Hoffman-Boston Elementary School

Perkins Eastman

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Hoffman-Boston Elementary School

The Hoffman-Boston Elementary School site presents a significant opportunity to expand the existing building and resolve some of the adjacency and space issues currently present on the campus. Currently with an enrollment of approximately 390 students, many in PreK or Kindergarten or special education classes, the future program of the school is being currently being discussed by APS and may in the future include a STEM or a language focus. The site also houses the Carver Community Center and a special education intake center. The proposed concept has been designed to provide the flexibility to respond to several alternative futures.

The proposed concept:

- Maximizes the building's capacity by taking advantage of significant underutilized site area and the topography to the south of the existing building;
- Creates two distinct front doors to allow for the campus to house either a single PreK-8 or PreK-12 program or two smaller, separate elementary schools;
- Remedies the remote location of the existing cafeteria relative to the majority of the classrooms;
- Provides a flexible, multi-purpose room;
- Enhances the civic presence of the school and the community center on S. Queen and 13th Streets through a shared entry plaza and lobby/pre-function space and on S. Queen Street through a new elevation and entry;
- Enhances and better engages the courtyards and outdoor space with the interior learning environments;
- Provides expanded parking and service resources that are convenient but unobtrusive.

As shown in the concept the site would allow for approximately 100,000 GSF of new construction, bringing the total area of the building to approximately 208,000 GSF. In addition to accommodating significant additional enrollment, the concept would also be able to support APS' sustainable, high performance building goals. For example, mechanical options for the site include the potential to utilize a very efficient ground source heat pump system with active chilled beams for the new construction and to also use this system to modernize the aging boilers in the existing building. Photovoltaics could also be utilized through a Power Purchase Agreement. Further due diligence investigation of this site would include geotechnical engineering to determine subsurface soil bearing capacity.

Main entrance at bus drop-off

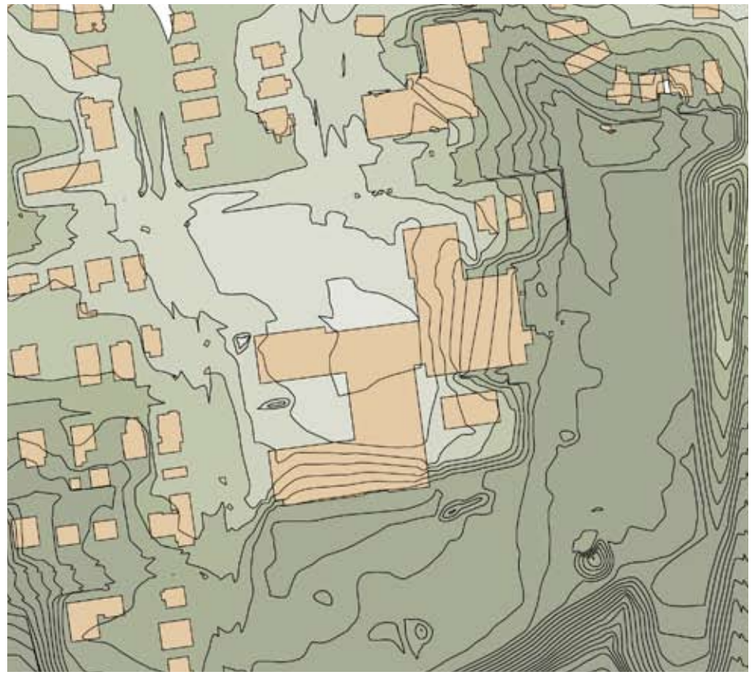
Courtyard and man entrance for parent drop-off at Queen St.

Access to fields from Queen St.

1999-2000 Addition to school

Hoffman-Boston Elementary School

	Building Sq.Ft.	School Site Sq. Ft.	Building Footprint Sq.Ft.	Playground Sq. Ft.**	Play Field Sq. Ft.**	Blacktop Sq. Ft.**	Parking Sq. Ft.**	Parking Spaces**	Relocatable Sq. Ft.**	Open Area Sq. Ft.**
Existing	108,135	374,746	57,641	13,546	89,935	26,293	34,230	62	0	153,101
Proposed	99,931 (addition)	no change	40,183 (addition)	13,546 (relocated)	57,300***	49,024	49,024	122 (total)		



TOPOGRAPHY: LIGHT GREEN INDICATES HIGHER ELEVATION

** Estimates based on 2009 aerial photographs

*** Does not include tennis and basketball courts

- EXISTING
- RENOVATION
- NEW
- BUS LOOP
- PARENT DROP OFF/ PICK UP
- PEDESTRIAN

0 100 200 400
1" = 200'

N

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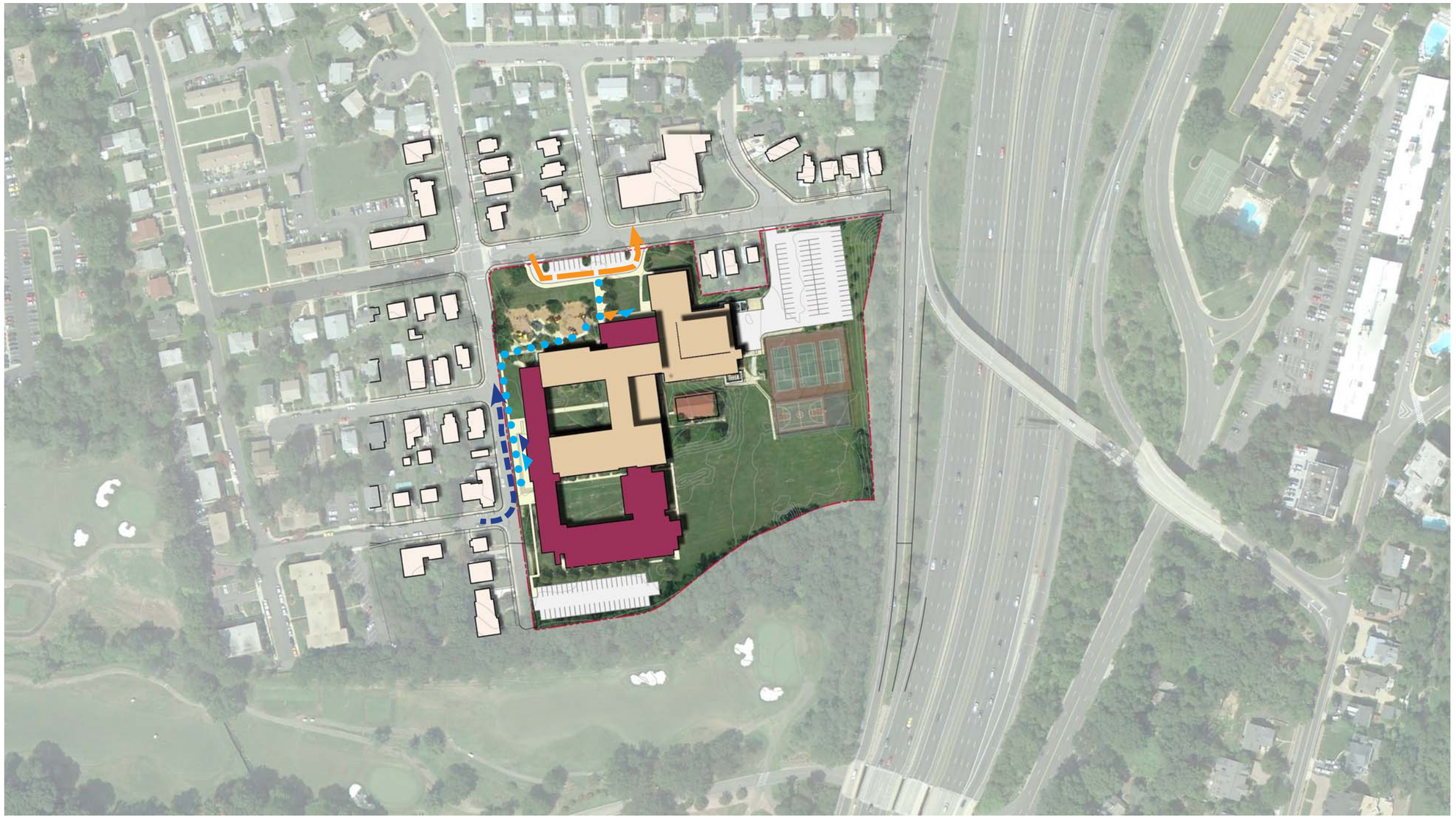
EXISTING CONDITIONS ANALYSIS

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Hoffman-Boston Elementary School



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ILLUSTRATIVE SITE PLAN

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Hoffman-Boston Elementary School

CLASSROOM

CORE SPACES

SERVICE/SUPPORT

0 25 50 100

1" = 50'

N

Please note: Plan north is to the right.

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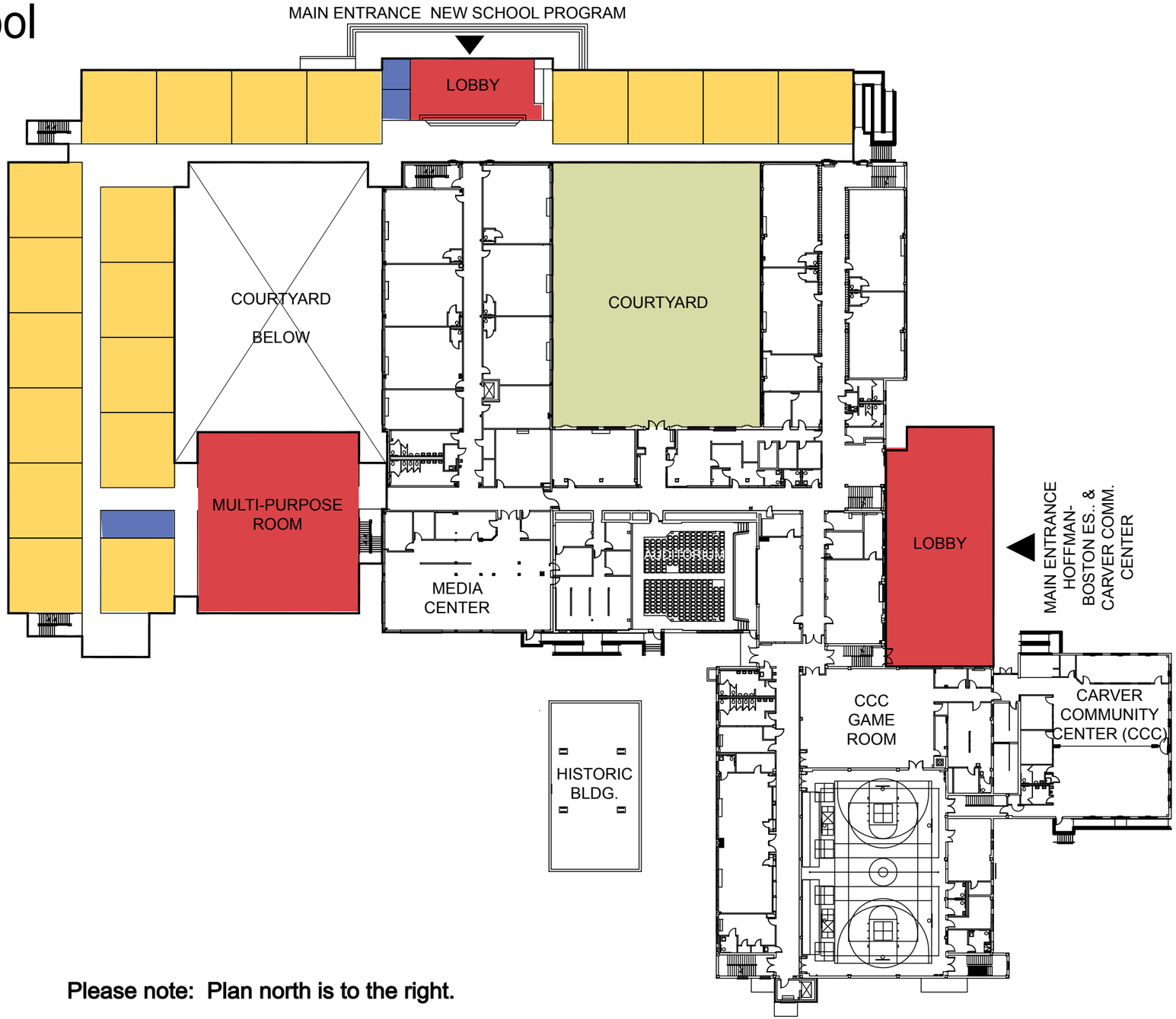
BASEMENT PLAN

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Hoffman-Boston Elementary School



CLASSROOM

CORE SPACES

SERVICE/SUPPORT

0 25 50 100

1″ = 50′

N

Please note: Plan north is to the right.

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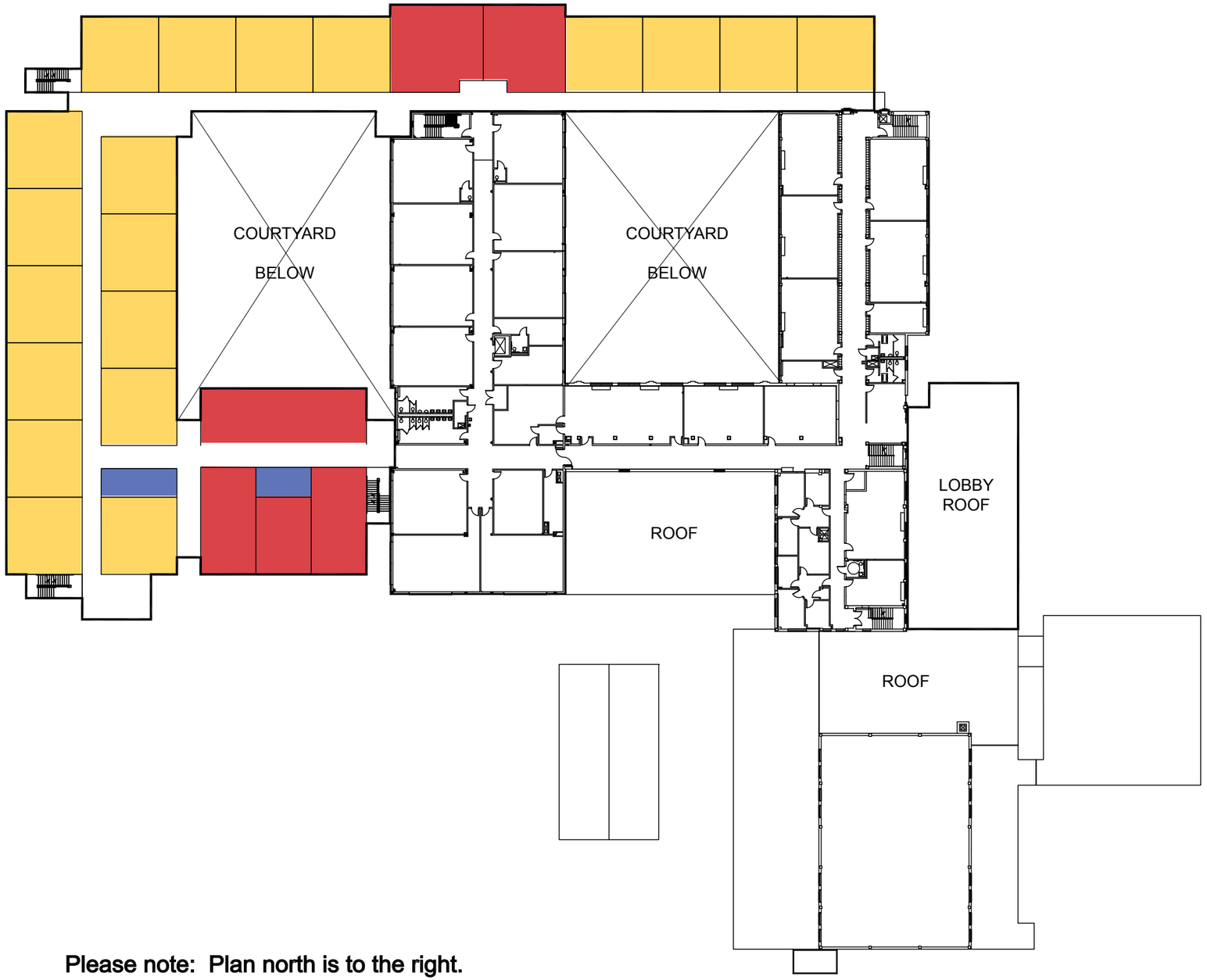
FIRST FLOOR PLAN

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Hoffman-Boston Elementary School



CLASSROOM

CORE SPACES

SERVICE/SUPPORT

0 25 50 100

1" = 50'

N

Please note: Plan north is to the right.

Perkins Eastman

SECOND FLOOR PLAN

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Hoffman-Boston Elementary School

OVERALL COST DISCUSSION

I. BUDGET ESTIMATE

There are two possible major tasks; first the construction of 99,931 s.f. of additions, and second the replacement of the existing boiler and chiller plant.

A. CONSTRUCTION OF ADDITIONS (MPE):

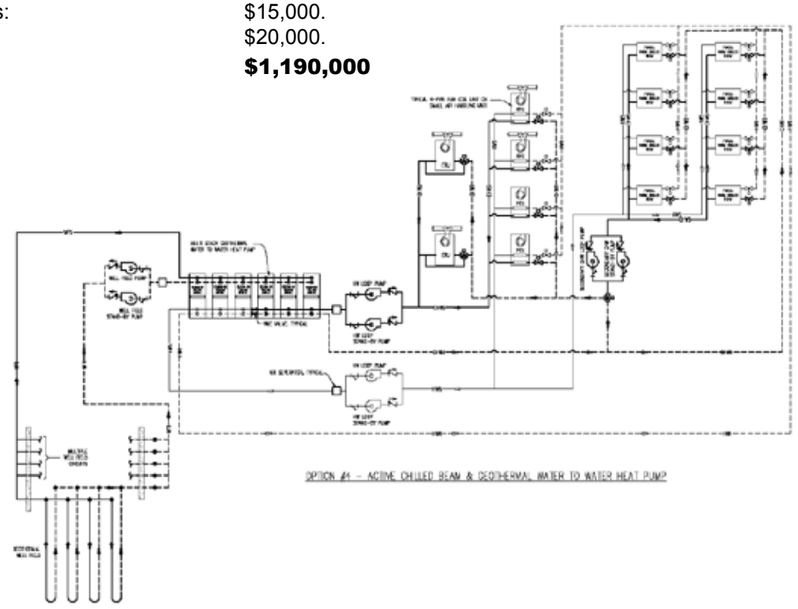
Division 15: approximately $51/s.f.
Division 16: approximately $29/s.f (combined price of $80/s.f.)

Costs include an allowance for the construction involved with an electrical service heavy-up and some site lighting. Utility connection and heavy-up fee are not included.

99,931 s.f. x $80 / s.f. = **$7,994,480**

B. HIGH PERFORMANCE CENTRAL PLANT REPLACEMENT:

Demolition (boilers, chiller, some piping):	$20,000.
Geothermal W/WSHP:	$360,000.
Geothermal Well field (for existing school):	$750,000.
Hydronic Modifications:	$25,000.
Electrical Modifications:	$15,000.
HVAC Controls:	$20,000.
Total Budget:	**$1,190,000**



OPTION #4 – ACTIVE CHILLED BEAM & GEOTHERMAL WATER TO WATER HEAT PUMP

MECHANICAL DESIGN NARRATIVE

I. SCOPE OF WORK - CONSTRUCTION OF ADDITIONS:

A. HVAC SYSTEM DESIGN INTRODUCTION:

For pricing considerations we are assuming the application of the highest performance HVAC system, Active Chilled Beams coupled with a Dedicated Outside Air System (DOAS) with a Geothermal Water to Water Heat Pump central plant.

This option has typically had the lowest first cost (when compared with similar high performance systems using a total building cost approach), lowest operating cost, and lowest life cycle cost.

B. DESCRIPTION OF THE ACTIVE CHILLED BEAMS AND GEOTHERMAL WATER TO WATER HEAT PUMP CENTRAL PLANT:

The proposed HVAC system uses a combination of well known HVAC system components in a grouping that leverages their individual traits to optimize the efficiencies of the associated components while providing superior indoor air quality at a reduced first, operating, and maintenance costs. This system option is comprised of three main component groups.

1. Dedicated Outside Air System (DOAS)
2. Active chilled beam.
3. Water-to-water geothermal heat pump plant

The hydronic system is comprised of:

1. (1) five module water to water heat pump unit at 70 tons per module with VME valving (nominal 350 tons).
2. Two 50 HP variable volume frame mounted end suction geothermal well field water pumps with variable frequency drives.
3. Two 25 HP variable volume frame mounted end suction chilled water loop pumps with variable frequency drives.
4. Two 20 HP variable volume frame mounted end suction heating water loop pumps with variable frequency drives.
5. Two 10 HP variable volume in-line secondary chilled water loop pumps with variable frequency drives.
6. 150 geothermal wells, each 450 feet deep, using 1-14” SDR-9 and 11 piping and high conductivity (1.2) bentonite grout.
7. A chilled water coil in the DOAS AHU, and four pipe AHU’s for the assembly areas. Hydronic heating units for heating only utility spaces.
8. A chilled beam(s) for each remaining occupied room.

ADVANTAGES:

1. Superior indoor air quality
2. The highest degree of zoning
3. Space by space heating or cooling on demand.
4. The elimination of approximately 50% of all ductwork when compared with other DOAS systems.
5. An efficiency improvement from the increased chilled water temperature difference.
6. Reduced chilled water pipe sizes
7. First cost and maintenance cost reduction on the electrical power distribution system
8. First cost and maintenance cost savings from the consolidation of all heating and cooling plant equipment
9. Reduction of required floor area dedicated to HVAC service.

Hoffman-Boston Elementary School

II. HIGH PERFORMANCE CENTRAL PLANT REPLACEMENT

The existing heating water plant was not replaced in the recently completed HVAC retrofit. Both boilers are in need of replacement. The building presently uses an air cooled chiller to produce chilled water. The condition of the chiller is unknown. Given that the boilers need to be replaced a replacement option is to utilize the same geothermal water to water source heat pump central plant arrangement. Under this approach the existing boilers and the one chiller would be demolished and be replaced with one unit comprised of approximately four 70 ton modules. All of the existing pumps would be reused and the hydronic piping would be modified so that both the heating water and chilled water loops are piped to the modular unit. The geothermal W/WSHP unit for the existing building can be co-located with the unit for the additions in the existing boiler room. Approximately 75 additional geothermal wells would be installed for the existing building load.

PLUMBING SCHEMATIC DESIGN NARRATIVE

III. SITE UTILITIES:

A. STORM AND SANITARY SEWER:

The plumbing design shall extend new storm and building sanitary sewer lines out five feet from the building additions, at points to connect to the respective on-site sewers extensions to be indicated on the civil plans.

B. COMBINED WATER SERVICE:

It appears that the existing water service may be sufficient for the proposed additions. A complete flow and pressure assessment will need to be conducted during design to confirm this and a fire hydrant flow test will be needed. The primary concern will be that the water pressure and flow in the existing street mains are adequate to extend the sprinkler system throughout the additions.

IV. POTABLE WATER SYSTEM:

This addition shall include a potable domestic water system serving all sinks, toilets, custodial needs, hose bibbs, heating and chilled water plant fill systems, and drinking water coolers/fountains.

V. DOMESTIC WATER HEATING SYSTEM:

The expanded hot water demand for the additions will be met with a new dedicated water heaters for the addition. A hot water return system with a recalculating pump shall be required for each water heater. Return pump requirements shall be determined by ASHRAE calculation methods. The on/off operation of the water circulation pump shall be controlled by time clock operation or by the Energy Management System.

VI. SANITARY AND STORM PIPING SYSTEM: New systems will be installed inside the building.

VII. PLUMBING FIXTURES/PLUMBING SPECIALTIES:

New plumbing fixtures are required throughout the proposed additions. Water closets shall be low water consumption dual-flush valve type with manual flush valves.

Urinals shall be waterless type.

Lavatories shall be manual two handle faucets and 0.5 gpm flow control aerators.

All plumbing fixtures and trim designed or designated for use by the handicapped shall meet the Americans with Disabilities Act guidelines.

Mop basins shall be floor-mounted with a wall-mounted faucet.

VIII. BUILDING FIRE PROTECTION SYSTEMS:

The building additions shall be fully sprinklered with a complete wet pipe fire suppression (sprinkler) system throughout via an extension of the existing system. This will require installing large diameter piping through portions of the existing building.

IX. ROOF DRAIN/STORM SEWER SYSTEMS:

The roof drainage system of the proposed additions will be comprised of piped roof drains with interior conductors. The new roofs require an emergency overflow roof drainage system. These roof areas will require a separately piped emergency drainage system which will spill out through the perimeter wall above grade. An alternative approach will be to use scuppers.

Hoffman-Boston Elementary School

ELECTRICAL DESIGN NARRATIVE:

I. **BUILDING UTILIZATION VOLTAGE AND SERVICE:** The existing service is approximately 2,000 amps utilizing one 1,200 amp and one 800 amp main switch with a building utilization voltage of 480Y/277V, 3 phase, 4 wire. Dry type transformers are utilized to transform power to 208Y/120V, 3- phase, 4 wire power for user equipment loads. An electrical service heavy-up will be required for the proposed additions.

II. **ELECTRICAL DISTRIBUTION:**

A. The existing switchgear need to be modified in the heavy-up. Additional 480 volt three phase loads will include the new geothermal W/WSHP equipment, building lighting at 277 volt, and new dry type transformers. Distribution (step down) transformers, where applied to serve branch circuit panels feeding sensitive electronic loads, shall be K-factor rated isolation type. K-factor rating shall be determined through systems analysis.

B. Transient voltage surge protection shall be provided on the main switchboard, and on branch circuit panels serving electronic equipment. Additional TVSS units may be applied to distribution panels as well.

C. Current carrying conductors shall be a minimum No. 12 American Wire Gauge. Conductors shall only be copper. Conductor size No. 12 and No. 10 may be stranded or solid type. Conductors No. 8 or larger shall be stranded.

D. Current carrying conductors shall be installed in conduit systems conforming to the National Electrical Code. Type MC cable will be allowed for lighting circuits (not including the homerun) above accessible ceilings only.

III. **LIGHTING DESIGN:**

A. GENERAL DESIGN THEME:
1. All classrooms are proposed to be illuminated with direct/indirect pendants with recessed fixtures with an asymmetrical distribution pattern located above the whiteboards.
2. General work spaces, admin areas and corridors will utilize 2 x 4, 32 watt, 3 lamp fixtures parabolic fixtures.
3. The exit signs will utilize LED lamps.
4. All back of house and service spaces are lit by either 2x4 lensed troffers or 2 lamp 4' industrial strip fixtures.

B. SITE LIGHTING DESIGN:
1. SECURITY LIGHTING: Additional wall-mounted or recessed light fixtures will be required to be installed directly above or adjacent to new exit doors.
2. DRIVES & PARKING AREAS: Modifications to drive and parking areas will require additional site lighting to achieve a minimum illumination level of 0.5 footcandles.
3. CONTROLS: All exterior lighting will be controlled by a combination of a time clock and building mounted photocell. A single set of controls shall switch all exterior lighting via relays.

C. LIFE SAFETY AND SECURITY LIGHTING FEATURES: Normal illumination of the means of egress will be provided throughout the building and to the public way. This will require additional loading of the emergency generator which will most likely involve replacing the existing unit with a larger generator.

IV. **WIRING DEVICES:** New electric and data outlets will be provided per code and as required by the Owner and the Educational Specifications.

V. **PHOTOVOLTAIC SYSTEM:** We are proposing that the school utilize a photovoltaic system provided via a contract with an outside company who provides the PV system and the Owner buys the power at a rate less than the current PEPCO utility cost via a Power Purchase Agreement (PPA). This will essentially be a zero cost system.

VI. **FIRE ALARM SYSTEM:** The existing fire alarm system is an addressable type which was recently installed. This system appears to be expandable to incorporating additional activation devices associated with the additions, such as pull stations, smoke detectors, flow switches, duct detectors, etc., and audio visual devices such as horns and strobes. Audible notification shall be voice type. Fire alarm pull stations shall be located at all required exit doors.

VII. **TELEPHONE SYSTEM:**

A. INCOMING TELEPHONE SERVICE: No changes are required

B. TELEPHONE OUTLETS AND LOCATIONS: Additional telephone outlet locations shall be provided throughout the addition coordinated with the Educational Specification and County School design guidelines. Expansion cards will be required in the telephone controller.

VIII. **VIDEO DISTRIBUTION SYSTEM:** The existing broadband coaxial cable system will be expanded into the new additions.

IX. **DATA/COMPUTER NETWORK:** Additional Intermediate Distribution Frame (IDF) closets will be provided in the additions with routers and patch panels to support new cat 6A wiring to jacks to all the new instructional and support spaces.

X. **SECURITY SYSTEMS:** The existing security system shall be extended throughout the new additions.

XI. **CENTRAL SOUND SYSTEM/PUBLIC ADDRESS SYSTEM:** The existing Public Address system will be expanded and extended throughout the new additions. Weatherproof exterior horns will be provided and protected with wire guards on the outside of new structures. All other areas will have speakers recessed in ceilings. Call back switches will be provided in all instructional areas, offices, staff work rooms, and the media center. Private offices will be provided with local wall mounted voice controls.

XII. **TECHNOLOGY:** A center hung cable tray will be provided above corridor ceilings of academic wings and other similar spaces to facilitate technology related cable systems throughout the additions.

Hoffman-Boston Elementary School

Perkins Eastman

3-D IMAGE

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Drew Model School

Option 1: New Building Creates Neighborhood Center

Option 2: Addition to the Existing School

Drew Model School

The existing Drew campus presents two opportunities: the creation of a new stand alone elementary school building or the expansion of the existing Drew Model School building. The current school houses approximately 590 students in both “graded” and Montessori programs of approximately equal enrollment. The campus also includes the Drew Community Center which features a gym and cafeteria that are jointly used by the school. Due to recent growth the school has also taken over space previously used by an adult education program.

The first option, a proposed new building concept:

- Provides the resources for a separate 600-student elementary school;
- Creates a campus setting with the existing Drew Elementary School Building;
- Establishes the civic presence of the campus on S. Kenmore Street;
- Provides the opportunity to use the topography along S. Kenmore to provide structured parking below the building, maximizing, outdoor play space;

The second option, the proposed addition concept:

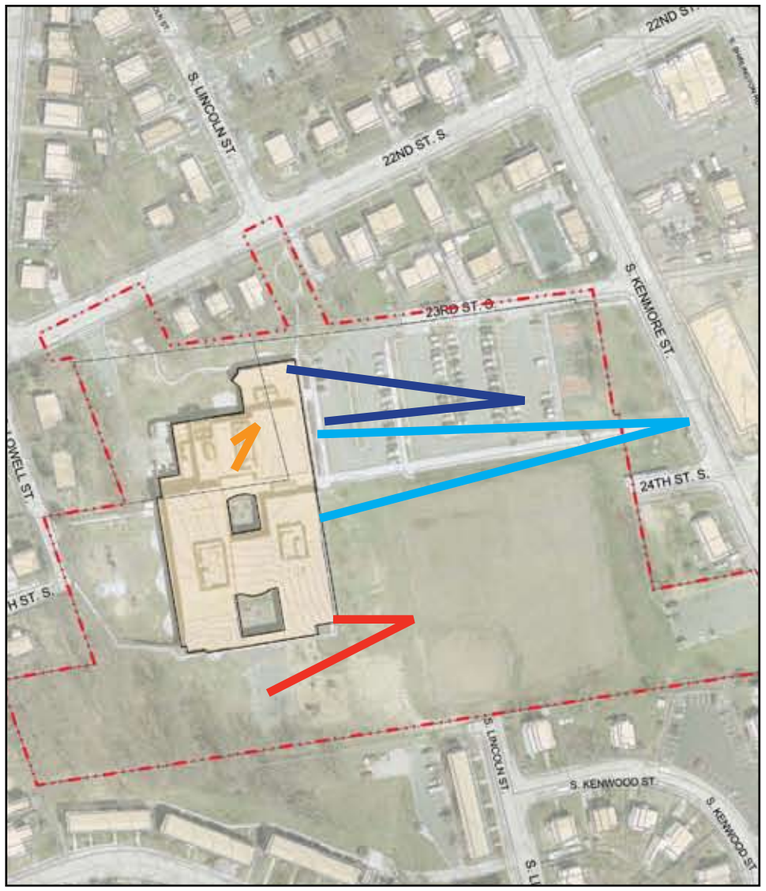
- Expands the existing building using its current corridor and courtyard configuration;
- Addresses the considerable elevation change on the west side of the site around the building;
- Enhances the underutilized south facing courtyard;
- Integrates the former adult education space that is current disconnected from the rest of the building.

Both options:

- Expand surface parking on-site by extending S. Lincoln Street onto the site from the north, creating a new, more efficient, bus drop off and enabling the reallocation of the current bus drop paved surface to additional parking.

As shown in the concept the site would allow for an addition of up to approximately 57,000 GSF bringing the total area of the existing building to approximately 157,000 GSF or a new building of 94,000 GSF. In addition to accommodating significant additional enrollment on campus, the concepts would also be able to support APS’ sustainable, high performance building goals. For example, mechanical options for the site include the potential to utilize a ground source heat pump system with active chilled beams for the new construction and to use this system to also modernize the existing mechanical plant. Photovoltaics could also be utilized through a Power Purchase Agreement.

Further due diligence investigation of these sites would include geotechnical engineering to determine subsurface soil bearing capacity. Consideration should also be given to the acquisition of the properties located along the S. Kenmore Street frontage to expand outdoor space on campus.



View of front door from parking lot

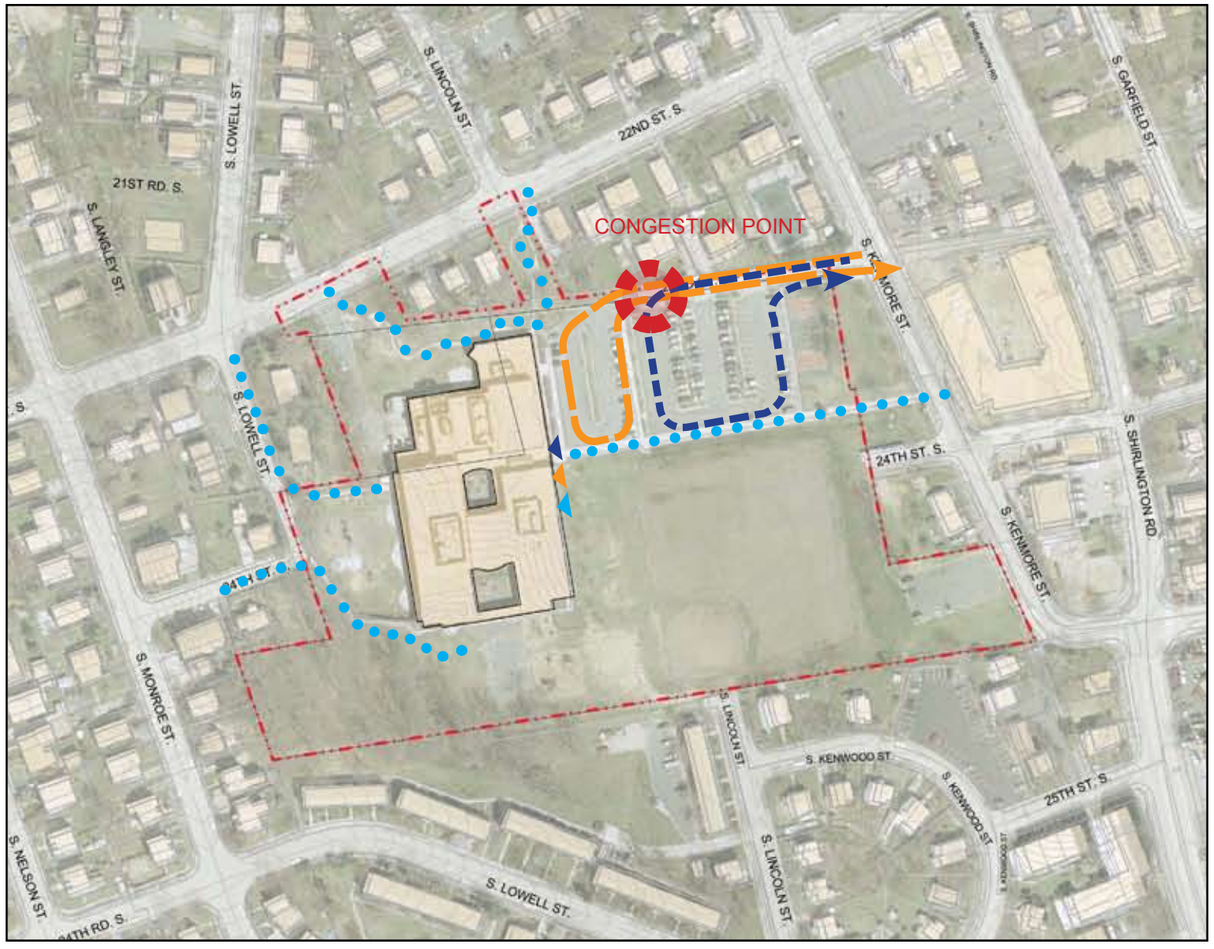
Location for possible addition

Cafeteria / Multi-purpose Room

Entrance gate at pedestrian access

Drew Model School

	Building Sq.Ft.	School Site Sq. Ft.	Building Footprint Sq.Ft.	Playground Sq. Ft.	Play Field Sq. Ft.	Blacktop Sq. Ft.	Parking Sq. Ft.	Parking Spaces	Relocatable Sq. Ft.	Open Area Sq. Ft.
Existing	100,815	434,534	60,804	34,841**	84,899**	15,842**	54,182**	92**	0**	183,966**
Option 1 (New Building)	94,270	103,560	54,600					223***		
Option 2 (Addition)	57,350	no change	32,525 (addition)					155		



TOPOGRAPHY: LIGHT GREEN INDICATES HIGHER ELEVATION

** Estimates based on 2009 aerial photographs

*** 99 spaces under new building, 124 spaces in shared parking lot

EXISTING

RENOVATION

NEW

BUS LOOP

PARENT DROP OFF/ PICK UP

PEDESTRIAN

0 50 100 200

1" = 100'

N

Perkins Eastman

EXISTING CONDITIONS ANALYSIS

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Drew Model School

Option 1: New School Building

EXISTING

RENOVATION

NEW

BUS LOOP

PARENT DROP OFF/ PICK UP

PEDESTRIAN

0 100 200 400

1" = 200'

N

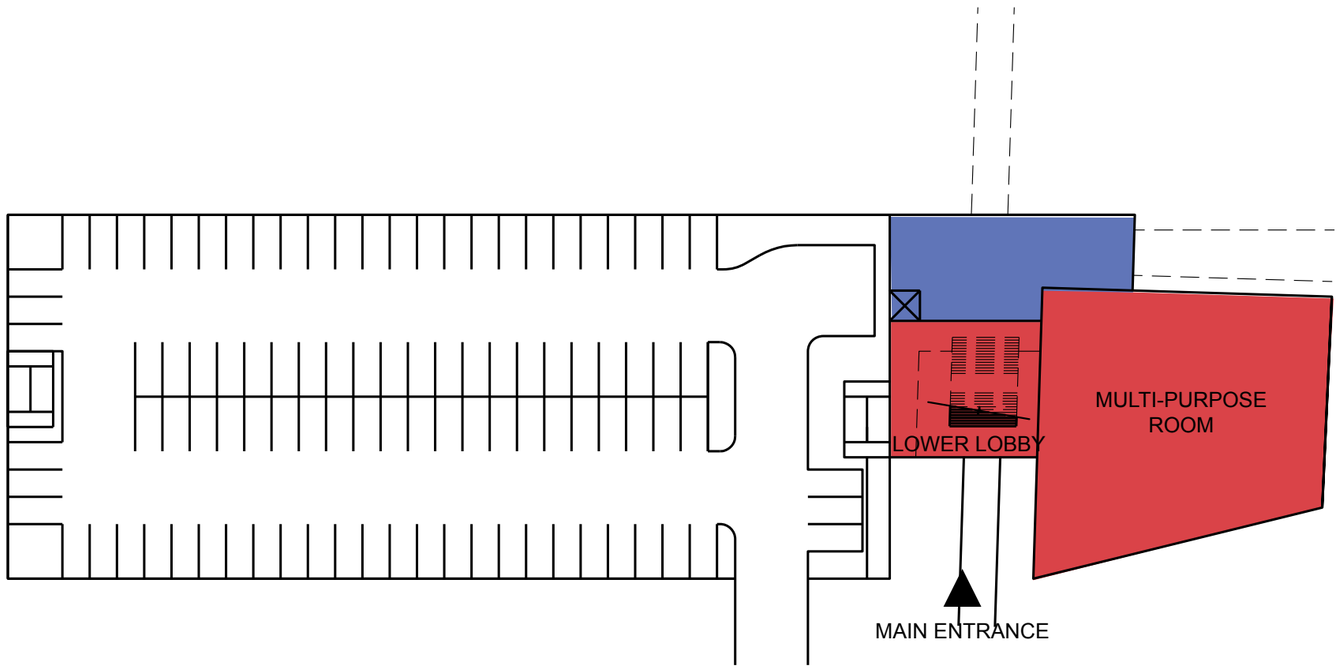
Perkins Eastman

ILLUSTRATIVE SITE PLAN

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Drew Model School

Option 1: New School Building



CLASSROOM

CORE SPACES

SERVICE/SUPPORT

0 25 50 100

1″ = 50′

N

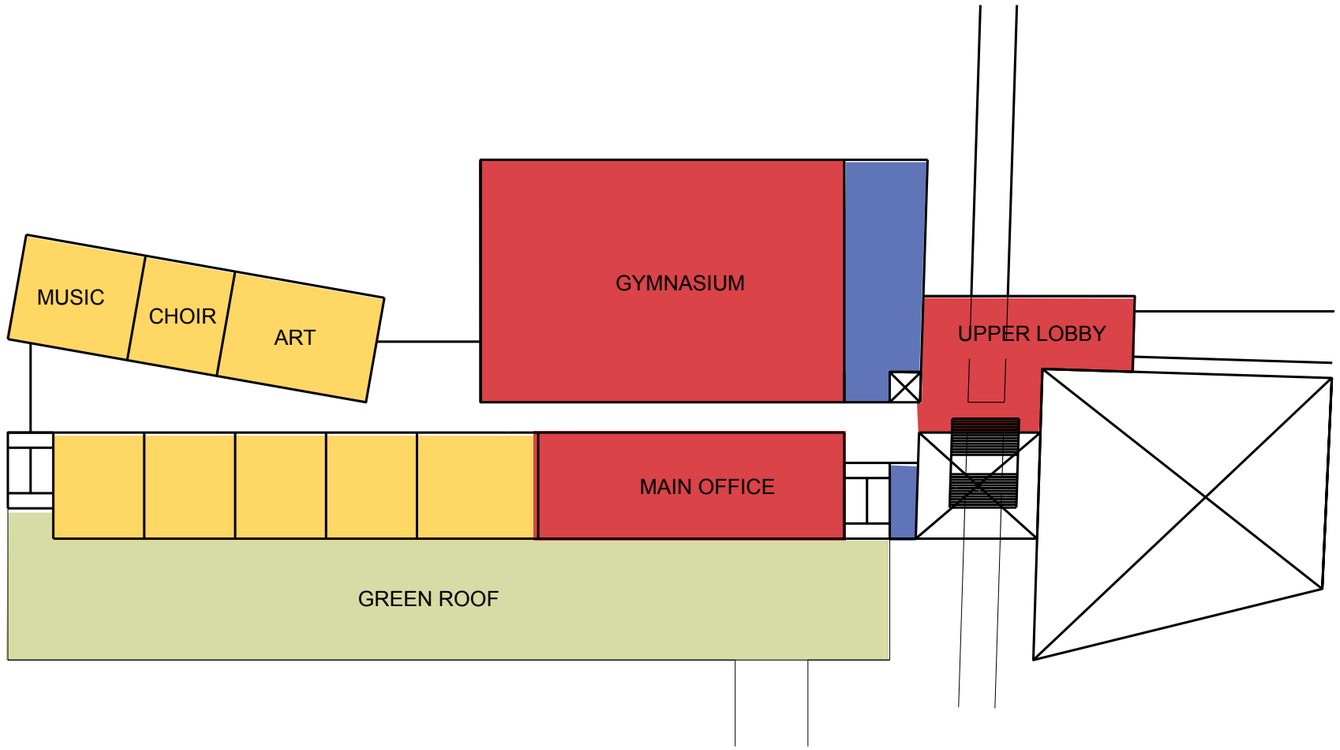
Perkins Eastman

LOWER LEVEL PLAN

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Drew Model School

Option 1: New School Building



CLASSROOM

CORE SPACES

SERVICE/SUPPORT

0 25 50 100

1" = 50'

N

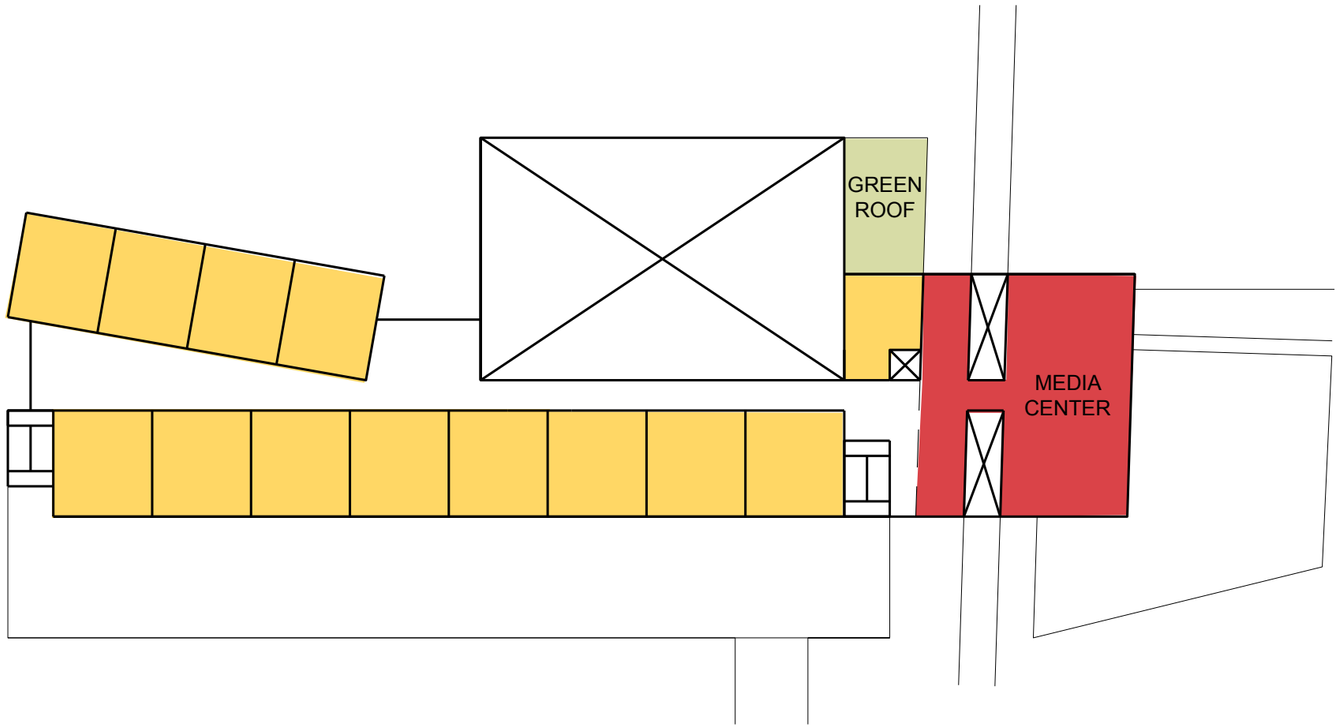
Perkins Eastman

FIRST FLOOR PLAN

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Drew Model School

Option 1: New School Building



CLASSROOM

CORE SPACES

SERVICE/SUPPORT

0 25 50 100

1" = 50'

N

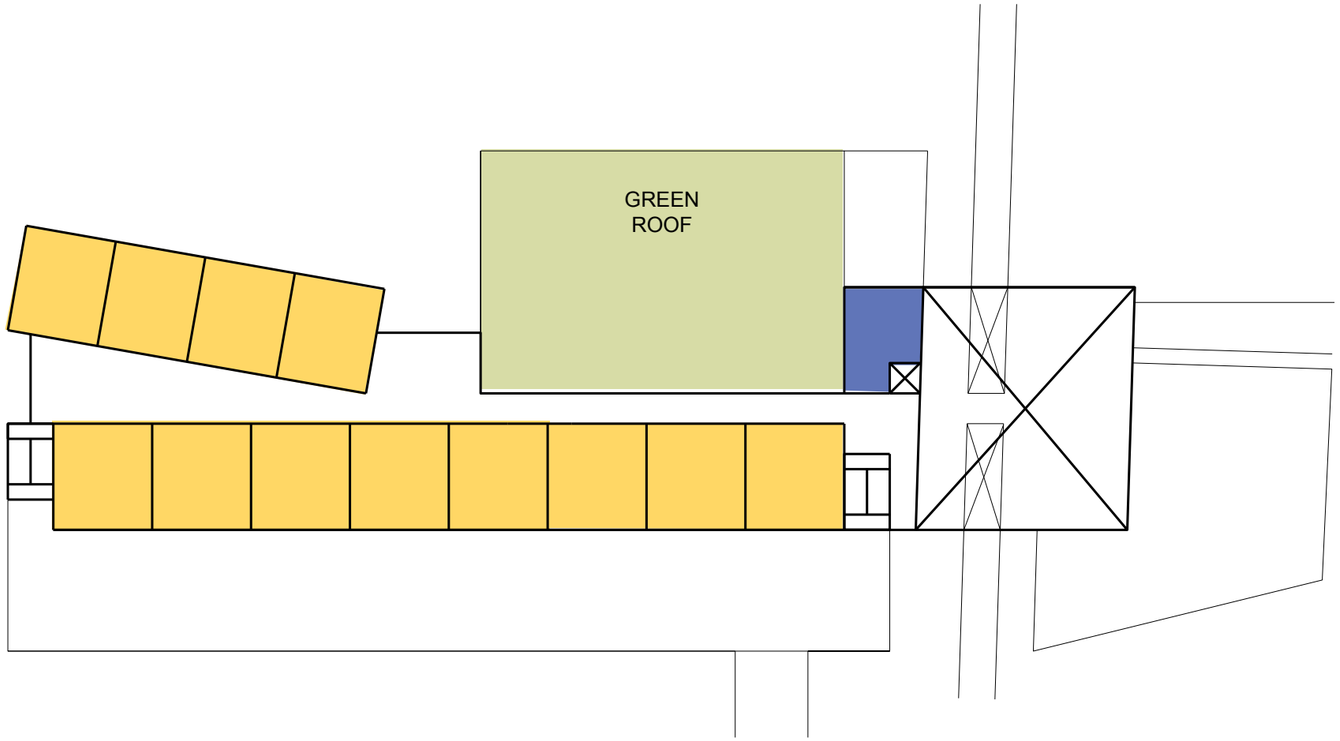
Perkins Eastman

SECOND FLOOR PLAN

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Drew Model School

Option 1: New School Building



CLASSROOM

CORE SPACES

SERVICE/SUPPORT

0 25 50 100

1″ = 50′

N

Perkins Eastman

THIRD FLOOR PLAN

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Drew Model School

Option 1: New School Building

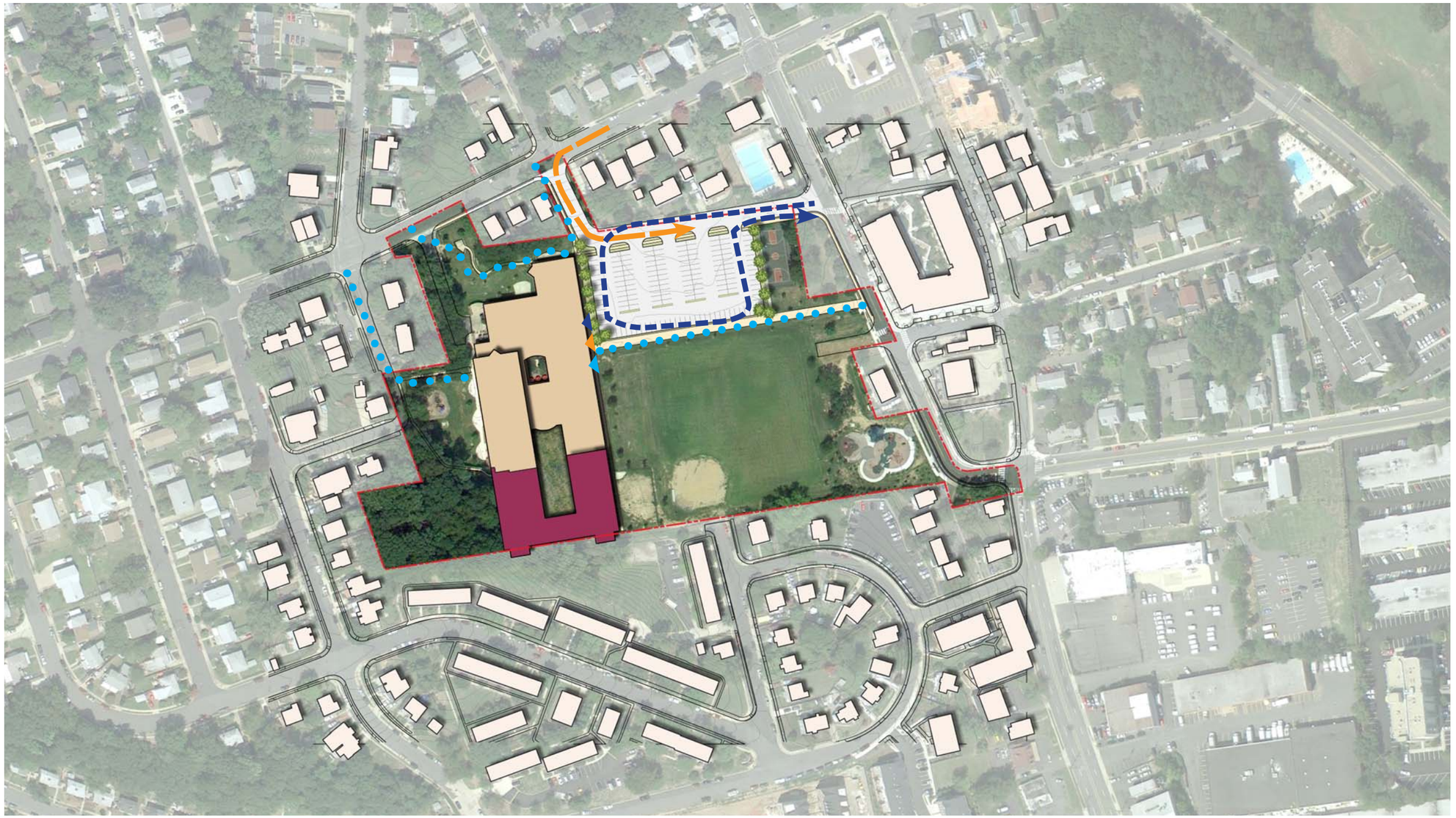
Perkins Eastman

3-D IMAGE

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Drew Model School

Option 2: Addition to the Existing Building



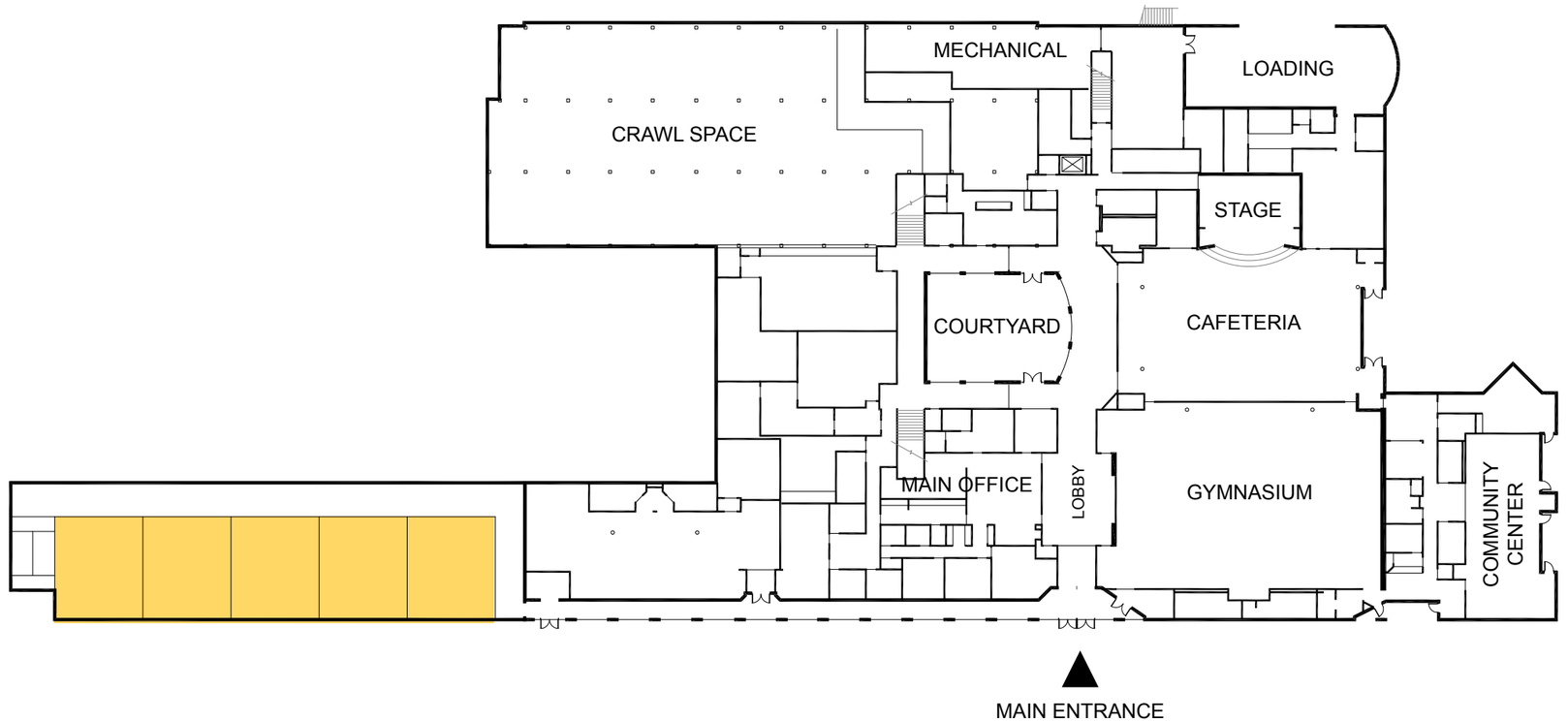
Perkins Eastman

ILLUSTRATIVE SITE PLAN

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Drew Model School

Option 2: Addition to the Existing Building



CLASSROOM

CORE SPACES

SERVICE/SUPPORT

0 25 50 100

1" = 50'

N

Please note: Plan north is to the right.

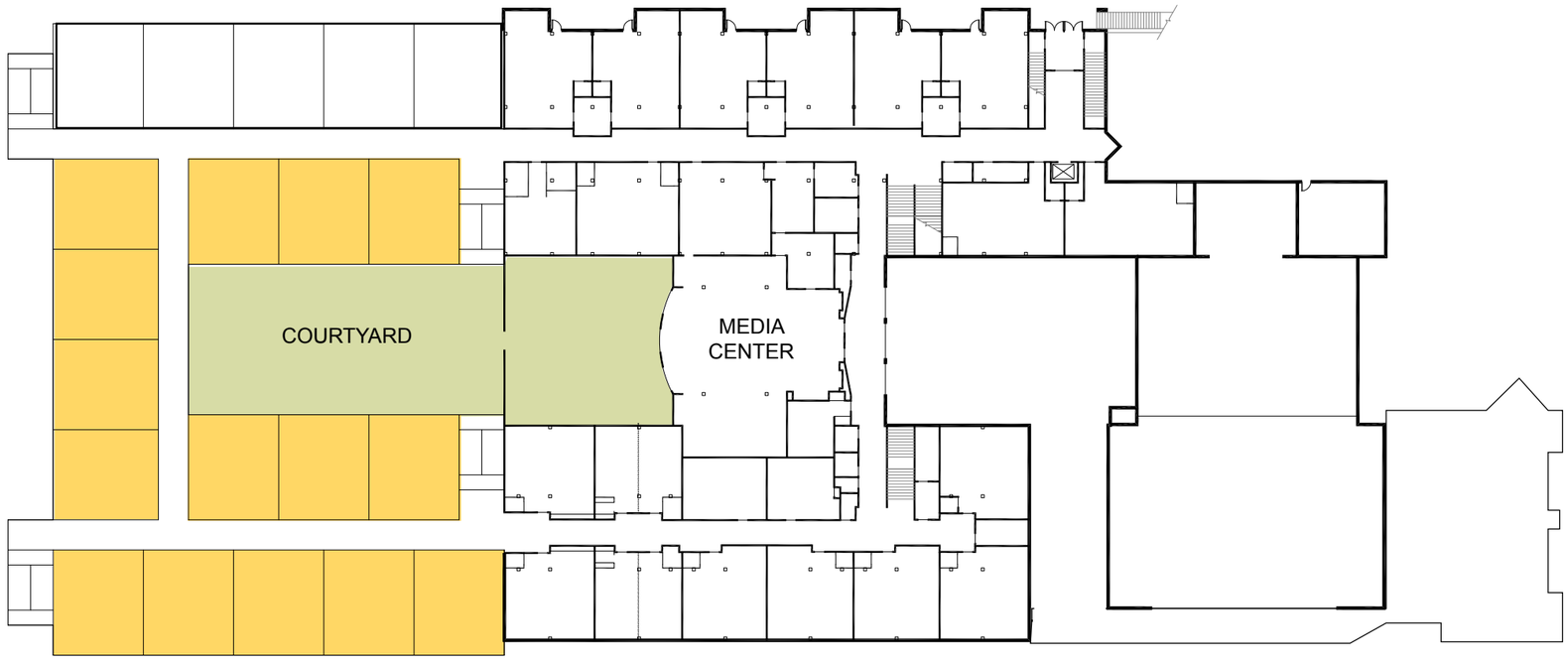
Perkins Eastman

FIRST FLOOR PLAN

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Drew Model School

Option 2: Addition to the Existing Building



CLASSROOM

CORE SPACES

SERVICE/SUPPORT

0 25 50 100

1″ = 50′

N

Please note: Plan north is to the right.

Perkins Eastman

SECOND FLOOR PLAN

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Drew Model School

Option 2: Addition to the Existing Building

CLASSROOM

CORE SPACES

SERVICE/SUPPORT

0 25 50 100

1" = 50'

N

Please note: Plan north is to the right.

Perkins Eastman

THIRD FLOOR PLAN

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Drew Model School

Option 2: Addition to the Existing Building

Perkins Eastman

3-D IMAGE

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Drew Model School

OVERALL COST DISCUSSION

I. BUDGET ESTIMATE

There are two options under consideration; first the construction of 57,350 s.f. addition, and second the construction of a 92,470 s.f. new building.

A. CONSTRUCTION OF ADDITION (MPE):

Division 15: approximately $51/s.f
Division 16: approximately $29/s.f. (combined price of $80/s.f.)

This figure includes an allowance for the construction involved with an electrical service heavy-up and some site lighting. Utility connection and heavy-up fee are not included.

57,350 s.f. x $80 / s.f. = **$4,588,000**

B. CONSTRUCTION OF A NEW BUILDING (MPE):

Division 15: approximately $51/s.f.
Division 16: approximately $29/s.f. (combined price of $80/s.f.)

This figure includes an allowance for the construction involved with an electrical service heavy-up and some site lighting. Utility connection and heavy-up fee are not included.

92,470 s.f. x $80 / s.f. = **$7,397,600**

Drew Model School

MECHANICAL DESIGN NARRATIVE

I. SCOPE OF WORK - CONSTRUCTION OF ADDITIONS:

A. HVAC SYSTEM DESIGN INTRODUCTION:

For pricing considerations we are assuming the application of the highest performance HVAC system, Active Chilled Beams coupled with a Dedicated Outside Air System (DOAS) with a Geothermal Water to Water Heat Pump central plant.

This option has typically had the lowest first cost (when compared with similar high performance systems using a total building cost approach), lowest operating cost, and lowest life cycle cost.

B. DESCRIPTION OF THE ACTIVE CHILLED BEAMS AND GEOTHERMAL WATER TO WATER HEAT PUMP CENTRAL PLANT:

The proposed HVAC system uses a combination of well known HVAC system components in a grouping that leverages their individual traits to optimize the efficiencies of the associated components while providing superior indoor air quality at a reduced first, operating, and maintenance costs. This system option is comprised of three main component groups.

1. Dedicated Outside Air System (DOAS)
2. Active chilled beam.
3. Water-to-water geothermal heat pump plant

The hydronic system is comprised of:

1. (1) five module water to water heat pump unit at 70 tons per module with VME valving (nominal 350 tons).
2. Two 50 HP variable volume frame mounted end suction geothermal well field water pumps with variable frequency drives.
3. Two 25 HP variable volume frame mounted end suction chilled water loop pumps with variable frequency drives.
4. Two 20 HP variable volume frame mounted end suction heating water loop pumps with variable frequency drives.
5. Two 10 HP variable volume in-line secondary chilled water loop pumps with variable frequency drives.
6. 150 geothermal wells, each 450 feet deep, using 1-14” SDR-9 and 11 piping and high conductivity (1.2) bentonite grout.
7. A chilled water coil in the DOAS AHU, and four pipe AHU’s for the assembly areas. Hydronic heating units for heating only utility spaces.
8. A chilled beam(s) for each remaining occupied room.

ADVANTAGES:

1. Superior indoor air quality
2. The highest degree of zoning
3. Space by space heating or cooling on demand.
4. The elimination of approximately 50% of all ductwork when compared with other DOAS systems.
5. An efficiency improvement from the increased chilled water temperature difference.
6. Reduced chilled water pipe sizes
7. First cost and maintenance cost reduction on the electrical power distribution system
8. First cost and maintenance cost savings from the consolidation of all heating and cooling plant equipment
9. Reduction of required floor area dedicated to HVAC service.

II. SCOPE OF WORK - CONSTRUCTION OF NEW BUILDING

The option of constructing a new building would utilize the same HVAC system approach. The primary difference will be the system capacities. The system would be comprised of the following:

A. (1) five module water to water heat pump unit at 70 tons per module with VME valving (nominal 350 tons).
B. Two 50 HP variable volume frame mounted end suction geothermal well field water pumps with variable frequency drives.
C. Two 25 HP variable volume frame mounted end suction chilled water loop pumps with variable frequency drives.
D. Two 20 HP variable volume frame mounted end suction heating water loop pumps with variable frequency drives.
E. Two 10 HP variable volume in-line secondary chilled water loop pumps with variable frequency drives.
F. 120 geothermal wells, each 450 feet deep, using 1-14” SDR-9 and 11 piping and high conductivity (1.2) bentonite grout.
G. A 21,000 cfm DOAS AHU
H. AHU’s for the assembly area.
I. Hydronic heating units for heating only utility spaces.
J. A chilled beam(s) for each remaining occupied room.

Drew Model School

PLUMBING SCHEMATIC DESIGN NARRATIVE

I. SCOPE OF WORK - CONSTRUCTION OF ADDITION:

A. STORM AND SANITARY SEWER:

The plumbing design shall extend new storm and building sanitary sewer lines out five feet from the building additions, at points to connect to the respective on-site sewers extensions to be indicated on the civil plans.

B. COMBINED WATER SERVICE:

It appears that the existing water service may be sufficient for the proposed additions. A complete flow and pressure assessment will need to be conducted during design to confirm this and a fire hydrant flow test will be needed. The primary concern will be that the water pressure and flow in the existing street mains are adequate to extend the sprinkler system throughout the additions.

C. POTABLE WATER SYSTEM:

This addition shall include a potable domestic water system serving all sinks, toilets, custodial needs, hose bibbs, heating and chilled water plant fill systems, and drinking water coolers/fountains.

D. DOMESTIC WATER HEATING SYSTEM:

The expanded hot water demand for the additions will be met with a new dedicated water heaters for the addition. A hot water return system with a recalculating pump shall be required for each water heater. Return pump requirements shall be determined by ASHRAE calculation methods. The on/off operation of the water circulation pump shall be controlled by time clock operation or by the Energy Management System.

E. SANITARY AND STORM PIPING SYSTEM: New systems will be installed inside the building.

F. PLUMBING FIXTURES/PLUMBING SPECIALTIES:

New plumbing fixtures are required throughout the proposed additions. Water closets shall be low water consumption dual-flush valve type with manual flush valves.

Urinals shall be waterless type.

Lavatories shall be manual two handle faucets and 0.5 gpm flow control aerators.

All plumbing fixtures and trim designed or designated for use by the handicapped shall meet the Americans with Disabilities Act guidelines.

Mop basins shall be floor-mounted with a wall-mounted faucet.

G. BUILDING FIRE PROTECTION SYSTEMS:

The building additions shall be fully sprinklered with a complete wet pipe fire suppression (sprinkler) system throughout via an extension of the existing system. This will require installing large diameter piping through portions of the existing building.

H. ROOF DRAIN/STORM SEWER SYSTEMS:

The roof drainage system of the proposed additions will be comprised of piped roof drains with interior conductors. The new roofs require an emergency overflow roof drainage system. These roof areas will require a separately piped emergency drainage system which will spill out through the perimeter wall above grade. An alternative approach will be to use scuppers.

II. SCOPE OF WORK - CONSTRUCTION OF NEW BUILDING:

The construction of a new building will utilize all of the same above listed systems except they will be new independent systems.

A new 8 inch combined domestic and fire water service will be required.

Drew Model School

ELECTRICAL DESIGN NARRATIVE:

I. SCOPE OF WORK - CONSTRUCTION OF ADDITION:

A. BUILDING UTILIZATION VOLTAGE AND SERVICE: The existing service is 2,000 amps utilizing with a building utilization voltage of 480Y/277V, 3 phase, 4 wire. Dry type transformers are utilized to transform power to 208Y/120V, 3- phase, 4 wire power for user equipment loads. An electrical service heavy-up will be required for the proposed additions.

B. ELECTRICAL DISTRIBUTION:

1. The existing switchgear need to be modified in the heavy-up. Additional 480 volt three phase loads will include the new geothermal W/WSHP equipment, building lighting at 277 volt, and new dry type transformers. Distribution (step down) transformers, where applied to serve branch circuit panels feeding sensitive electronic loads, shall be K-factor rated isolation type. K-factor rating shall be determined through systems analysis.
2. Transient voltage surge protection shall be provided on the additional sections of the main switchboard, and on branch circuit panels serving electronic equipment. Additional TVSS units may be applied to distribution panels as well.
3. Current carrying conductors shall be a minimum No. 12 American Wire Gauge. Conductors shall only be copper. Conductor size No. 12 and No. 10 may be stranded or solid type. Conductors No. 8 or larger shall be stranded.
4. Current carrying conductors shall be installed in conduit systems conforming to the National Electrical Code. Type MC cable will be allowed for lighting circuits (not including the homerun) above accessible ceilings only.

C. LIGHTING DESIGN:

1. GENERAL DESIGN THEME:
   - a. All classrooms are proposed to be illuminated with direct/indirect pendants with recessed fixtures with an asymmetrical distribution pattern located above the whiteboards.
   - b. General work spaces, admin areas and corridors will utilize 2 x 4, 32 watt, 3 lamp fixtures parabolic fixtures.
   - c. The exit signs will utilize LED lamps.
   - e. All back of house and service spaces are lit by either 2x4 lensed troffers or 2 lamp 4' industrial strip fixtures.

2. SITE LIGHTING DESIGN:
   - a. SECURITY LIGHTING: Additional wall-mounted or recessed light fixtures will be required to be installed directly above or adjacent to new exit doors.
   - b. DRIVES & PARKING AREAS: Modifications to drive and parking areas will require additional site lighting to achieve a minimum illumination level of 0.5 footcandles.
   - c. CONTROLS: All exterior lighting will be controlled by a combination of a time clock and building mounted photocell. A single set of controls shall switch all exterior lighting via relays.

3. LIFE SAFETY AND SECURITY LIGHTING FEATURES: Normal illumination of the means of egress will be provided throughout the building and to the public way. This will require additional loading of the emergency generator which will most likely involve replacing the existing unit with a larger generator.

D. WIRING DEVICES: New electric and data outlets will be provided per code and as required by the Owner and the Educational Specifications.

E. PHOTOVOLTAIC SYSTEM: We are proposing that the school utilize a photovoltaic system provided via a contract with an outside company who provides the PV system and the Owner buys the power at a rate less than the current PEPCO utility cost via a Power Purchase Agreement (PPA). This will essentially be a zero cost system.

G. FIRE ALARM SYSTEM: The existing fire alarm system is an addressable type which was recently installed. This system appears to be expandable to incorporating additional activation devices associated with the additions, such as pull stations, smoke detectors, flow switches, duct detectors, etc., and audio visual devices such as horns and strobes. Audible notification shall be voice type. Fire alarm pull stations shall be located at all required exit doors.

G. TELEPHONE SYSTEM:

1. INCOMING TELEPHONE SERVICE: No changes are required
2. TELEPHONE OUTLETS AND LOCATIONS: Additional telephone outlet locations shall be provided throughout the addition coordinated with the Educational Specification and County School design guidelines. Expansion cards will be required in the telephone controller.

H. VIDEO DISTRIBUTION SYSTEM: The existing broadband coaxial cable system will be expanded into the new additions.

I. DATA/COMPUTER NETWORK: Additional Intermediate Distribution Frame (IDF) closets will be provided in the additions with routers and patch panels to support new cat 6A wiring to jacks to all the new instructional and support spaces.

J. SECURITY SYSTEMS: The existing security system shall be extended throughout the new additions.

K. CENTRAL SOUND SYSTEM/PUBLIC ADDRESS SYSTEM: The existing Public Address system will be expanded and extended throughout the new additions. Weatherproof exterior horns will be provided and protected with wire guards on the outside of new structures. All other areas will have speakers recessed in ceilings. Call back switches will be provided in all instructional areas, offices, staff work rooms, and the media center. Private offices will be provided with local wall mounted voice controls.

L. TECHNOLOGY: A center hung cable tray will be provided above corridor ceilings of academic wings and other similar spaces to facilitate technology related cable systems throughout the additions.

II. SCOPE OF WORK - CONSTRUCTION OF NEW BUILDING:

The construction of a new building will utilize all of the same above listed systems except they will be new independent systems. A new 600 amp 480Y277 volt three phase four wire service with a pad mounted transformer will be required. Site lighting modification for new drive areas will also be required.