room (MDF/"head end") and all intermediate distribution frame rooms (IDFs) shall be a hybrid single-mode/multimode fiber optic cable (6/12 strands). Multimode fiber shall be a minimum OM3 type fiber while singlemode fiber shall be reserved for distributed antenna systems (DAS) applications or future use as needed.

All horizontal cabling shall be terminated in Category 6 rack-mounted patch panels in the IDF rooms, and in communication network outlets (CNOs) at the workstation. The data infrastructure will support the implementation of a wireless local area network (LAN) system and potential convergence of voice and video onto the data distribution network. Horizontal voice and data cables shall not exceed 90 meters in length. Data electronics (routers, switches, servers, etc.) shall be employed and utilize the data network infrastructure. IDFs will be managed through stackable switches sharing a gigabit uplink to the chassis switch located in the MDF. Each terminated data outlet shall be cross-connected to an active switch port.

Data outlets intended for wireless use shall be cross-connected to inline powered switch ports or power inverting equipment. These outlets shall be mounted above the drop ceiling in a low voltage jack and faceplate or have a male RJ-45 termination. Each wireless drop shall include two cables and may utilize Category 6a to provide 10 gigabit Ethernet out to 95 meters. In either scenario, the ceiling grid must be tagged and a fifteen foot service loop must be allocated. The school district has currently standardized on Aruba as their wireless solution.

The design team will work with the client to refine the number of data drops in all types of instructional and non-instructional spaces to ensure that it complies with Howard County Public School standards and guidelines as well as MSDE Technology Standards.

Howard County Public Schools currently receives service to their buildings from Howard County Government Fiber as well as Verizon and Comcast. The specific services delivered to the building will be refined with the owner throughout design based on their latest arrangements. Pathways will be provided to accommodate services as needed with spares for future use.

Voice Distribution Infrastructure Description

The voice cable plant will consist of Category 6 UTP cables extended from IDFs to the workstation. These cables will be terminated in Category 6 patch panels and will be cross-connected to either rack mounted Category 6 patch panels or 100-pair Category 5e rack mounted 110 blocks. Multipair Category 5e cables shall be installed for analog backbone connectivity and interconnect IDF rooms with the MDF (head end). Category 5e backbone cables shall be terminated in wall-mounted 110-blocks at the MDF and connected to various analog services where required. The infrastructure will support analog, digital and internet protocol (IP) based services.

Telephone Systems Description

The school will contain the Category 6 cable described above for voice distribution in offices and classrooms. The infrastructure will support the analog, digital and IP telephone services. Currently, the district is considering options to migrate away from traditional Centrex services and private branch exchange (PBX) systems. The design team will incorporate owner-specified telephone electronics into the design documents when they are available from the owner.

Voicemail servers shall be incorporated into the design to allow for a more unified communications platform. Telephone handsets will also be provided in offices and classrooms. Handsets will be located appropriately during the design phase of the project. The school should also maintain a minimum number of separate incoming analog telephone lines for elevator, fax, fire and security connections throughout the facility.

Video Distribution Description

Comcast cable service will be brought to the building. Comcast shall provide three digital transport adaptors (DTAs) to convert encrypted digital signals to de-encrypted analog signals. A small coaxial cable plant will be installed to strategic locations for immediate viewing without the need for a set-top box.

The IP data network shall be used for IP video streaming. The IP video streaming head end will consist of a distribution cabinet holding rack mounted video distribution equipment and be located in the MDF room. The system will allow for content to be streamed over the data network and viewed through a computer or through a display using a video decoder. The head end will receive signals from external and internal sources and establish channels to display images on demand.

Classroom Audio/Video System Description

The instructor's station in each classroom will have cable harness assembly that will allow the teacher's computer to display to a video monitor, wall mounted LCD projector or electronic whiteboard. The A/V harness shall include HDMI, USB, VGA and 3.5 MM audio at a minimum and be connected to various devices around the room. The HCPSS currently uses Epson Brighlink 595 wall mounted interactive projectors with Epson Pixie controllers.

Sound reinforcement will be included in each instructional space as part of the A/V systems. The system includes two or four ceiling mounted speakers that can also be integrated with other classroom equipment such as the LCD projector, DVD player or television tuner to amplify sound from those sources as well. The system has the ability to act as a mixer to switch audio sources and control volume levels on multiple inputs. Sound levels are equalized throughout the space so students hear at proper volume and clarity levels.

Video Surveillance Description

Closed circuit television (CCTV) shall provide visual surveillance and recording of the school, internally and externally, 24 hours per day. Currently, the HCPSS utilizes Pelco cameras connected via coaxial cable to GE DVRs strategically located within facilities. At a minimum, the CCTV system will utilize analog cameras connected to DVRs via RG-6 coaxial cable. A possible implementation would include IP based cameras that are connected to the data network through switching equipment in IDF rooms. Each IP camera location shall have a Cat6 UTP cable, identical to other data infrastructure at the facility, terminated with a 15 service loop and an 18/2 AWG wire that follows the same path (for possible future transition to a PTZ camera.). Analog cameras shall have an RG-6 coaxial cable with Male F Connector and 15 foot service loop at each camera location. Exterior pole mounted cameras shall receive an RG-6, RG-11 or fiber for signal transmission along with associated power conductors.

Cameras will survey the corridors, specific rooms and portions of the perimeter of the facility. Digital video recordings will be transmitted from each camera location and stored for no less than 30 days. The CCTV will be connected to an emergency backup system that will keep the system operational in a power outage.

All external cameras shall be pan, tilt, zoom (PTZ) type cameras and cameras facing access doors will have an auto focus iris to allow for the change in lighting conditions. Cameras will record digital pictures in color whenever light conditions permit and only revert to black and white where low light conditions will not permit accurate color images. Interior fixed cameras should generally be considered over PTZ type cameras due to cost and operator issues.

The location of the system cameras, NVRs, DVRs, power supplies and associated control software/ hardware will be located during design phase of the project. The system will be capable of reviewing images based upon time and location inquiries.

Access Control and Intrusion Detection Description

The access control and intrusion detection system shall allow/prevent access, track movement throughout the facility and provide an alarm signal on and offsite in the event of an unauthorized entry. The systems shall be integrated and will be controllable on and offsite to allow for efficient system management. Bosch shall be used for the intrusion system and AMAG shall be used for the access control system.

The system shall consist of motion detectors, door and window contacts, card readers, door controllers, power supplies and intelligent software all connected to alarm panels throughout the facility. Electric locking devices and door hardware shall be provided by others.

Cabling for this system will be installed in dedicated pathways with panels located in telecommunications rooms and storage rooms. All entrances will be equipped with handicapped reachable speakers, intercom, and video camera entry systems. Entrance areas will be fitted with cable for future installation of metal detectors.

Intercom and Master Clock Description

The intercommunication system shall utilize a copper cable infrastructure to distribute multiple, simultaneous conversations on separate channels throughout the facility through telephones, call-in switches and loudspeaker assemblies. A programmable master clock with correction of secondary clocks shall also be included as part of the overall system. In addition, the system must be scalable to meet the user's future expansion needs and be programmable from a computer terminal located at the facility.

The HCPSS is currently reviewing intercom and clock system types and architectures. The final decisions made by the HCPSS will be incorporated into the design documents once available.

Auxiliary Sound System Description

Specific spaces within the facility shall have local auxiliary sound systems that allow for sound amplification and reproduction. These spaces include gymnasium, cafetorium, mini-auditorium and music rooms. The spaces shall have a combination of hardwired and wireless microphone inputs output speakers and system control.

A typical auxiliary sound system shall include rack or cabinet mounted electronics consisting of pre-amplifiers, mixers, program sources, equalizers, amplifiers, wireless microphone inputs, assistive listening stations and storage space for microphones. Each system should be connected to the facilities intercom system and fire alarm control panel to allow for system override in the event of an important or emergency announcement.

Food Service Design Narrative

The food service facility for Elementary School #42 will be equipped with the following energy efficient foodservice equipment that will significantly reduce energy consumption in the kitchen:

- Pass-thru refrigerators with new R290 Hydrocarbon (HC) refrigerant will reduce energy consumption by 20 percent versus a traditional refrigerator.
- Walk-in cooler and freezer compartment and refrigeration systems will be in compliance with the Energy Independence and Security Act standards (EISA) and USGBC's LEED requirements.
- Refrigeration Systems for walk-In cooler and freezer will utilize the "reverse cycle defrost with hot gas" option with smart controller reducing energy consumption by 20 percent to 30 percent.
- The ventless conveyor dishmachine for warewashing with heat recovery unit will eliminate the need for an exhaust vent and motor. The waste heat recovery system reclaims heat generated by the machine and uses it to pre-heat incoming water, reducing energy consumption. This also reduces the amount of time required to increase water temperature for final rinse application.
- Energy-Star rated electric cooking equipment will be utilized since electric is 100 percent efficient compare to 80 percent with gas.
- The exhaust canopy will be a type II hood rated at 109 CFM/FT. The exhaust canopy will be reduced to 13'-0" x 109 CFM/Ft = 1,417 CFM of exhaust.
- LED lights will be provided in the kitchen, walk-in cooler and freezer and pass-thru refrigerators and exhaust canopy.
- Boiler-less convection steamer will be utilized versus traditional boiler-base unit.

Construction Cost Estimate

Elementary School #42

Site Work	$ 3,148,434
Building	$ 30,188,115
Construction Cost Total	$ 33,336,549

Notes

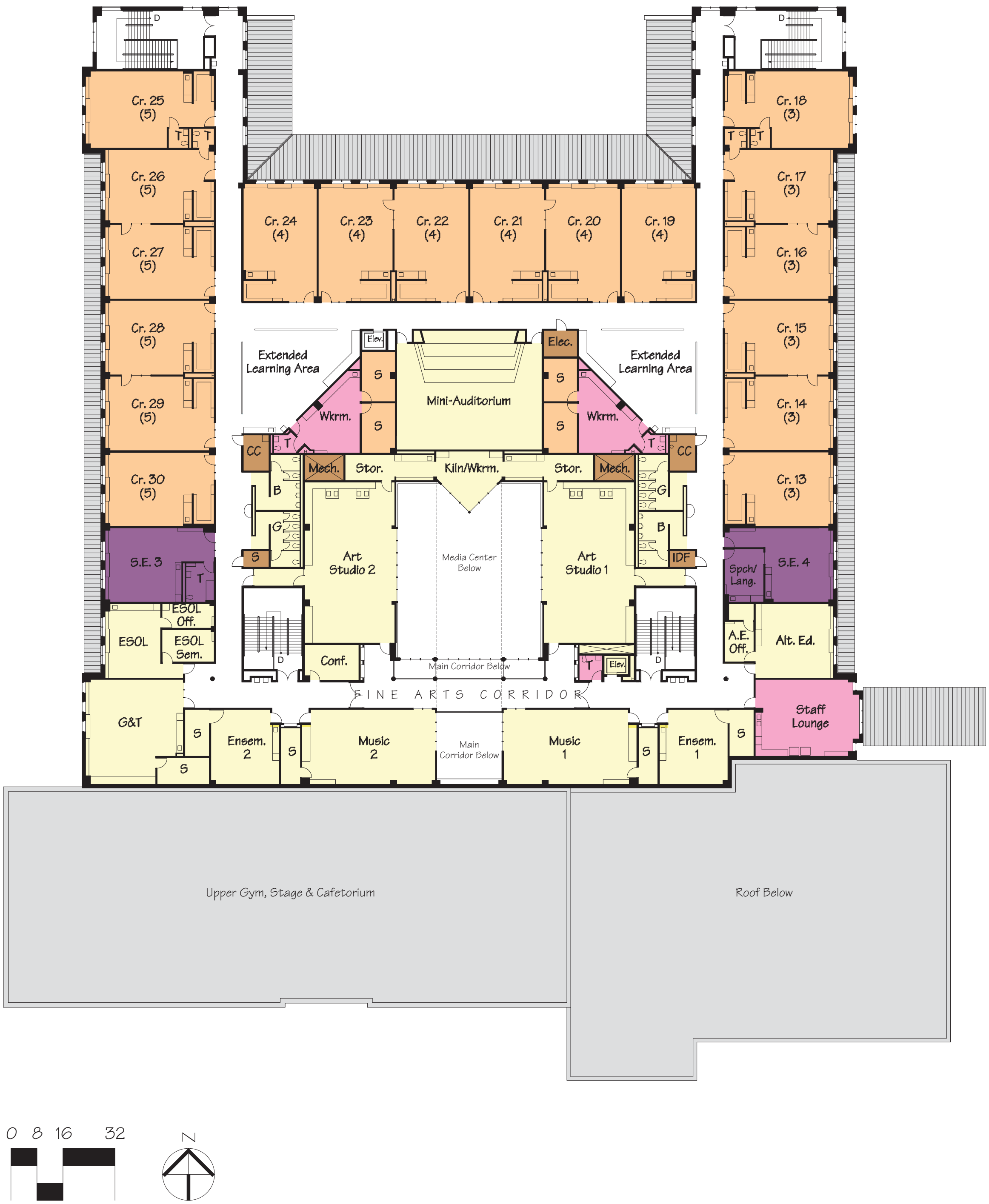
- Construction cost was prepared by the construction manager, J. Vinton Schafer & Sons and assumes that bids will be received in July 2016.
- Construction cost includes cost of food service equipment.
- Estimate includes a schematic phase cost estimate contingency of +10% percent.
- Estimate assumes wage-rate pricing.
- Estimate does not include a project contingency.
- Estimate includes a cost contingency for constructing a LEED ‘Gold’ design.

APPENDIX

Original Prototype Design as Constructed for Bushy Park Elementary School Provided for Reference

First Floor Plan

Original Prototype Design as Constructed for Bushy Park Elementary School Provided for Reference



Second Floor Plan