Appendix A: Design Reports

Appendix A: Arlington Science Focus (2017)

ARLINGTON PUBLIC SCHOOLS

TASK #2—ARLINGTON SCIENCE FOCUS ELEMENTARY

Feasibility Study Revised 8/25/17

BRAILSFORD & DUNLAVEY

Hanscomb Consulting

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1. EXECUTIVE SUMMARY

In response to the challenges of enrollment growth and limited land resources in Arlington County, Arlington Pubic Schools ("APS") wanted to determine the feasibility of expanding its student capacity at Arlington Science Focus School by four (4) or more classrooms. The project team conducting the assessment was tasked with evaluating the existing 1998 design - to convert an existing crawl space into four (4) classrooms. As this design was bid to the market in 2015 and came in well above budget, the team was asked to explore creative cost-saving ideas to make this option feasible. In addition, the task included exploring other options for expansion, analyzing the results to determine feasibility and viability, and providing conclusions and recommendations to APS for a proposed expansion.

Approach:

The project team consisted of program managers Brailsford & Dunlavey, Inc. and construction consultants Hanscomb Consulting, Inc. The project team coordinated with APS, structural engineers Ehlert Bryan, and geotechnical engineers Haley Aldrich to determine the feasibility of the proposed options.

The project team conducted site visits, gathered information from APS and the school, and studied the site and building conditions, as well as other pertinent information such as the existing structural, architectural, and topographical drawings. Based on existing documentation and feedback from APS, the project team developed and vetted possibilities and arrived at a total of seven (7) potential options for expansion.

At a programmatic level, a layout plan was developed for each option and analyzed from both an architectural and structural perspective to determine constructability, efficiency, and viability. As part of the conceptual analysis, the project team developed the following for each option:

- Scope of work
- Location plan
- Site access and logistics plan
- Structural review and analysis
- Conceptual level schedule
- Programmatic/conceptual budget estimate
- List of major pros and cons

A total project cost estimate for each option is provided based on the scope of work developed. The total project cost estimate includes the following assumptions:

- Design contingency: 10%
- General conditions, bond, insurance, overhead, and profit: 15.75%
- Escalation to mid-point of construction: 3% per year compounded
- Construction contingency: 10%
- Soft costs: 25%
- Owner's contingency: 10%

Note that these percentages are based on assumptions made at the time of this report for the purposes of comparing total project cost for each option. However, the actual percentages could vary based on a variety of factors, including but not limited to market conditions and schedule.

For Options 2-4, and for comparison purposes, the estimated construction cost and schedule are based on the approval of a new or amended Use Permit, design and construction permitting within a fifteen (15) month time frame. However, please note this process could take up to 18-24 months, which will . influence the proposed project completion date, and escalate the project cost.

Viable Options:

While a more detailed description is provided later in the full report a general description of the options and results of the analysis is as follows:

Option 1 is a proposed conversion of a crawl space under an existing set of four (4) classrooms into four (4) additional classrooms. Option 1 requires underpinning of existing foundation walls, special temporary shoring of the structure in order to modify existing foundations, and support of excavation in the courtyard in order to construct a new exterior wall, which would allow daylight into the classrooms.
Based on bids received in 2015 for the existing design, the total project cost of Option 1 is estimated at $7.3 Million. The higher per-seat cost is mainly due to the increased risks involved with a very restrictive schedule, special construction techniques, manual work associated with underpinning and excavation. After review of the design and constructability by the project team, it was concluded that most elements of the construction would have to be implemented as designed, and around 10–15% in potential cost savings could be achieved through alternate

means and methods of construction. These ideas included alternate means of shoring and support of excavation. Option 1 is the highest cost at $79,137 per added seat (based on 23.33 students per classroom).

Option 2 (A-C) is a stand-alone building addition in the existing recreation area located on the south side of the school adjacent to the existing gymnasium. The new addition would displace the existing relocatable classrooms, proposed to be moved to the existing blacktop play area to execute option 2.

The following variations of option 2 are included in this report:

- Option 2a - one- (1-) story, four- (4-) classroom building addition
- Option 2b - one- (1-) story, six- (6-) classroom building addition
- Option 2c - two- (2-) story, twelve- (12-) classroom building addition

Total project costs for these variations are estimated at $5 Million, $5.9 Million, and $9.5 Million, respectively. The cost per added seat for these variations are $54,533, $42,214, and $33,992, respectively. The pros and cons of Options 2a, 2b, and 2c—all of which are less expensive than Option 1—are worth considering as possible solutions based on the school's capacity needs.

Each of these Option 2 variations would require a Use Permit approval; therefore, construction would probably not be able to start until two years after project initiation. This extended timeline provides an opportunity to plan and execute the relocation of the existing demountable classrooms during the summer break session prior to construction. The relocation of existing classrooms and construction of a new addition will not impact the existing school capacity. Also, the construction of the new addition and independent structure can be accomplished more safely, with minimal impact on the operations of the main school building.

Option 3 is an independent, 10,340 SF two- (2) story building constructed on the wooded property located to the north of the existing school building. Site access for construction would be from north Kirkwood Road, which would minimize impact to the existing school building considerably. However, the site has a challenging topography, which adds significant cost for site logistics, grading, and foundations for the building. Based on access and egress issues on site, a two- (2) story building with a relatively small footprint should be considered for ten (10) classrooms.

The total project cost for Option 3 is estimated at $8.3 Million, which equates to approximately $35,801 per added seat, which is comparable to Option 2c in terms of price. While site work costs in Option 3 are higher than Option 2c, there are no additional costs to move relocatable classrooms.

Required Use Permit approval, topography, and access issues may extend the projected fourteen- (14) month schedule and substantial completion to at least 2020 for Option 3.

Option 4 is a vertical addition on top of the one- (1-) story existing wing along the east side of the existing school building. Option 4 has the following two variations.

- Option 4a is a one- (1-) story vertical addition with five (5) additional classrooms
- Option 4b is a two- (2-) story addition on top of the one- (1-) story existing wing, with nine (9) additional classrooms

Options 4a and 4b require the existing one- (1-) story wing to be demolished and rebuilt to accommodate additional floors considering the existing structure cannot accommodate vertical expansion. The area of construction is relatively isolated to the back of the school and can be constructed with only moderate impact to school operations. Access is anticipated to be along the north side of the existing school, which has a ramp in place for vehicular access. Construction access may conflict with emergency egress along the north side of the school, which will have to be studied further and resolved as part of site logistics. Also, additional infrastructure including stairs or stair modifications, an elevator, and bathrooms are included as part of Options 4a and 4b.

Total project costs for Options 4a and 4b are estimated at $7.7 Million and $10.3 Million, respectively. That translates to a cost per added student of $66,270 and $49,083, respectively. Based on an approximate cost of $35,000 per added student for both Options 2c and 3, Options 4a and 4b are 89% and 40% more costly respectively than Option 2c or 3.

Conclusion:

Option	No. of Classrooms Added	Seats Added	Estimated Total Project Cost	Cost per Seat
1	4	93	$7,359,694	$79,137
2A	4	93	$5,071,577	$54,533
2B	6	140	$5,909,927	$42,214
2C	12	280	$9.517,669	$33,992
3	10	233	$8,341,596	$35,801
4A	5	116	$7,687,333	$66,270
4B	9	210	$10,307,477	$49,083

In terms of cost and minimizing impact on school operations, Options 2c and 3—the new building addition on either the south or north side of the existing building—are the more feasible of the options studied for expanding the school's capacity. These options add between 10 and 12 classrooms, respectively, at a total approximate project cost of approximately $35,000 per added seat. Both options would be constructed on school property and are accessible in a way that minimizes impact on school operations—a key factor in mitigating risk and project cost. Comparing the two against each other, option 2c involves the removal of considerably fewer trees than option 3, as the new building addition is sited in the area where there are currently six (6) relocatable classrooms. However, both options require a Use Permit and Building Permit, which adds some schedule risk to the start of construction.

Considering all but one of these options are under $10 Million, the project would be procured through the design/ bid/build project delivery method. This project delivery method requires at least some level of prequalification or qualification verification and competitive bidding. Selection would be made based on the lowest bid price. This project delivery method introduces some risk with limited control of schedule, bid cost, quality of work, and potential change orders by APS.

Based on the options studied, including Option 1 for the existing 1998 design, option 2c appears to be the more feasible, considering the new building addition in this option provides more student capacity in the least intrusive, and most cost- effective manner. However, the value of Option 2c, that is the return for the investment, should be considered carefully within the context of the entire APS program and the value of other APS projects either underway or under consideration.

Each option has benefits and drawbacks. The risks, impacts, and costs provided in this report should be carefully considered when evaluating the viability of the options.

2. NARRATIVE

A. Project Approach & Team

The team of **Brailsford & Dunlavey** and **Hanscomb Consulting**, Program Managers, working with Arlington Public Schools ("APS"), was tasked with developing and exploring the feasibility and impact of adding four (4) or more classrooms at Arlington Science Focus Elementary School. The program management team collaborated with engineer, **Ehlert Bryan** (structural) and **Haley Aldrich** (civil and geotechnical) in determining the structural feasibility of the options and other project consultation services. It was determined early in the study that only broad geotechnical information was required at the feasibility stage; therefore, specific geotechnical analysis is not used in this report although the project concepts were reviewed by Haley Aldrich geotechnical engineers.

The team began the study with a review of the existing building, followed by the development and review of various possible options, and then the determination with APS of the most viable options to further explore. All available drawings of the existing school and structure, site plans, aerial photographs, and other schematic drawings were reviewed. The options were developed in concept and vetted with the school division to ensure alignment with the school's program. Considering the school system's requirements, seven (7) total options were identified as the most likely to accommodate the school's needs and were developed further.

At a programmatic level, the options were laid out in plan and studied from both an architectural and structural perspective to determine constructability, efficiency, and viability. As part of the conceptual options, the team developed for each option: a scope of work, a location plan, a site access plan, a structural review, a conceptual budget, and a construction schedule. A summary of pros and cons, schedule, and project budget analysis have been developed for comparison purposes (see Appendix) to assist the school division with analyzing the options and developing a conclusion.

The estimates included throughout the report contain: hard construction costs, approximate escalation, construction and owner's contingency, and project soft costs for information.

B. Existing Construction & Site Description

The existing building, in its current configuration, consists of an original construction with an addition in 1998. There is also a proposed drawing set for a third renovation in which a portion of the building was to be underpinned to capture existing crawl space for conversion into classrooms. This project was designed in 2015 but was never constructed and is referred to as the "Dirt Room Project."

The scope of the Dirt Room Project primarily consisted of foundations work, shoring, and underpinning. Some heavy steel framing was contemplated to support the existing floor structure where the original concrete columns were to be removed. A tall retaining wall was proposed along the courtyard side of the building to allow for daylight to reach the below-grade space.

The original building construction consists of a two-level, cast-in-place, concrete and load-bearing masonry structure, while the 1998 addition is primarily a one-level, steel frame, and load-bearing masonry structure. The roof and elevated floor structure for the original construction consist of cast-in-place, one-way concrete joists with an integral thin concrete slab also referred to as a pan joist system. The elevated roof and floor are supported on load-bearing masonry, or cast-in-place concrete beams and columns.

The roof structure of the 1998 construction consists of 1½ - 22 GA metal roof deck supported on open-web steel bar joists spaced at 4 to 5 feet, on center. The joists bear on interior and exterior load-bearing masonry walls. There are small amounts of steel beam and column framing; however, the vast majority of gravity load is supported by load-bearing masonry walls.

The building foundation is on conventional spread, column, and wall footings. Design pressures for the original construction are unknown, but the foundations for the two additions are engineered to bear on soil at a maximum allowable bearing pressure of 3,000 PSF.

The ground floor consists of a reinforced 5-inch concrete grade slab over gravel drainage fill. While the slab thickness for the original construction is unknown, drawings for the additions both identify a 5-inch-thick slab. However, drawings for the 1998 addition note wire mesh reinforcing with 4 inches of gravel, and the 2015 drawings identify #5 bars at 8 inches, on center, each way with 6 inches of gravel.

Neither set of construction drawings identifies a distinct lateral stability system for building adequacy under the wind or seismic loading. However, based on a review of the existing construction, it is believed that lateral stability is achieved shear action of the exterior and interior masonry walls at the upper and lower levels.

Based on a review of the two sets of drawings, design parameters and loads are as follows:

1998 Drawing Set (Addition)		2015 Drawing Set (Dirt Room Project)	
Building Code Reference	BOCA—Latest Edition (1996 Assumed)	Building Code Reference	IBC 2012
Roof	Ground Snow (Pg) 30 PSF Roof Snow (Pf) Not Indicated	Roof	None Indicated
Elevated Floor	80 PSF	Elevated Floor	40 + 20 PSF Classroom
Stairs/Exits	100 PSF	Stairs/Exits	None Indicated
Mechanical Space	None Indicated	Mechanical Space	None Indicated
Wind Load	None Indicated	Wind Load	None Indicated
Seismic Load	None Indicated	Seismic Load	None Indicated

C. Structural Design Criteria for Construction

Structural Design Codes

New construction and additions to the building will be designed to meet current building codes and ordinances applicable to construction in Arlington County, Virginia. These include, but are not limited to:

1. Virginia Uniform Statewide Building Code (VUSBC / 2012)
2. Building Code Requirements for Reinforced Concrete ACI-318, American Concrete Institute, Detroit, MI
3. Manual of Steel Construction ASD, American Institute of Steel Construction, Chicago, IL
4. AISI "Specification for the Design of Cold-Formed Steel Structural Members," American Iron and Steel Institute, Washington, DC.
5. Building Code Requirements for Masonry Structures and Specifications for Masonry Structures ACI-530 / 530.1, American Concrete Institute, Detroit, MI

Design Loads

Structural design parameters and loads for the building will be as follows:

- Risk Category III
- Roof Live Load
  - Roof – 30 PSF minimum
- Floor Live Load
  - Assembly / Exits – 100 PSF
  - Classrooms – 40 PSF
  - Offices / Admin – 50 PSF
  - Mechanical / Storage – 125 PSF
  - Elevated Corridors – 80 PSF
- Snow Loads
  - Ground Snow (Pg) – 25 PSF
  - Snow Importance Factor – 1.10
  - Flat-roof snow load (pf) – 22 PSF
  - Snow exposure factor (Ce) – 1.0
  - Thermal factor (Ct) – 1.0
  - Snow Drift per ASCE-7
- Wind Loads
  - Vult - 120 MPH (3 Second Gust)
  - Vasd – 92 MPH
  - Exposure B
- Seismic Loads
  - Seismic Importance Factor = 1.25
  - Ss – 0.160g
  - S1 – 0.053g
  - Site Classification – D assumed (TBD in Geotechnical Report)
  - Reinforced Masonry Shear Walls
  - Equivalent Lateral Force Method

Material Specifications for New Construction

Material specifications to be used in the building design will be as follows:

- Cast in place concrete
  - Grade Slabs – 3,500 PSI
  - Foundations – 3,000 PSI
  - Fill on Metal Deck – 3,000 PSI
- Concrete / Masonry Reinforcing Steel
  - Deformed Bars - ASTM A615, Grade 60
  - Welded Wire Fabric – ASTM A185
- Concrete Unit Masonry
  - Concrete Masonry Units – ASTM C90, f'm = 1,500 PSI
  - Mortar – ASTM C270, Type M or S
- Structural Steel
  - Primary Steel Framing – ASTM A992
  - Miscellaneous Steel – ASTM A36
  - Hollow Steel Sections – ASTM A500, Gr B
- Cold Formed Metal Framing
  - Metal framing – ASTM A525 (fy=33 and 50 KSI)
- Soils Design Values – 3,000 PSF (assumed)
  - Subgrade modulus and foundations/allowable soil bearing pressure to be determined per recommendation of Geotechnical Engineer based on Subsurface Soils Investigation and Report.

Arlington Science Focus Elementary School
School Expansion Feasibility Options

Hanscomb Consulting

Option 4A	Quantity	Unit	Rate	Total
B30 Roofing				
B3010 Roof Coverings				
Roof coverings & insulation	4,876	SF	24.00	117,029
B3020 Roof Openings				
Allowance for penetrations	6	EA	1,000.00	6,000
				123,029
C10 Interior Construction				
C1010 Partitions				
Interior partitions allowance	9,752	SF	13.50	131,657
Interior glazing/storefront allowance	9,752	SF	2.75	26,819
Allow for misc. metals and blocking	9,752	SF	2.50	24,381
C1020 Interior Doors				
Interior doors including door, frame & hardware complete, allow				
- Single leaf	28	EA	1,400.00	39,200
- double leaf	7	EA	2,200.00	15,400
C1030 Fittings				
Allowance	9,752	SF	14.00	136,534
				373,991
C20 Stairways				
C2010 Stair Construction				
Interior stairs, incl. railings	40	Riser	850.00	34,000
C2020 Stair Finishes				
Paint and sealer egress stair - concrete sealant	40	Riser	90.00	3,600
				37,600
C30 Interior Finishes				
C3010 Wall Finishes				
Allowance	9,752	SF	4.50	43,886
C3020 Floor Finishes				
Allowance	9,752	SF	9.50	92,648
C3030 Ceiling Finishes				
Allowance	9,752	SF	7.50	73,143
Allowance for premium ceilings	975	SF	15.00	14,629
				224,305

Arlington Science Focus Elementary School
School Expansion Feasibility Options

Hanscomb Consulting

Option 4A

	Quantity	Unit	Rate	Total
D10 Conveying Systems				
D1010 Elevators & Lifts				
2-stop elevator	1	EA	90,000.00	90,000
				90,000
D20 Plumbing Systems				
Plumbing Fixtures				
Allowance	9,752	SF	$1.85	18,042
Domestic Water Distribution				
Allowance	9,752	SF	$2.60	25,356
Sanitary Waste and Vent Distribution				
Allowance	9,752	SF	$2.20	21,455
Storm Distribution				
Allowance	9,752	SF	$1.40	13,653
Other Plumbing Systems				
Allowance	9,752	SF	$1.20	11,703
				90,210
D30 Heating, Ventilation & Air Conditioning				
Allowance	9,752	SF	$52.00	507,125
				507,125
D40 Fire Protection				
Allowance	9,752	SF	$3.00	29,257
				29,257
D50 Electrical Lighting, Power & Communications				
Allowance	9,752	SF	$42.00	409,601
				409,601
E10 Equipment				
E1020 Institutional Equipment				
Allowance	9,752	SF	$4.00	39,010
				39,010
E20 Furnishings				
E2010 Fixed Furnishings				
Window Treatments	2,500	SF	7.00	17,500
General allowance	9,752	SF	2.50	24,381
				41,881

Arlington Science Focus Elementary School
School Expansion Feasibility Options

Hanscomb Consulting

Option 4A

	Quantity	Unit	Rate	Total
F10 Special Construction				
F1010 Special Structures				
Temporary classrooms - deliver & set in place	3	EA	$25,000.00	75,000
				75,000
F20 Selective Demolition				
F2010 Building Elements Demolition				
Demolish & haul existing building	48,960	CF	0.65	31,824
F2020 Hazardous Components Abatement				
Excluded				Excluded
				31,824
G10 Site Preparation				
G1010 Site Clearing				
Allowance for areas around existing building	7,314	SF	1.00	7,314
G1020 Site Demolition and Relocations				
Allow for removal of slab on grade & footings	4,080	SF	2.50	10,200
Allow for relocating underground utilities	1	LS	15,000.00	15,000
G1030 Site Earthwork				
Allow for fine grading/compacting	7,314	SF	1.80	13,166
G1040 Hazardous Waste Remediation				
Excluded				Excluded
				45,680
G20 Site Improvements				
G2020 Parking Lots				
Allowance	15,000	SF	10.00	150,000
G2030 Pedestrian Paving				
Allowance	1,000	SF	30.00	30,000
G2040 Site Development				
Allowance for site walls, ramps etc	1	LS	25,000.00	25,000
Site preparation & paving for temporary classrooms	7,500	SF	2.00	15,000
New play area, including equipment relocation	1,250	SF	24.00	30,000
Asphalt recreation area	1,250	SF	9.00	11,250
G2050 Landscaping				
Allowance	1	LS	20,000.00	20,000
				281,250
G30 Site Mechanical Utilities				
Water - allowance, incl. to temporary classrooms	300	LF	$90.00	27,000
Storm drainage - allowance	1	LS	$50,000.00	50,000
Sewer - allowance, incl. to temporary classrooms	350	LF	$100.00	35,000
				112,000

Arlington Science Focus Elementary School
School Expansion Feasibility Options

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Option 4A

	Quantity	Unit	Rate	Total
G40 Site Electrical Utilities				
G4010 Electrical Distribution				
Conduit & feeders, incl. to temporary classrooms	300	LF	150.00	45,000
G4020 Site Lighting				
Allowance	1	LS	50,000.00	50,000
G4030 Site Communications & Security				
Telecom ductbank - allow	200	LF	125.00	25,000
				120,000

Option 4b Total—$10,307,447

Arlington Science Focus Elementary School
School Expansion Feasibility Options

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Option 4B

			$/SF	TOTAL	%
	Gross Area:		14,629 SF		
A10	Foundations		11.51	168,391	2%
A20	Basement Construction		6.37	93,173	1%
A	**Substructure**		**17.88**	**261,564**	**4%**
B10	Superstructure		37.35	546,382	8%
B20	Exterior Enclosure		41.28	603,816	9%
B30	Roofing		8.41	123,029	2%
B	**Shell**		**87.04**	**1,273,227**	**19%**
C10	Interior Construction		38.35	560,987	8%
C20	Stairways		3.86	56,400	1%
C30	Interior Finishes		23.00	336,458	5%
C	**Interiors**		**65.20**	**953,844**	**14%**
D10	Conveying Systems		8.20	120,000	2%
D20	Plumbing Systems		8.40	122,880	2%
D30	Heating, Ventilation & Air Conditioning		52.00	760,687	11%
D40	Fire Protection		3.00	43,886	1%
D50	Electrical Lighting, Power & Communications		42.00	614,401	9%
D	**Services**		**113.60**	**1,661,854**	**24%**
E10	Equipment		4.00	58,514	1%
E20	Furnishings		4.25	62,149	1%
E	**Equipment & Furnishings**		**8.25**	**120,664**	**2%**
F10	Special Construction		5.13	75,000	1%
F20	Selective Demolition		2.18	31,824	0%
F	**Special Construction & Demolition**		**7.30**	**106,824**	**2%**
G10	Site Preparation		3.12	45,680	1%
G20	Site Improvements		19.23	281,250	4%
G30	Site Mechanical Utilities		7.66	112,000	2%
G40	Site Electrical Utilities		8.20	120,000	2%
G90	Other Site Construction		0.00	0	0%
G	**Building Sitework**		**38.21**	**558,930**	**8%**
Z1	Design Contingency	10.00%	33.75	493,691	7%
BUILDING & SITEWORK DIRECT COST BEFORE GC MARK-UPS			**371.23**	**5,430,598**	**80%**
Z10	General Conditions	8.00%	29.70	434,448	6%
Z11	Phasing/Interface	1.00%	4.01	58,650	1%
Z12	Bonds & insurances	1.75%	7.09	103,665	2%
Z13	Contractors Overhead & Profit	5.00%	20.60	301,368	4%
TOTAL CONSTRUCTION COST BEFORE ESCALATION			**432.63**	**6,328,729**	**93%**
Z30	Escalation	7.68%	33.23	486,132	7%
ESTIMATED CONSTRUCTION COST AT AWARD			**465.86**	**6,814,861**	**100%**
	Construction Contingency	10.00%		681,486	
	Project Soft Costs	25.00%		1,874,087	
	Owner's Contingency	10.00%		937,043	
ESTIMATED TOTAL COST			**704.61**	**10,307,477**	

Arlington Science Focus Elementary School
School Expansion Feasibility Options

Hanscomb Consulting

Option 4B

	Quantity	Unit	Rate	Total
A10 Foundations				
Some spread footings	4,876	SF	8.00	39,010
Perimeter wall footing	113	CY	525.00	59,491
6" thick slab on grade, incl. 6" gravel	4,876	SF	10.00	48,762
Underslab drainage system	4,876	SF	3.00	14,629
Elevator pit	1	EA	6,500.00	6,500
				168,391
A20 Basement Construction				
A2010 Basement Excavation				
Excavate/fill as required	361	CY	30.00	10,836
Dispose off-site	181	CY	25.00	4,515
Backfill with excavated material	181	CY	20.00	3,612
A2020 Basement Walls				
CMU foundation walls, 12" thick	1,749	SF	20.00	34,983
Elevator shaft wall, 8" thick, complete	40	CY	550.00	21,739
Waterproofing to walls	3,498	SF	3.00	10,495
Perimeter foundation drain	350	LF	20.00	6,993
				93,173
B10 Superstructure				
B1010 Floor Construction				
Steel frame	59	Tons	4,500.00	263,315
Metal deck & concrete	9,752	SF	11.00	107,276
B1020 Roof Construction				
Steel frame	29	Tons	4,500.00	131,657
Roof decking & insulation	4,876	SF	7.00	34,133
Steel Roof dunnage	1	LS	10,000.00	10,000
				546,382
B20 Exterior Enclosure				
B2010 Exterior Walls				
Brick & stud back-up cavity wall, incl. insulation etc	3,462	SF	40.00	138,465
EIFS to upper floor	7,500	SF	28.00	210,006
Coping	350	LF	35.00	12,238
B2020 Exterior Windows				
Fixed windows (25%)	3,654	SF	65.00	237,507
B2030 Exterior Doors				
Solid exterior doors, complete; double	2	PR	2,800.00	5,600
				603,816

Arlington Science Focus Elementary School
School Expansion Feasibility Options

Hanscomb Consulting

Option 4B

	Quantity	Unit	Rate	Total
B30 Roofing				
B3010 Roof Coverings				
Roof coverings & insulation	4,876	SF	24.00	117,029
B3020 Roof Openings				
Allowance for penetrations	6	EA	1,000.00	6,000
				123,029
C10 Interior Construction				
C1010 Partitions				
Interior partitions allowance	14,629	SF	13.50	197,486
Interior glazing/storefront allowance	14,629	SF	2.75	40,229
Allow for misc. metals and blocking	14,629	SF	2.50	36,572
C1020 Interior Doors				
Interior doors including door, frame & hardware complete, allow				
- Single leaf	42	EA	1,400.00	58,800
- double leaf	11	EA	2,200.00	23,100
C1030 Fittings				
Allowance	14,629	SF	14.00	204,800
				560,987
C20 Stairways				
C2010 Stair Construction				
Interior stairs, incl. railings	60	Riser	850.00	51,000
C2020 Stair Finishes				
Paint and sealer egress stair - concrete sealant	60	Riser	90.00	5,400
				56,400
C30 Interior Finishes				
C3010 Wall Finishes				
Allowance	14,629	SF	4.50	65,829
C3020 Floor Finishes				
Allowance	14,629	SF	9.50	138,972
C3030 Ceiling Finishes				
Allowance	14,629	SF	7.50	109,715
Allowance for premium ceilings	1,463	SF	15.00	21,943
				336,458

Hanscomb Consulting

Option 4B

	Quantity	Unit	Rate	Total
D10 Conveying Systems				
D1010 Elevators & Lifts				
3-stop elevator	1	EA	120,000.00	120,000
				120,000
D20 Plumbing Systems				
Plumbing Fixtures				
Allowance	14,629	SF	$1.70	24,869
Domestic Water Distribution				
Allowance	14,629	SF	$2.40	35,109
Sanitary Waste and Vent Distribution				
Allowance	14,629	SF	$2.00	29,257
Storm Distribution				
Allowance	14,629	SF	$1.30	19,017
Other Plumbing Systems				
Allowance	14,629	SF	$1.00	14,629
				122,880
D30 Heating, Ventilation & Air Conditioning				
Allowance	14,629	SF	$52.00	760,687
				760,687
D40 Fire Protection				
Allowance	14,629	SF	$3.00	43,886
				43,886
D50 Electrical Lighting, Power & Communications				
Allowance	14,629	SF	$42.00	614,401
				614,401
E10 Equipment				
E1020 Institutional Equipment				
Allowance	14,629	SF	$4.00	58,514
				58,514
E20 Furnishings				
E2010 Fixed Furnishings				
Window Treatments	3,654	SF	7.00	25,578
General allowance	14,629	SF	2.50	36,572
				62,149

Arlington Science Focus Elementary School
School Expansion Feasibility Options

Hanscomb Consulting

Option 4B

	Quantity	Unit	Rate	Total
F10 Special Construction				
F1010 Special Structures				
Temporary classrooms - deliver & set in place	3	EA	$25,000.00	75,000
				75,000
F20 Selective Demolition				
F2010 Building Elements Demolition				
Demolish & haul existing building	48,960	CF	0.65	31,824
F2020 Hazardous Components Abatement				
Excluded				Excluded
				31,824
G10 Site Preparation				
G1010 Site Clearing				
Allowance for areas around existing building	7,314	SF	1.00	7,314
G1020 Site Demolition and Relocations				
Allow for removal of slab on grade & footings	4,080	SF	2.50	10,200
Allow for relocating underground utilities	1	LS	15,000.00	15,000
G1030 Site Earthwork				
Allow for fine grading/compacting	7,314	SF	1.80	13,166
G1040 Hazardous Waste Remediation				
Excluded				Excluded
				45,680
G20 Site Improvements				
G2020 Parking Lots				
Allowance	15,000	SF	10.00	150,000
G2030 Pedestrian Paving				
Allowance	1,000	SF	30.00	30,000
G2040 Site Development				
Allowance for site walls, ramps etc	1	LS	25,000.00	25,000
Site preparation & paving for temporary classrooms	7,500	SF	2.00	15,000
New play area, including equipment relocation	1,250	SF	24.00	30,000
Asphalt recreation area	1,250	SF	9.00	11,250
G2050 Landscaping				
Allowance	1	LS	20,000.00	20,000
				281,250

Arlington Science Focus Elementary School
School Expansion Feasibility Options

Hanscomb Consulting

Option 4B

	Quantity	Unit	Rate	Total
G30 Site Mechanical Utilities				
Water - allowance, incl. to temporary classrooms	300	LF	$90.00	27,000
Storm drainage - allowance	1	LS	$50,000.00	50,000
Sewer - allowance, incl. to temporary classrooms	350	LF	$100.00	35,000
				112,000
G40 Site Electrical Utilities				
G4010 Electrical Distribution				
Conduit & feeders, incl. to temporary classrooms	300	LF	150.00	45,000
G4020 Site Lighting				
Allowance	1	LS	50,000.00	50,000
G4030 Site Communications & Security				
Telecom ductbank - allow	200	LF	125.00	25,000
				120,000

6. Schedule

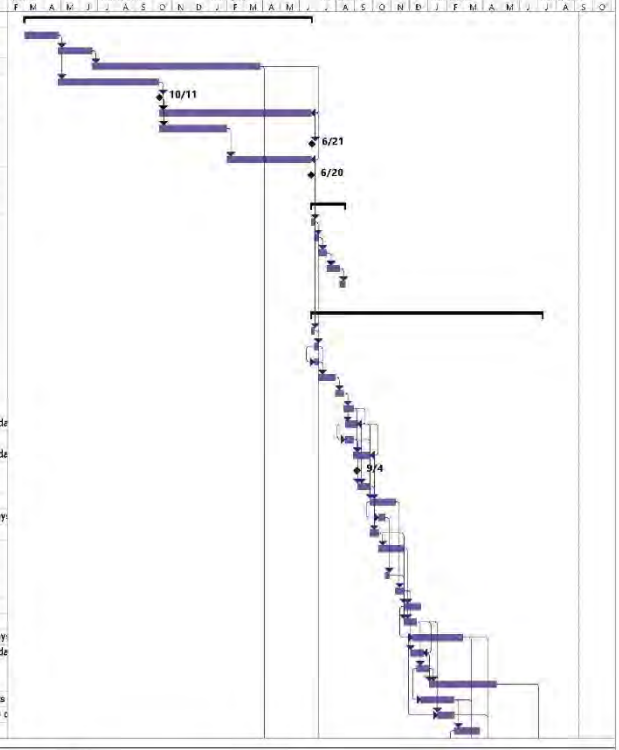
The proposed construction schedules for option 4A and 4B are over a summer and the next consecutive school year for a total length of roughly fourteen (14) and fifteen (15) months, respectively.

Below you can find a timeline of the Option 4A and Option 4B schedules, including the design phase. A full project schedule can be found on the next few pages.

Option 4A

Schedule Option 4a - One floor Vertical expansion

ID	Task Name	Duration	Start	Finish	Predecessors
1	**Design Phase**	**342 days**	**Thu 3/1/18**	**Fri 6/21/19**	
2	Designer procurement	40 days	Thu 3/1/18	Wed 4/25/18	
3	Site plan development	40 days	Thu 4/26/18	Wed 6/20/18	2
4	Site plan approval	200 days	Thu 6/21/18	Wed 3/27/19	3
5	Design development	120 days	Thu 4/26/18	Wed 10/10/18	2
6	Permit Set complete	1 day	Thu 10/11/18	Thu 10/11/18	5
7	Building plan approval/permit	180 days	Fri 10/12/18	Thu 6/20/19	4FF,5,6
8	Construction drawings	80 days	Fri 10/12/18	Thu 1/31/19	6
9	Building permit	1 day	Fri 6/21/19	Fri 6/21/19	7
10	General contractor procurement	100 days	Fri 2/1/19	Thu 6/20/19	7FF,8
11	Last Day of School	1 day	Thu 6/20/19	Thu 6/20/19	
12					
13	**Install 3 demountable classrooms**	**40 days**	**Fri 6/21/19**	**Thu 8/15/19**	
14	Mobilize contractor	3 days	Fri 6/21/19	Tue 6/25/19	10
15	Site prep for demountables	5 days	Wed 6/26/19	Tue 7/2/19	14
16	U/G utilities for demountables	10 days	Wed 7/3/19	Tue 7/16/19	15
17	Install demountables	15 days	Wed 7/17/19	Tue 8/6/19	16
18	Site concrete - SW/Stairs	7 days	Wed 8/7/19	Thu 8/15/19	17
19					
20	**Building Construction**	**275 days**	**Fri 6/21/19**	**Thu 7/9/20**	
21	Mobilize contractor	3 days	Fri 6/21/19	Tue 6/25/19	10
22	Establish erosion control	5 days	Wed 6/26/19	Tue 7/2/19	21
23	Temp protections	5 days	Wed 6/26/19	Tue 7/2/19	22SS
24	Demolition	20 days	Wed 7/3/19	Tue 7/30/19	22,23
25	Rough grade/cut&fill	10 days	Wed 7/31/19	Tue 8/13/19	24
26	U/G Site utilities	12 days	Wed 8/14/19	Thu 8/29/19	25
27	Foundations	15 days	Fri 8/16/19	Thu 9/5/19	25,26FF+5 da
28	Excavate, form/pour elevator pit	10 days	Fri 8/16/19	Thu 8/29/19	27SS
29	U/G MEP Rough In	20 days	Fri 8/30/19	Thu 9/26/19	26,27FF+5 da
30	First Day of School	1 day	Wed 9/4/19	Wed 9/4/19	
31	Masonry at Elevator shaft	15 days	Fri 9/6/19	Thu 9/26/19	27,28
32	Steel frame	30 days	Fri 9/27/19	Thu 11/7/19	27,28,31
33	First floor elevated metal decking	7 days	Fri 10/11/19	Mon 10/21/19	32SS+10 days
34	Slab on grade	10 days	Fri 9/27/19	Thu 10/10/19	29
35	Masonry at bathrooms and stair towers	30 days	Fri 10/11/19	Thu 11/21/19	34
36	First floor elevated deck prep/pour	5 days	Tue 10/22/19	Mon 10/28/19	33
37	Roof joists and decking	10 days	Fri 11/8/19	Thu 11/21/19	32
38	Building Interior wall framing	20 days	Fri 11/22/19	Thu 12/19/19	34,35,36
39	Building exterior wall framing	15 days	Fri 11/22/19	Thu 12/12/19	34,37
40	MEP Rough in walls and ceilings	60 days	Fri 12/6/19	Thu 2/27/20	38SS+10 days
41	Roofing	15 days	Tue 12/3/19	Mon 12/23/19	37,39FF+7 da
42	Exterior wall sheathing	15 days	Fri 12/13/19	Thu 1/2/20	39
43	Install Elevator	80 days	Fri 1/3/20	Thu 4/23/20	41,42
44	Exterior building skin	40 days	Fri 12/20/19	Thu 2/13/20	42SS+5 days
45	Set Mechanical Equipment	20 days	Fri 1/17/20	Thu 2/13/20	39,40SS+30 d
46	Windows	30 days	Fri 2/14/20	Thu 3/26/20	44



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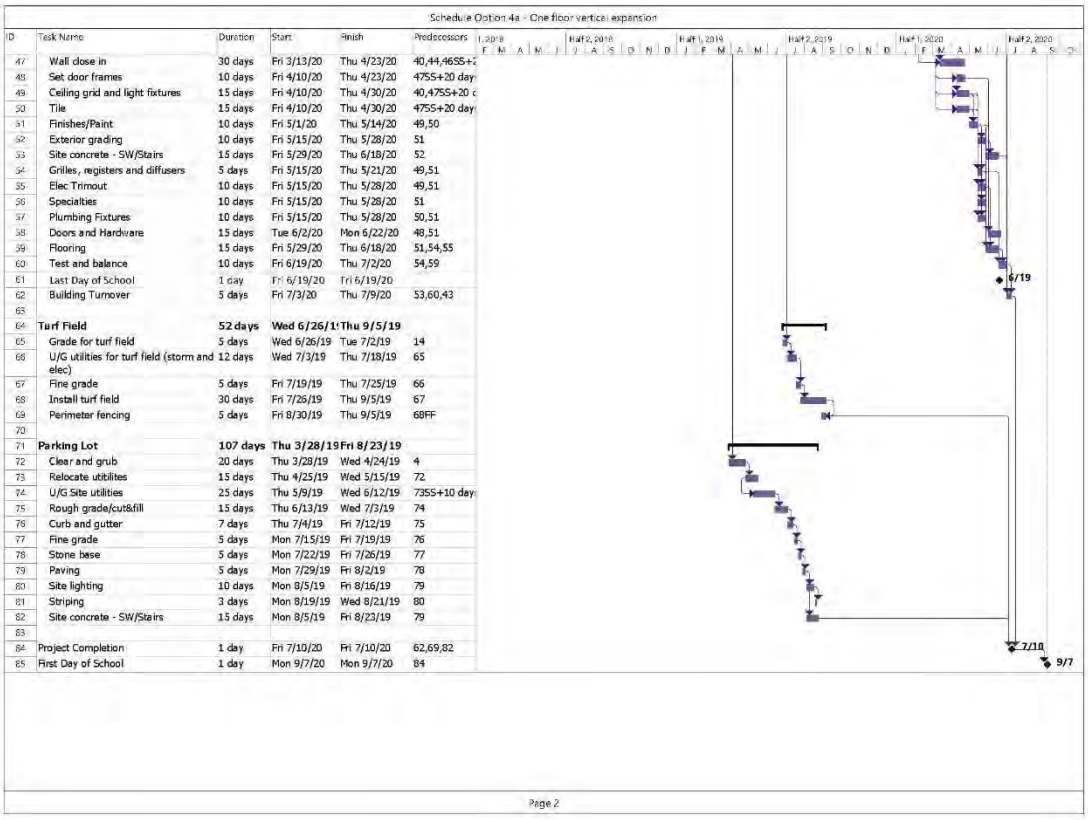
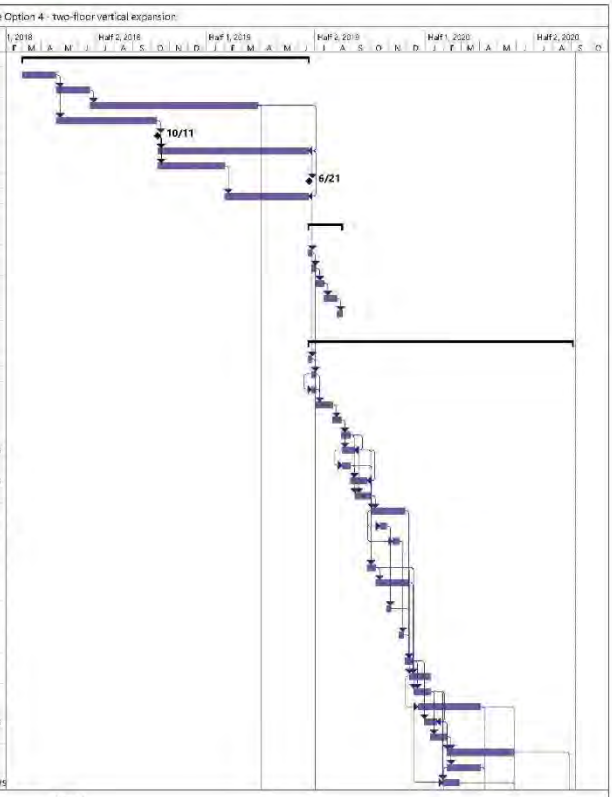


ID	Task Name	Duration	Start	Finish	Predecessors
47	Wall close in	30 days	Fri 3/13/20	Thu 4/23/20	40,44,46SS+2
48	Set door frames	10 days	Fri 4/10/20	Thu 4/23/20	47SS+20 days
49	Ceiling grid and light fixtures	15 days	Fri 4/10/20	Thu 4/30/20	40,47SS+20 d
50	Tile	15 days	Fri 4/10/20	Thu 4/30/20	47SS+20 days
51	Finishes/Paint	10 days	Fri 5/1/20	Thu 5/14/20	49,50
52	Exterior grading	10 days	Fri 5/15/20	Thu 5/28/20	51
53	Site concrete - SW/Stairs	15 days	Fri 5/29/20	Thu 6/18/20	52
54	Grilles, registers and diffusers	5 days	Fri 5/15/20	Thu 5/21/20	49,51
55	Elec Trimout	10 days	Fri 5/15/20	Thu 5/28/20	49,51
56	Specialties	10 days	Fri 5/15/20	Thu 5/28/20	51
57	Plumbing Fixtures	10 days	Fri 5/15/20	Thu 5/28/20	50,51
58	Doors and Hardware	15 days	Tue 6/2/20	Mon 6/22/20	48,51
59	Flooring	15 days	Fri 5/29/20	Thu 6/18/20	51,54,55
60	Test and balance	10 days	Fri 6/19/20	Thu 7/2/20	54,59
61	Last Day of School	1 day	Fri 6/19/20	Fri 6/19/20	
62	Building Turnover	5 days	Fri 7/3/20	Thu 7/9/20	53,60,43
63					
64	**Turf Field**	**52 days**	**Wed 6/26/19**	**Thu 9/5/19**	
65	Grade for turf field	5 days	Wed 6/26/19	Tue 7/2/19	14
66	U/G utilities for turf field (storm and elec)	12 days	Wed 7/3/19	Thu 7/18/19	65
67	Fine grade	5 days	Fri 7/19/19	Thu 7/25/19	66
68	Install turf field	30 days	Fri 7/26/19	Thu 9/5/19	67
69	Perimeter fencing	5 days	Fri 8/30/19	Thu 9/5/19	68FF
70					
71	**Parking Lot**	**107 days**	**Thu 3/28/19**	**Fri 8/23/19**	
72	Clear and grub	20 days	Thu 3/28/19	Wed 4/24/19	4
73	Relocate utitilites	15 days	Thu 4/25/19	Wed 5/15/19	72
74	U/G Site utilities	25 days	Thu 5/9/19	Wed 6/12/19	73SS+10 days
75	Rough grade/cut&fill	15 days	Thu 6/13/19	Wed 7/3/19	74
76	Curb and gutter	7 days	Thu 7/4/19	Fri 7/12/19	75
77	Fine grade	5 days	Mon 7/15/19	Fri 7/19/19	76
78	Stone base	5 days	Mon 7/22/19	Fri 7/26/19	77
79	Paving	5 days	Mon 7/29/19	Fri 8/2/19	78
80	Site lighting	10 days	Mon 8/5/19	Fri 8/16/19	79
81	Striping	3 days	Mon 8/19/19	Wed 8/21/19	80
82	Site concrete - SW/Stairs	15 days	Mon 8/5/19	Fri 8/23/19	79
83					
84	Project Completion	1 day	Fri 7/10/20	Fri 7/10/20	62,69,82
85	First Day of School	1 day	Mon 9/7/20	Mon 9/7/20	84

Option 4B

Schedule Option 4 - two-floor vertical expansion

ID	Task Name	Duration	Start	Finish	Predecessors
1	**Design Phase**	**342 days**	**Thu 3/1/18**	**Fri 6/21/19**	
2	Designer procurement	40 days	Thu 3/1/18	Wed 4/25/18	
3	Site plan development	40 days	Thu 4/26/18	Wed 6/20/18	2
4	Site plan approval	200 days	Thu 6/21/18	Wed 3/27/19	3
5	Design development	120 days	Thu 4/26/18	Wed 10/10/18	2
6	Permit Set complete	1 day	Thu 10/11/18	Thu 10/11/18	5
7	Building plan approval/permit	180 days	Fri 10/12/18	Thu 6/20/19	4FF,5,6
8	Construction drawings	80 days	Fri 10/12/18	Thu 1/31/19	6
9	Building permit	1 day	Fri 6/21/19	Fri 6/21/19	7
10	General contractor procurement	100 days	Fri 2/1/19	Thu 6/20/19	7FF,8
11					
12	**Install 3 demountable classrooms**	**40 days**	**Fri 6/21/19**	**Thu 8/15/19**	
13	Mobilize contractor	3 days	Fri 6/21/19	Tue 6/25/19	10
14	Site prep for demountables	5 days	Wed 6/26/19	Tue 7/2/19	13
15	U/G utilities for demountables	10 days	Wed 7/3/19	Tue 7/16/19	14
16	Install demountables	15 days	Wed 7/17/19	Tue 8/6/19	15
17	Site concrete - SW/Stairs	7 days	Wed 8/7/19	Thu 8/15/19	16
18					
19	**Building Construction**	**315 days**	**Fri 6/21/19**	**Thu 9/3/20**	
20	Mobilize contractor	3 days	Fri 6/21/19	Tue 6/25/19	10
21	Establish erosion control	5 days	Wed 6/26/19	Tue 7/2/19	20
22	Temp protections	5 days	Wed 6/26/19	Tue 7/2/19	21SS
23	Demolition	20 days	Wed 7/3/19	Tue 7/30/19	21,22
24	Rough grade/cut&fill	10 days	Wed 7/31/19	Tue 8/13/19	23
25	U/G Site utilities	12 days	Wed 8/14/19	Thu 8/29/19	24
26	Foundations	15 days	Fri 8/16/19	Thu 9/5/19	24,25FF+5 days
27	Excavate, form/pour elevator pit	10 days	Fri 8/16/19	Thu 8/29/19	26SS
28	U/G MEP Rough In	20 days	Fri 8/30/19	Thu 9/26/19	25,26FF+5 days
29	Masonry at Elevator shaft	20 days	Fri 9/6/19	Thu 10/3/19	26,27
30	Steel frame	40 days	Fri 10/4/19	Thu 11/28/19	26,27,29
31	First floor elevated metal decking	7 days	Fri 10/18/19	Mon 10/28/19	30SS+10 days
32	Second floor elevated metal decking	7 days	Fri 11/8/19	Mon 11/18/19	30SS+25 days
33	Slab on grade	10 days	Fri 9/27/19	Thu 10/10/19	28
34	Masonry at bathrooms and stair towers	40 days	Fri 10/11/19	Thu 12/5/19	33
35	First floor elevated deck prep/pour	5 days	Tue 10/29/19	Mon 11/4/19	31
36	Second floor elevated deck prep/pour	5 days	Tue 11/19/19	Mon 11/25/19	32
37	Roof joists and decking	10 days	Fri 11/29/19	Thu 12/12/19	30
38	Building Interior wall framing	25 days	Fri 12/6/19	Thu 1/9/20	33,34,35,36
39	Building exterior wall framing	20 days	Fri 12/13/19	Thu 1/9/20	33,37
40	MEP Rough in walls and ceilings	75 days	Fri 12/20/19	Thu 4/2/20	38SS+10 days
41	Roofing	15 days	Tue 12/31/19	Mon 1/20/20	37,39FF+7 days
42	Exterior wall sheathing	20 days	Fri 1/10/20	Thu 2/6/20	39
43	Install Elevator	80 days	Fri 2/7/20	Thu 5/28/20	41,42
44	Exterior building skin	40 days	Fri 2/7/20	Thu 4/2/20	42
45	Set Mechanical Equipment	20 days	Fri 1/31/20	Thu 2/27/20	39,40SS+30 days



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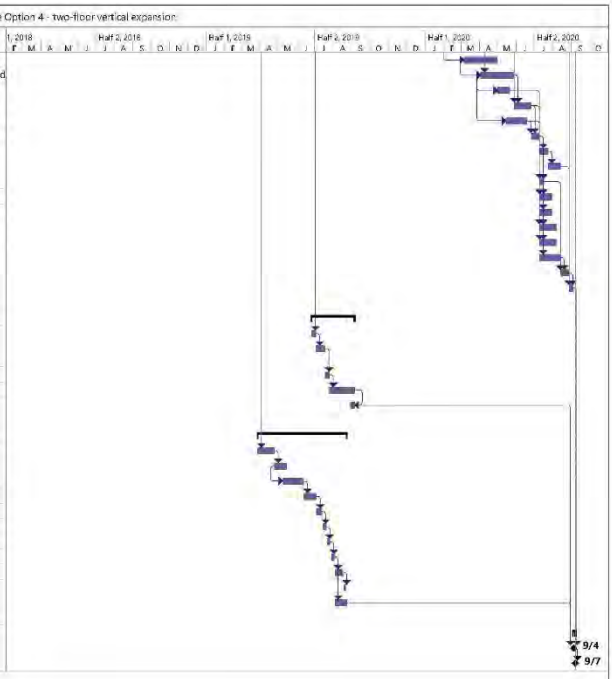
Schedule Option 4 - two-floor vertical expansion

ID	Task Name	Duration	Start	Finish	Predecessors
46	Windows	40 days	Fri 3/6/20	Thu 4/30/20	44SS+20 days
47	Wall close in	40 days	Fri 4/3/20	Thu 5/28/20	40,44,46SS+20 d
48	Set door frames	14 days	Fri 5/1/20	Wed 5/20/20	47SS+20 days
49	Ceiling grid and light fixtures	20 days	Fri 5/29/20	Thu 6/25/20	40,47,45
50	Tile	25 days	Fri 5/15/20	Thu 6/18/20	47SS+30 days
51	Finishes/Paint	10 days	Fri 6/26/20	Thu 7/9/20	49,50
52	Exterior grading	10 days	Fri 7/10/20	Thu 7/23/20	51
53	Site concrete - SW/Stairs	15 days	Fri 7/24/20	Thu 8/13/20	52
54	Grilles, registers and diffusers	5 days	Fri 7/10/20	Thu 7/16/20	49,51
55	Elec Trimout	15 days	Fri 7/10/20	Thu 7/30/20	49,51
56	Specialties	15 days	Fri 7/10/20	Thu 7/30/20	51
57	Plumbing Fixtures	20 days	Fri 7/10/20	Thu 8/6/20	50,51
58	Doors and Hardware	20 days	Fri 7/10/20	Thu 8/6/20	48,51
59	Flooring	25 days	Fri 7/10/20	Thu 8/13/20	51
60	Test and balance	10 days	Fri 8/14/20	Thu 8/27/20	54,59
61	Building Turnover	5 days	Fri 8/28/20	Thu 9/3/20	53,60,43
62					
63	**Turf Field**	**52 days**	**Wed 6/26/19**	**Thu 9/5/19**	
64	Grade for turf field	5 days	Wed 6/26/19	Tue 7/2/19	13
65	U/G utilities for turf field (storm and elec)	12 days	Wed 7/3/19	Thu 7/18/19	64
66	Fine grade	5 days	Fri 7/19/19	Thu 7/25/19	65
67	Install turf field	30 days	Fri 7/26/19	Thu 9/5/19	66
68	Perimeter fencing	5 days	Fri 8/30/19	Thu 9/5/19	67FF
69					
70	**Parking Lot**	**107 days**	**Thu 3/28/19**	**Fri 8/23/19**	
71	Clear and grub	20 days	Thu 3/28/19	Wed 4/24/19	4
72	Relocate utitilites	15 days	Thu 4/25/19	Wed 5/15/19	71
73	U/G Site utilities	25 days	Thu 5/9/19	Wed 6/12/19	72SS+10 days
74	Rough grade/cut&fill	15 days	Thu 6/13/19	Wed 7/3/19	73
75	Curb and gutter	7 days	Thu 7/4/19	Fri 7/12/19	74
76	Fine grade	5 days	Mon 7/15/19	Fri 7/19/19	75
77	Stone base	5 days	Mon 7/22/19	Fri 7/26/19	76
78	Paving	5 days	Mon 7/29/19	Fri 8/2/19	77
79	Site lighting	10 days	Mon 8/5/19	Fri 8/16/19	78
80	Striping	3 days	Mon 8/19/19	Wed 8/21/19	79
81	Site concrete - SW/Stairs	15 days	Mon 8/5/19	Fri 8/23/19	78
82					
83	**Project Completion**	**2 days**	**Fri 9/4/20**	**Mon 9/7/20**	
84	Project Completion	1 day	Fri 9/4/20	Fri 9/4/20	61,68,81
85	First Day of School	1 day	Mon 9/7/20	Mon 9/7/20	84



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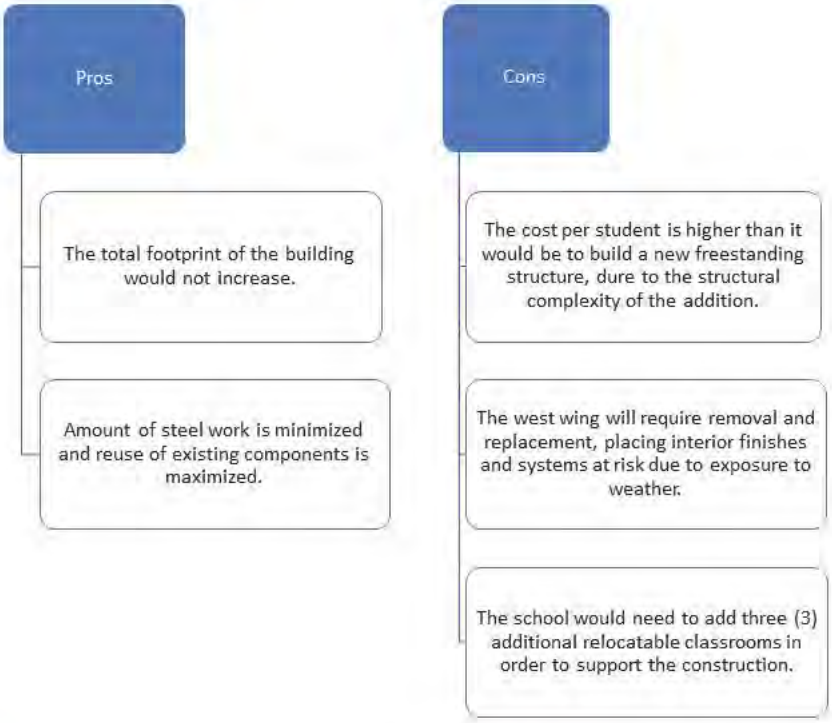
7. Pros & Cons

The team offers the following pros and cons for consideration.



8. Summary

Option 4A Summary

In conclusion, option 4a would yield five (5) new classrooms, and rebuild three (3) existing classrooms, increasing the total permanent capacity needed to meet the projected enrollment through 2026. The cost estimated to complete this work is $7,687,333. The time it would take to complete the project is fourteen (14) months, which includes a summer and the consecutive school year. In comparison to the other options, Option 4A would cost $66,270 per seat which is higher than the other options.

Option 4B Summary

This option yields nine (9) new classrooms and rebuilds three (3) existing classrooms, exceeding the total permanent capacity needed to meet the projected enrollment through 2026. The cost estimated to complete this work is $10,307,477. The time it would take to complete the project is fifteen (15) months, which includes a summer and the consecutive school year. In comparison to the other options, the cost per seat is $49,083, which is on the high side of the presented options.

D. List of Drawings

1998 Set of Drawings

- Cover Page
- Site Plan
- Life Safety
- Demolition Drawings
- Architecture Drawings
- Structural Drawings
- Electrical Drawings
- Plumbing Drawings
- Mechanical Drawings
- Finish Plans
- Exterior Sections

Classroom Layout: 2014–2015

2015—100% Construction Documents

- Full Combined Bid Set
- Full Bid Specifications

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All Arlington Public Schools (APS) budget and operations decisions are based on the best information available at the time. Staff and community members are reminded that funding forecasts from Arlington County and the state may change, based on many external factors. Similarly, student enrollment and projections are based on the best available information, but are also subject to change due to employment, housing and other economic factors. For these reasons, APS and the Arlington School Board may adjust future budget allocations, staffing and other operations decisions to reflect the existing community and operating landscape.

Appendix A: Barcroft (2014)

Arlington Public Schools

Barcroft Elementary School

existing capacity: 460
possible addition: up to 225

SITE PLAN

EXISTING CONDITION

FLOOR ONE

FLOOR TWO

FLOOR THREE

Pros / Cons

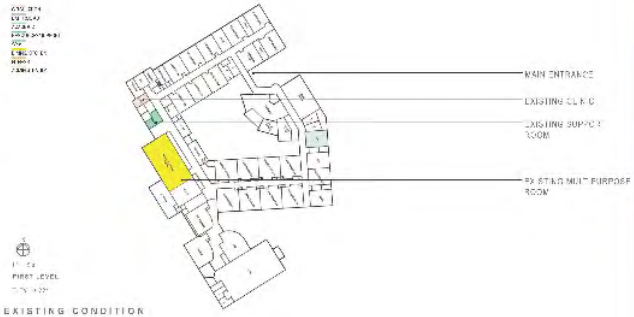
Appendix A: Campbell (2014)

Arlington Public Schools

Campbell Elementary School

existing capacity 436
possible addition: up to 661

SITE PLAN



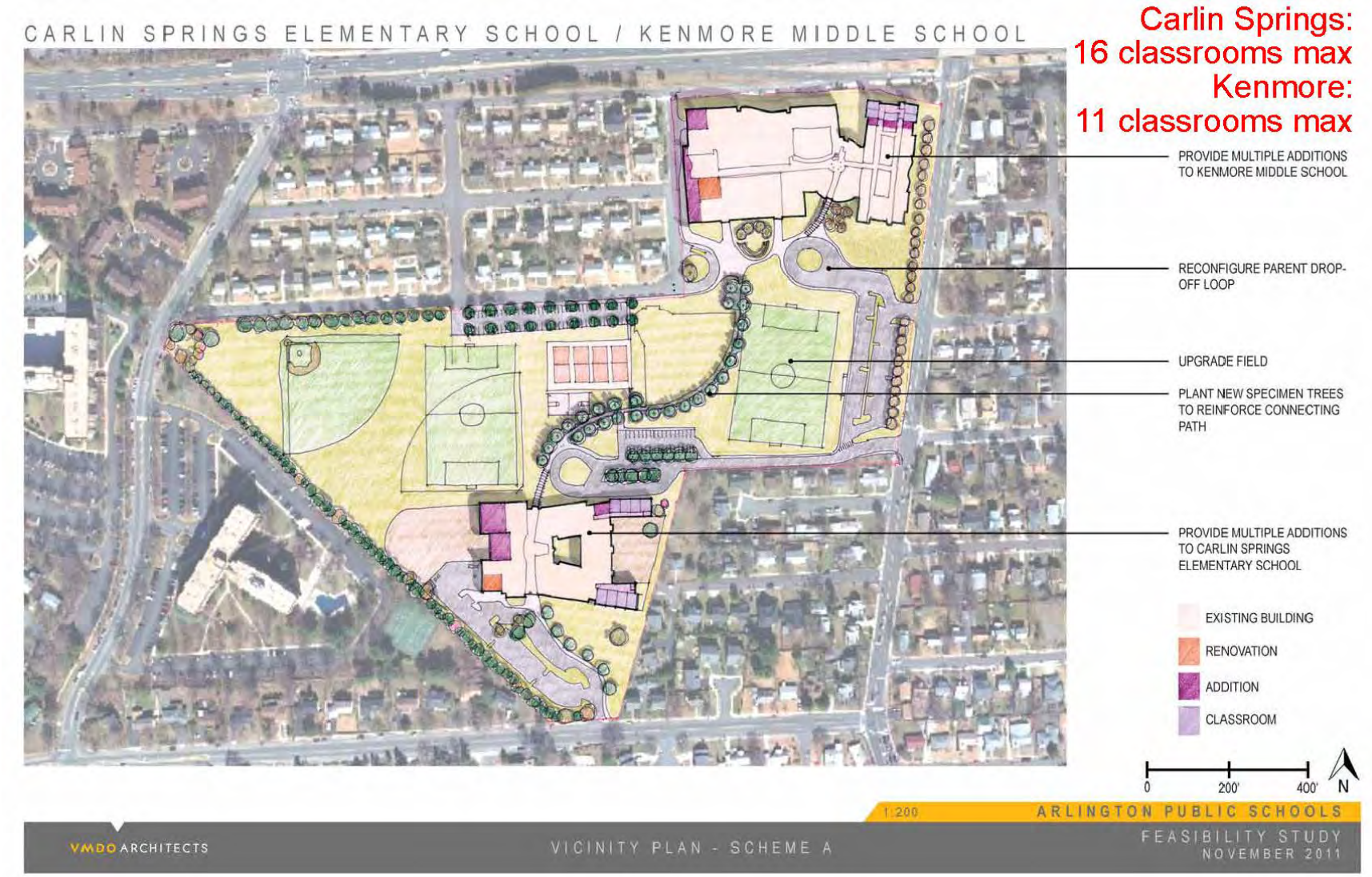
EXISTING CONDITION

LEVEL ONE

LEVELS TWO AND THREE

Pros/Cons

Appendix A: Carling Springs (2011)



CARLIN SPRINGS ELEMENTARY SCHOOL / KENMORE MIDDLE SCHOOL

Addition:
8 classrooms
New School:
25 classrooms

PROVIDE MODEST ADDITIONS TO KENMORE MIDDLE SCHOOL - NO NET CHANGE IN CAPACITY

RE-ORIENT AND UPGRADE FIELD AS AN ORGANIZING ELEMENT BETWEEN MIDDLE SCHOOL & NEW SCHOOL

BUILD NEW SCHOOL (CAPACITY = 650 STUDENTS) FOR EITHER UPPER ELEMENTARY OR LOWER MIDDLE SCHOOL

IMPROVE EXISTING BUS LOOP; SHARE WITH NEW SCHOOL

PROVIDE MODEST ADDITION TO CARLIN SPRINGS ELEMENTARY SCHOOL - NO NET CHANGE IN CAPACITY

EXISTING BUILDING
RENOVATION
ADDITION
CLASSROOM

0 200' 400' N

1:200

ARLINGTON PUBLIC SCHOOLS

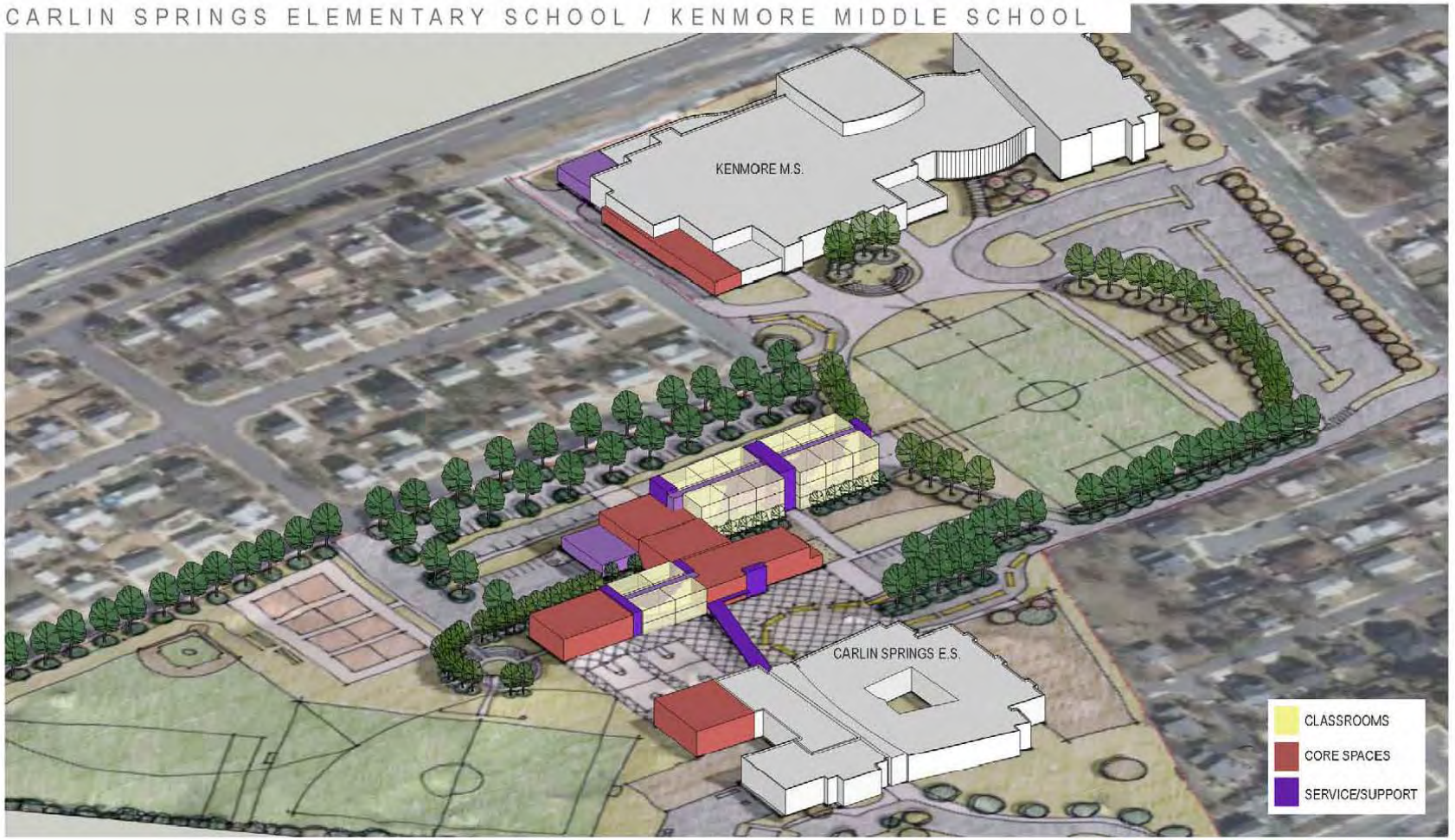
VMDO ARCHITECTS

VICINITY PLAN - SCHEME B

FEASIBILITY STUDY
NOVEMBER 2011

All Arlington Public Schools (APS) budget and operations decisions are based on the best information available at the time. Staff and community members are reminded that funding forecasts from Arlington County and the state may change, based on many external factors. Similarly, student enrollment and projections are based on the best available information, but are also subject to change due to employment, housing and other economic factors. For these reasons, APS and the Arlington School Board may adjust future budget allocations, staffing and other operations decisions to reflect the existing community and operating landscape.

CARLIN SPRINGS ELEMENTARY SCHOOL / KENMORE MIDDLE SCHOOL



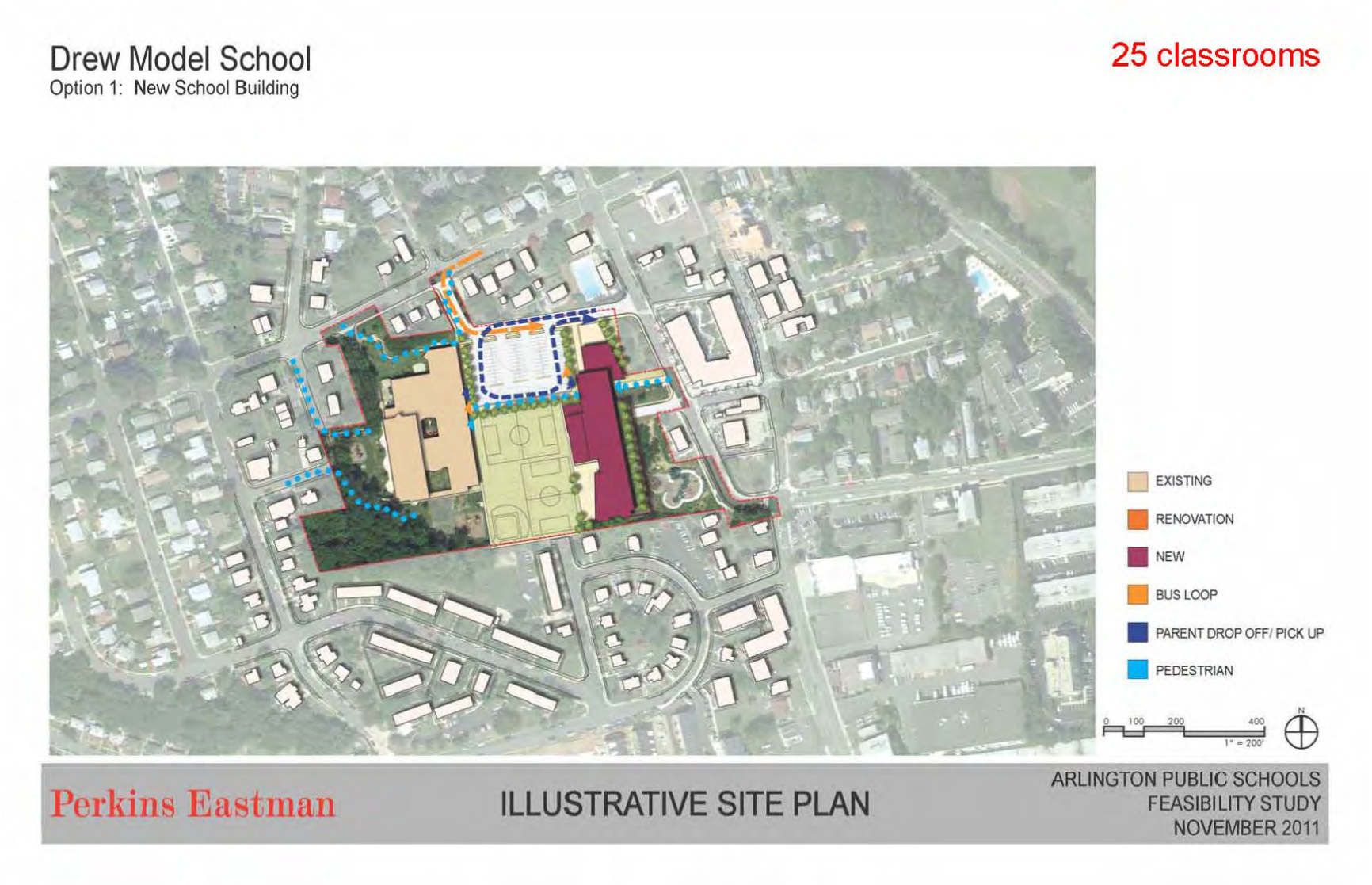
ARLINGTON PUBLIC SCHOOLS

VMDO ARCHITECTS

MASSING STUDY LOOKING NORTHEAST

FEASIBILITY STUDY
NOVEMBER 2011

Appendix A: Drew (2011)



Drew Model School

Option 1: New School Building

Perkins Eastman

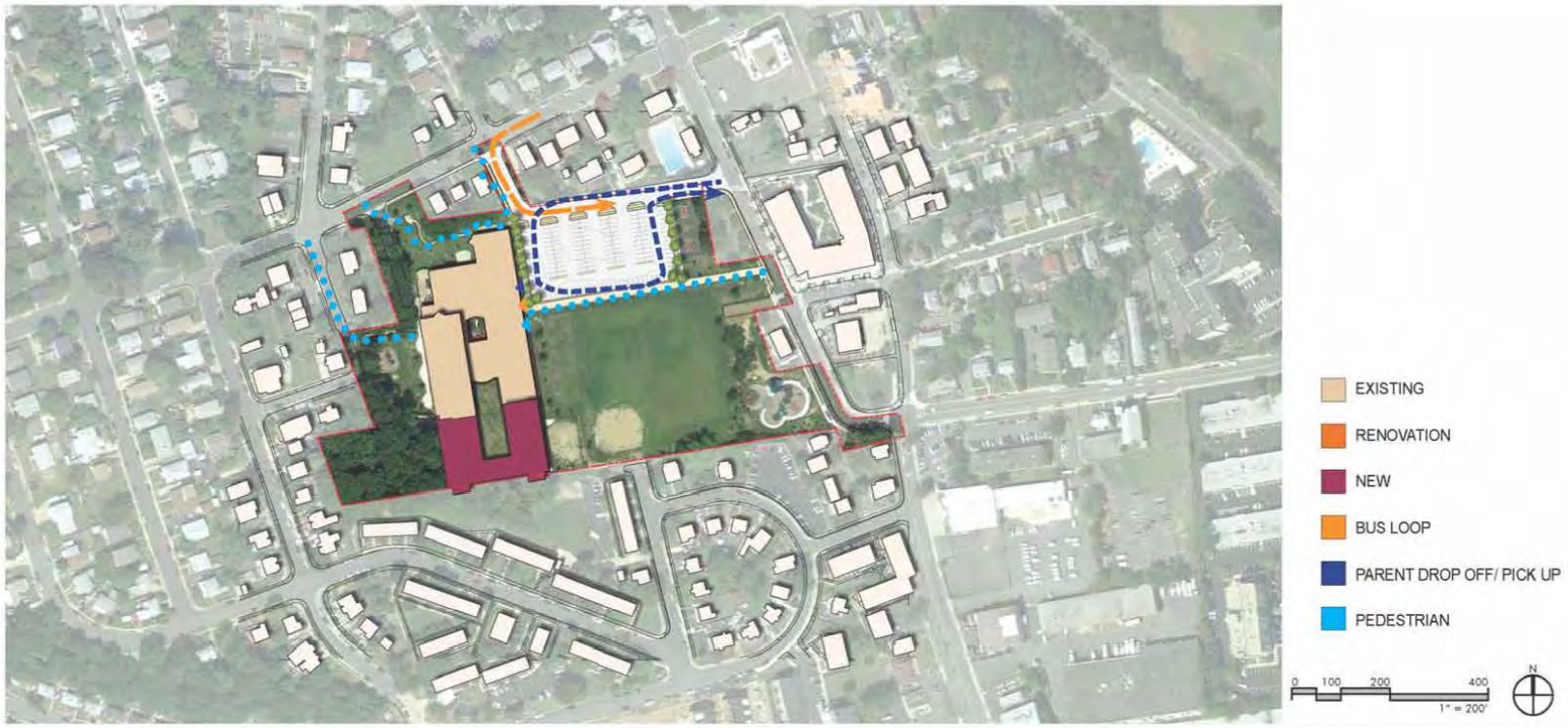
3-D IMAGE

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Drew Model School

Option 2: Addition to the Existing Building

25 classrooms max



Perkins Eastman

ILLUSTRATIVE SITE 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

Appendix A: Drew (2011)

GLEBE ELEMENTARY SCHOOL

17 classrooms max

EXISTING SITE PLAN

PROPOSED SITE PLAN

LEGEND

- EXISTING
- RENOVATION
- NEW WORK
- PROPERTY LINE
- SETBACK

KEY

A. EXISTING SCHOOL
B. PLAYGROUND
C. KINDERGARTEN PLAYGROUND
D. EXISTING RELOCATABLES
E. EXISTING PARKING
F. SOCCER FIELD
G. CHURCH
H. NURSERY PROPERTY
I. BLACKTOP PLAY AREA
J. PROPOSED AREA OF RENOVATION
K. PROPOSED ADDITION

N

0 100 200 400

1"=200'-0" SCALE OF FEET

QUINN EVANS ARCHITECTS

SITE PLANS

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

GLEBE ELEMENTARY SCHOOL

QUINN EVANS ARCHITECTS

PROPOSED MASSING AND SUMMARY

VIEW FROM SOUTH

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Appendix A: Henry (2014)

Arlington Public Schools

Patrick Henry – New Addition

existing capacity: 463
possible addition: up to 225

Pros/Cons:

Appendix A: Hoffman-Boston (2011)

Hoffman-Boston Elementary School

Perkins Eastman

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Appendix A: Jamestown (2011)

Jamestown Elementary School

12 classrooms max

Zoning and Site Constraints Plan

Site Circulation Plan

Accessible Route and Entry @ Grade
Play Areas
Site Paving
Existing Building
Proposed Addition
Storm Water Mgmt. Area
Parent Drop-Off
Bus Loop & Drop-Off
Pedestrian Route
Steep Slopes
Wooded Areas
Recommended Setback

N

1" = 200'

b|g|a
Bowie Gridley Architects

Site Diagrams

Arlington Public Schools
Feasibility Study
November 2011

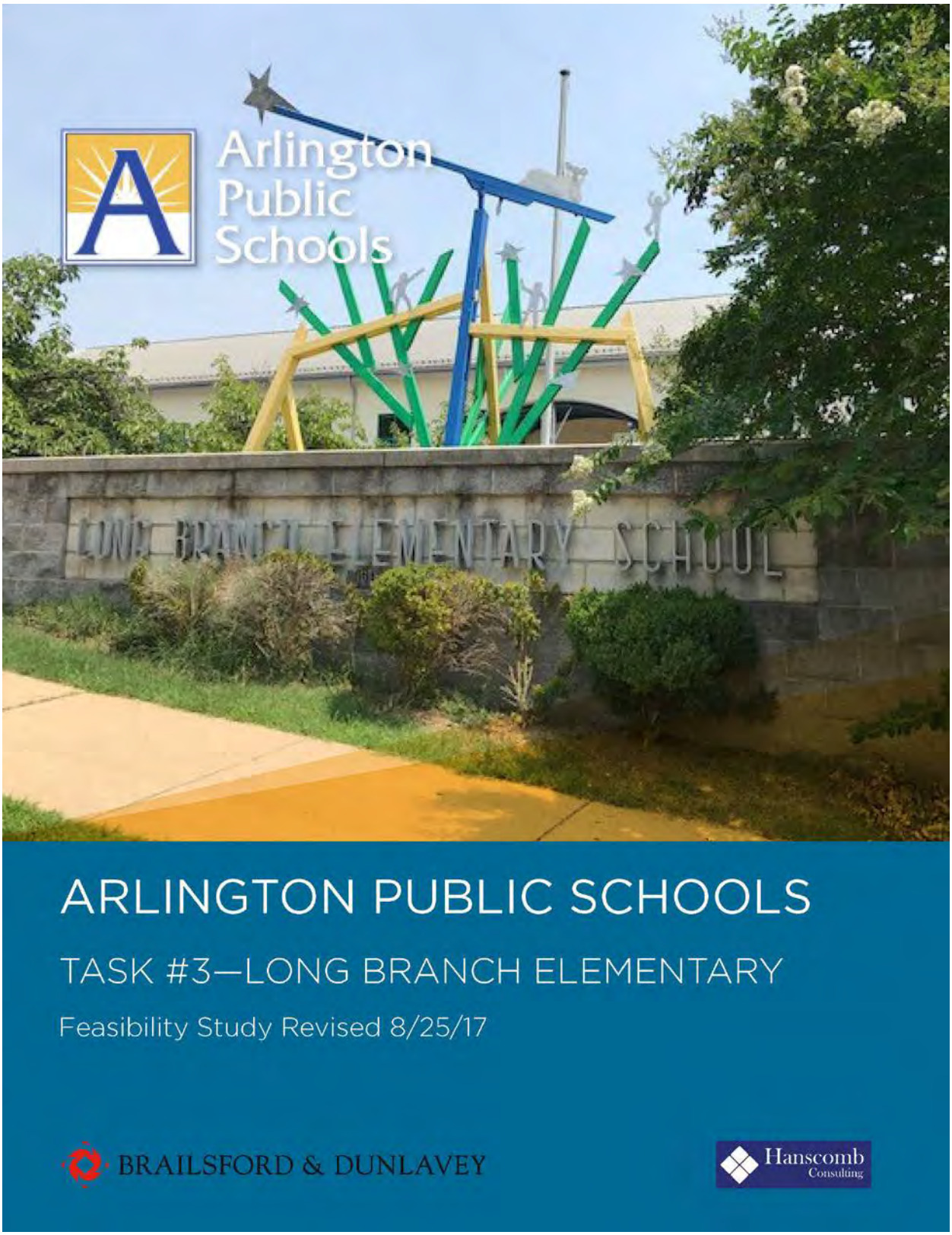
Jamestown Elementary School

b|g|a
Bowie Gridley Architects

Massing Diagrams

Arlington Public Schools
Feasibility Study
November 2011

Appendix A: Long Branch (2017)



2 | APS Task #3—Long Branch Elementary

Table of Contents

1. EXECUTIVE SUMMARY

In response to the challenges of enrollment growth and limited land resources in Arlington County, Arlington Pubic Schools ("APS") wanted to determine the feasibility of expanding its student capacity at Long Branch Elementary School. Consequently, this assessment was commissioned to explore the feasibility of adding four (4) or more classrooms at the school. The project team conducting the assessment was tasked with exploring a vertical expansion option containing four (4) classrooms by adding a floor on top of an occupied wing of the school. During the course of the assessment, the project team developed an alternative option to accommodate the additional student capacity at a minimum, analyze the results to determine feasibility and viability, and provide conclusions and recommendations to APS for the proposed expansion options.

Approach:

The project team consisted of program managers Brailsford & Dunlavey, Inc. and construction consultants Hanscomb Consulting. The project team coordinated with APS, structural engineers Ehlert Bryan, and geotechnical engineers Haley Aldrich to determine the feasibility of the proposed options.

The project team conducted site visits, gathered information from APS and the school, and studied the site and building conditions, as well as other pertinent information such as the existing structural, architectural, and topographical drawings. Based on existing documentation and feedback from APS, the project team developed and vetted possibilities and arrived at two (2) potential options for expansion.

At a programmatic level, a layout plan was developed for each option and analyzed from both an architectural and structural perspective to determine constructability, efficiency, and viability. As part of the conceptual analysis, the project team developed the following for each option:

- Scope of work
- Location plan
- Site access and logistics plan
- Structural review and analysis
- Conceptual level schedule
- Programmatic/conceptual budget estimate
- List of major pros and cons

A total project cost estimate for each option is provided based on the scope of work developed. The total project cost estimate includes the following assumptions:

- Design contingency: 10%
- General conditions, bond, insurance, overhead, and profit: 15.75%
- Escalation to mid-point of construction: 3% per year compounded
- Construction contingency: 10%
- Soft costs: 25%
- Owner's contingency: 10%

Note that these percentages are based on assumptions made at the time of this report for the purposes of comparing total project cost for each option. However, the actual percentages could vary based on a variety of factors, including but not limited to market conditions and schedule.

For all options presented, and for comparison purposes, the estimated construction cost and schedule are based on the approval of a new or amended Use Permit, design and construction permitting within a fifteen (15) month time frame. However, please note this process could take up to 18-24 months, which will influence the proposed project completion date, and escalate the project cost.

Viable Options:

Option 1 is a second-story vertical expansion (5,400 SF) on top of an existing four- (4-) classroom segment of the existing school. It was believed that the 1995 addition was designed to accommodate a future second-floor expansion of four (4) classrooms along the south wing of the building, near the west side of the new gymnasium. However, structural analysis conducted as part of this assessment revealed that neither the structure nor the foundations are adequately sized for a second floor and modifications to the existing structure would be required to support a second-floor expansion.

The project team identified a solution for mitigating structural modifications and intrusion of the existing structure by adding a mid-span column in the classroom party walls. However, foundations would need to be added for this new set of columns. To accomplish this solution, portions of the floors in each classroom would need to be cut out and excavated to install new foundations. In addition, utilities in the first-floor ceiling cavity would have to be removed temporarily and relocated to accommodate

the second-floor structure on a set of additional roof joists. As the proposed structural intrusion would be fairly significant, it was concluded that the classrooms on the first floor would need be taken out of service for the duration of the estimated eleven- (11-) month construction period and replaced with portable temporary classrooms in the school yard during construction. Considering construction is expected to greatly impact the lower classroom floor, the analysis used a total of 10,800 SF to evaluate the total impact of the proposed expansion.

Option 1 is feasible with respect to its connection to the existing building. Although it needs to be confirmed, the elevation of the existing roof structure appears to accommodate additional floor structure needed for a second floor. The second floor addition could connect to the existing second floor structure near the stair tower without additional infrastructure, such as bathrooms, an elevator or a staircase.

The Option 1 expansion would require an amendment to the Use Permit due to the additional student capacity and parking. It should be noted that during construction several parking spaces would be temporarily displaced. Additionally, construction entry and access through the existing parking lot would require coordination between construction traffic and school traffic.

The total project cost for Option 1 is estimated at just under $5 Million ($462/SF), which equates to $1.25 Million per added classroom. Based on 23.33 students per classroom, the cost of this option is $53,667 per seat. While the cost per square foot for Option 1 is 33% less than the cost per square foot for Option 2, the cost per seat is 48% higher as this option yields only four (4) additional classrooms versus the eight (8) additional classrooms in Option 2.

Option 2 is a stand-alone, two- (2) story, eight- (8) classroom building addition (9,800 SF) proposed to be located in the back of the school, adjacent to the east side of the existing gymnasium on the blacktop recreational area.

The building construction would be a free-standing steel frame with a composite steel/concrete second floor with a bar joist–supported, lightweight, insulated membrane roof. The building envelope will consist of brick and stucco veneer with ribbon or punch windows to complement the existing school's architectural features. With only a connecting corridor to the existing building, this addition would require a stair, elevator, and bathroom core.

Despite the fourteen- (14) month construction schedule, Option 2 could be executed with less disruption to the existing school operations in terms of exposure to weather impacts, parking, and on-going operational considerations. Also, this option provides more square footage than Option 1. The added square feet could be used either for classrooms or for support program spaces, depending on the needs of the school.

Due to the proposed increase to the building's footprint and the added student capacity, Option 2 would require the development and approval of a Use Permit and likely additional parking. The Use Permit approval period is longer than a Use Permit Amendment as required for Option 1. Depending on the layout and final architectural design of the addition, the school's existing lot line would be very close to the proposed addition. Therefore, the addition may have to be built partially on land owned by the County. Land acquisition or at least permission to build on County property would need to be secured by APS – an additional step required for the feasibility of Option 2. Furthermore, as the location of the proposed stand-alone addition is on the existing recreational blacktop area, the school would either lose or have to relocate its blacktop recreational area. Construction access would have to be through the shared parking lot.

The total project cost for Option 2 is estimated at $6.7 Million ($690/SF), which equates to eight (8) classrooms at $845,000 per classroom, including the construction of a stair, elevator, and bathroom core. Based on 23.33 students per classroom, the cost of Option 2 is $36,342 per seat. This equates to a lower cost per seat in comparison to Option 1, but is about $1.7 Million greater in total project cost.

Conclusion:

Option	No. of Classrooms Added	Seats Added	Estimated Total Project Cost	Cost per Seat
1	4	93	$4,991,042	$53,667
2	8	186	$6,759,665	$36,342

Based on the feasibility assessment, Option 1 with the four- (4-) classroom expansion is the more efficient option as it needs no additional support , infrastructure, or land. However, contrary to some assumptions, structural investigation confirms that the first floor was not constructed to accommodate a second-floor addition and the existing structure will require fairly significant intrusion and displacement of the first-floor classrooms. The risk of exposure to weather, the need for structural enhancement, the impact to operations/displacement of students, and the cost at $53,667 per seat are significant considerations for Option 1.

While less intrusive and therefore less risky with respect to construction, Option 2 with a stand-alone two- (2-) story structure requires its own infrastructure and therefore costs more per square foot. Option 2 yields more space and the total project cost per seat of $36,342 is significantly less than Option 1. Potential risks to be considered for Option 2 include the need for site plan approval and acquisition of land (or permission to construct on land) that is required for the addition, which may cause significant schedule impacts to the start of construction. Costs associated with potential land acquisition are not factored into the total project cost.

In addition, neither option provides for additional parking to support the added program. This issue can be addressed by developing an agreement for overflow parking with the neighboring parking lot based on zoning approval.

Each option has benefits and drawbacks. The risks, impacts, and costs provided in this report should be carefully considered when evaluating the viability of the options.

2. NARRATIVE

A. Project Approach & Team

The team of **Brailsford & Dunlavey** and **Hanscomb Consulting**, Program Managers, working with Arlington Public Schools (APS), was tasked with developing and exploring the feasibility and impact of adding four (4) or more classrooms at Long Branch Elementary School. The program management team collaborated with structural engineer, **Ehlert Bryan** in determining the structural feasibility of the options and geotechnical engineer **Haley Aldrich**. It was determined early in the study that only broad geotechnical information was required at the feasibility stage, so specific geotechnical analysis is not used in this report.

The team began the study with a review of the existing building, followed by the development and review of various possible options, and then the determination with APS of the most viable options to further explore. All available drawings of the existing school and structure, site plans, aerial photographs, and other schematic drawings were reviewed. The options were developed in concept and vetted with the school system to ensure alignment with the school's program. Incorporating the school system's requirements, and assessing the existing school capacity versus future projected enrollment, two (2) options were identified as the most likely to accommodate the school's needs and were developed further.

At a programmatic level, a layout plan was developed for the two (2) options and analyzed from both an architectural and structural perspective to determine constructability, efficiency, and viability. As part of the conceptual options, the team developed the scope of work, location plan, site access plan, structural review, conceptual budget, and a schedule for the proposed school expansion plan. A summary of pros and cons, schedule, and project budget analysis have been developed for comparison purposes (see Appendix) to assist the school division in analyzing the options, and developing a conclusion.

The estimates included throughout the report include: hard construction costs, approximate escalation, construction and owner's contingency, and project soft costs for information.

B. Existing Construction & Site Description

The existing building, in its current configuration, consists of an original construction in 1972 with an addition in 1995. Both constructions are two- (2-) level, steel frame buildings with no below grade spaces. The roof structure from the 1972 construction consists of a 2 inch lightweight, insulating concrete fill over a 1½ inch form-board with bulb tees. The roof structure from the 1995 construction consists of 1½ - 20 GA metal roof deck. Both roof systems are supported on open-web steel bar joists with wide flange steel girders and steel columns.

The elevated floor consists of a 4-inch-thick composite concrete slab over a metal deck supported on wide flange steel framing. Headed shear studs are provided on the top flange of the steel beams to provide composite action between the slab and the beams. In the 1972 construction, lightweight concrete fill was provided over the metal deck in the 1995 construction, normal weight was provided.

The building is founded on conventional spread, column and wall footings engineered to bear on soil with an allowable bearing pressure of 2,500 PSF. The ground floor consists of a wire-mesh reinforced 4 inch thick concrete grade slab over a 4 inch thickness of a gravel drainage fill. Based on our review of the foundation plans, the footings appear to have been constructed fairly deep in the ground. The top elevation of the footings ranges from 3 feet below the floor level, to as much as 7 feet or more below slab level. Top of footings in the 1995 addition appear to be situated at higher elevations.

For the most part, neither set of construction drawings identifies a distinct lateral stability system for building adequacy under wind or seismic loading; however, in the 1972 drawings, distinct masonry shear walls are identified at several locations below the second floor. Based on this notation, the general review of the drawings, and the design practice at the time of construction, it is anticipated that lateral stability is achieved from shear action of the exterior and interior masonry walls at the upper and lower levels.

Based on a review of the two (2) drawing sets, design parameters and loads are as follows:

1972 Drawing Set (Original Construction)		1995 Drawing Set (Addition)	
Building Code Reference	None	Building Code Reference	BOCA 1993
Roof	30 PSF	Roof	Ground Snow (Pg) 30 PSF Roof Snow Not Indicated
Elevated Floor	100 PSF	Elevated Floor	40 PSF Classroom
			80 PSF Office
			80 PSF Corridor
Stairs/Exits	100 PSF	Stairs/Exits	100 PSF
Mechanical Space	150 PSF	Mechanical Space	None Indicated
Wind Load	None Indicated	Wind Load	80 MPH
Seismic Load	None Indicated	Seismic Load	None Indicated

C. Structural Design Criteria for Construction

Structural Design Codes

New construction and additions to the building will be designed to meet current building codes and ordinances applicable to construction in Arlington County, Virginia. These include, but are not necessarily limited to:

1. Virginia Uniform Statewide Building Code (VUSBC / 2012)
2. Building Code Requirements for Reinforced Concrete ACI-318, American Concrete Institute, Detroit, MI
3. Manual of Steel Construction ASD, American Institute of Steel Construction, Chicago, IL
4. AISI "Specification for the Design of Cold-Formed Steel Structural Members," American Iron and Steel Institute, Washington, DC
5. Building Code Requirements for Masonry Structures and Specifications for Masonry Structures ACI-530 / 530.1, American Concrete Institute, Detroit, MI

Design Loads

Structural design parameters and loads for the building will be as follows:

- Risk Category III
- Roof Live Load
  - Roof – 30 PSF minimum
- Floor Live Load
  - Assembly / Exits – 100 PSF
  - Classrooms – 40 PSF
  - Offices / Admin – 50 PSF
  - Mechanical / Storage – 125 PSF
  - Elevated Corridors – 80 PSF
- Snow Loads
  - Ground Snow (Pg) – 25 PSF
  - Snow Importance Factor – 1.10
  - Flat-roof snow load (pf) – 22 PSF
  - Snow exposure factor (Ce) – 1.0
  - Thermal factor (Ct) – 1.0
  - Snow Drift per ASCE-7
- Wind Loads
  - Vult - 120 MPH (3 Second Gust)
  - Vasd – 92 MPH
  - Exposure B
- Seismic Loads
  - Seismic Importance Factor = 1.25
  - Ss – 0.160g
  - S1 – 0.053g
  - Site Classification – D assumed (TBD in Geotechnical Report)
  - Reinforced Masonry Shear Walls
  - Equivalent Lateral Force Method

Material Specifications for New Construction

Material specifications to be used in the building design will be as follows:

- Cast in place concrete
  - Grade Slabs – 3,500 PSI
  - Foundations – 3,000 PSI
  - Fill on Metal Deck – 3,000 PSI
- Concrete / Masonry Reinforcing Steel
  - Deformed Bars - ASTM A615, Grade 60
  - Welded Wire Fabric – ASTM A185
- Concrete Unit Masonry
  - Concrete Masonry Units – ASTM C90, f'm = 1,500 PSI
  - Mortar – ASTM C270, Type M or S
- Structural Steel
  - Primary Steel Framing – ASTM A992
  - Miscellaneous Steel – ASTM A36
  - Hollow Steel Sections - ASTM A500, Gr B
- Cold Formed Metal Framing
  - Metal framing – ASTM A525 (fy=33 and 50 KSI)
- Soils Design Values – 2,500 PSF (assumed)
  - Subgrade modulus and foundations/allowable soil bearing pressure to be determined per recommendation of Geotechnical Engineer based on Subsurface Soils Investigation and Report.

D. Site Description

Long Branch Elementary School is located at 33 North Fillmore Street, Arlington, Virginia. The property includes a blacktop area and playground where the current relocatable classrooms are located at the northeast corner of the school. The school currently does not own this land. Below are the site limitations of the school.

E. Overview of Options

Option 1

Option 1 anticipates a vertical expansion on the south wing of the building on top of four (4) existing classrooms totaling 5,400 SF. This is a great option if the school does not want to increase the total footprint of the building. During the construction process the four (4) lower classrooms affected would need to be relocated. This cost is included in the total project cost. Rebuilding the four (4) lower classrooms drives the total square footage of the project from 5,400 SF to 10,800 SF. The option would yield a net of four (4) additional classrooms, adding 5,400 square feet to the school. The total estimated cost is $4,991,042, which is $462/SF (based on 10,800 SF), and breaks out to cost $53,667 per seat. The construction schedule would extend from the time school gets out in June until the following May for a total of eleven (11) months.

Option 2

Option 2 proposes to add a new freestanding structure on the east side of the school in the current location of the blacktop area, adjacent to the existing gymnasium. The existing relocatable classrooms would remain in the same area, in the northeast corner of the school. This option would yield eight (8) classrooms, adding 9,800 square feet to the school. The total estimated cost is $6,759,665, which is $690/SF, and breaks out to $36,342 per seat. The schedule would extend from the time school gets out in June until the following July for a total of fourteen (14) months.

3. OPTIONS

A. Option 1—Vertical Expansion

1. Description of Option & Scope of Work

The idea of a 2nd floor addition at the south wing was derived from the original plans for the school. When the school was first constructed, this second floor was initially planned, but was removed from the construction plans due to budgetary constraints. APS required verification if the structure was sized during the original construction to accommodate the second floor. However, Ehlert Bryan's structural analysis revealed neither the structure nor the foundations are sized for a second floor, and the roof joists are inadequate to carry the load of a second floor.

The option to add the second floor would yield four (4) new classrooms and would connect with the existing second floor structure adjacent to the existing stairwell located near the front of the school. Even though the addition will add the originally contemplated second floor, the structure will have to be modified in order to carry the weight of the proposed second floor, and would affect the four (4) existing classrooms below the proposed addition. Accordingly, these existing classrooms would have to be taken out of service for the duration of the construction. In order to accommodate this, a "swing" space consisting of four (4) relocatable classrooms would be required for one school year. The added classrooms on the second floor would be under 900 square feet each, making them available for grades 1–5.

Construction of this option would have a duration of eleven (11) months and would include the following scope of work:

- Establish the construction site limitations (refer to the site access plan included in this section).
- Install four (4) additional relocatable classrooms at the back of the school.
- Install temporary protections to the existing school to minimize unnecessary damage and impact areas outside of the construction zone.
- Remove the roof structure of the existing four (4) classrooms and parts of the floors and walls of the classrooms on the first floor to access required structural modifications.
- Remove and re-route any utilities in the first floor ceiling cavity to allow the existing joists to be fortified or to add new joists.
- Make necessary adjustments to the existing steel columns and beams to support the second floor and the roof.
- Install a new structure, including party wall mid-span foundations and steel columns to carry the weight of the second floor, up through and including a new roof at the second floor using bar joists, a metal deck and a mechanically fastened roof system.
- Reinstall removed first floor ceiling utilities. Rough in all necessary mechanical, electrical, and plumbing, and install any new mechanical units as required.
- Install an exterior EIFS (Exterior Insulation Finish System) building skin to match the existing building skin and glazing.
- Fit out the interior of the spaces of the four (4) new classrooms to include suspended acoustical ceilings, light fixtures, millwork, doors frames and hardware, paint, and flooring.
- Test and balance the air-conditioning system for the classrooms below and the new classrooms to ensure commissioning is effective.
- At the end of construction, turn the site back over to the school and replace any landscaping or grading that was disturbed before the new school year.

The additional permanent capacity of this option is 93 seats based on 23.33 students per classroom. This would increase the total permanent capacity of the school from 533 seats to 626 seats.

2. Plan View

3. Structural & Soil Review

In a typical bay at the location of the proposed vertical expansion, the existing roof consists of 1 ½ - 20 GA Type B metal roof deck over 16K4 joists spanning 26'-6". The joists are installed level and span between W18X46 steel beams, also level, that are supported on 4X4X5/15 steel tube columns. The columns are founded on 4'-6" X 4'-6" X 12" concrete footings.

No geotechnical testing was performed for consideration in the performance of this study. However, based on the two (2) sets of original drawings, foundations for both constructions were engineered for an allowable soil bearing pressure of 2,500 PSF. The 1995 drawings also indicated that a geotechnical report was provided at that time. It is reasonable to consider 2,500 PSF for soil bearing since it has been proven twice before; however, a geotechnical testing would have to be performed at the time of the new construction in order to confirm the foundation design parameters and provide a document for permit submission.

Per current building code, the elevated floor of the proposed vertical expansion would be required to support a live load suitable for classrooms. The bare minimum this could be is 40 PSF. In order to construct a floor at the same level as the current 2nd floor, a minimum of 4½ inches would have to be placed over the existing metal roof deck. Considering the addition of 4 ½ inches of light-weight concrete fill at 110 PCF and a 40 PSF live load, the following conditions would exist:

- The 1½ - 20 GA metal roof deck would be adequate to support the wet weight of concrete and to perform as a floor.
- The 16K4 joists would be 64% overstressed due to the added dead and live loads
- The W18 steel beam would be 12% overstressed due to added loading, but will also have a ½-inch live load deflection at the cantilever end under 40 PSF transient loading.

Also, considering the addition of the roof structure above the proposed second floor, the existing columns would need to be extended to the roof level to support a joist and beam construction with a metal deck roof. Considering this scenario along with a 30 PSF snow load, the following conditions would exist:

- The interior 4X4X5/16 tube column would be 17% overstressed, but the exterior 4X4X5/16 column would be structurally adequate.
- Similarly, the footing at the interior column would be 66% overstressed due to soils pressure, but the exterior wall column would only be overstressed by about 7%.

Based on this analysis, Ehlert Bryan found that the existing structure is not able to support the vertical addition without strengthening of the steel framing, columns, and foundations. In order to resolve the column and footing issues, a new column and footing may be placed halfway between the two existing columns. This serves to shorten the span of the W18, thus making it structurally adequate. It also serves to render the columns and footings structurally adequate by reducing the distribution of load to those components.

Traditionally, open web steel bar joists may be reinforced to increase their load-carrying capacity. This is generally done by welding parallel smooth round rods to the existing chords–top and bottom. In general, it is possible to increase the load capacity 30% to 40%, but achieving a 64% increase will not be feasible. Consequently, we recommend installing additional joists halfway between the existing joists. This will serve to reduce the loading distribution to these existing joists by half, or doubling the load capacity of the overall joist framing. This scope of work will also require the removal and replacement of the roof deck, the relocation of the existing electrical conduits, and the relocation or temporary removal of pipes, which will be replaced after the new joists are installed.

For the construction of the future roof, it is anticipated that a 1½-inch metal deck will be supported on new open-web steel bar joists. The joists would bear on steel beams in the same alignment as the floor below, and would be supported on new tube columns that would align with the existing columns, below. The exterior wall construction at the south side would consist of the same masonry construction with a veneer; however, it is expected that the interior walls and the exterior wall on the north side would consist of cold-formed metal framing in order to minimize weight.

4. Site Access

The construction staging area, pictured below, for this addition would have to be placed in the parking lot next to the school during the summer. When school resumes, it could be confined to a smaller area during the fit out phase of the project. The staging area is outlined with the orange dotted line. It is recommended that the contractor utilizes an exterior stair tower and material lift to minimize construction traffic within the school.

Photo 1.1

Photo 1.2

5. Estimated Budget

The total estimated cost for this addition is $4,991,042. This includes hard costs, escalation, soft costs, and owner's contingency. The breakdown of the estimate can be found on the following pages.

Long Branch Elementary School
School Expansion Feasibility Options

Hanscomb Consulting

Option 1 Summary

			$/SF	TOTAL	%
	Gross Area:		10,800 SF		
A10	Foundations		6.61	71,336	2%
A20	Basement Construction		0.65	7,000	0%
A	**Substructure**		**7.25**	**78,336**	**2%**
B10	Superstructure		33.55	362,350	11%
B20	Exterior Enclosure		24.89	268,818	8%
B30	Roofing		12.56	135,600	4%
B	**Shell**		**71.00**	**766,768**	**23%**
C10	Interior Construction		22.63	244,353	7%
C20	Stairways		0.00	0	0%
C30	Interior Finishes		17.75	191,700	6%
C	**Interiors**		**40.38**	**436,053**	**13%**
D10	Conveying Systems		0.00	0	0%
D20	Plumbing Systems		4.63	49,950	2%
D30	Heating, Ventilation & Air Conditioning		26.00	280,800	9%
D40	Fire Protection		3.00	32,400	1%
D50	Electrical Lighting, Power & Communications		31.50	340,200	10%
D	**Services**		**65.13**	**703,350**	**21%**
E10	Equipment		4.00	43,200	1%
E20	Furnishings		3.65	39,451	1%
E	**Equipment & Furnishings**		**7.65**	**82,651**	**3%**
F10	Special Construction		9.26	100,000	3%
F20	Selective Demolition		1.95	21,060	1%
F	**Special Construction & Demolition**		**11.21**	**121,060**	**4%**
G10	Site Preparation		1.33	14,310	0%
G20	Site Improvements		5.79	62,500	2%
G30	Site Mechanical Utilities		8.15	88,000	3%
G40	Site Electrical Utilities		3.47	37,500	1%
G90	Other Site Construction		0.00	0	0%
G	**Building Sitework**		**18.73**	**202,310**	**6%**
Z1	Design Contingency	10.00%	22.13	239,053	7%
BUILDING & SITEWORK DIRECT COST BEFORE GC MARK-UPS			**243.48**	**2,629,581**	**80%**
Z10	General Conditions	8.00%	19.48	210,366	6%
Z11	Phasing/Interface	1.00%	2.63	28,399	1%
Z12	Bonds & insurances	1.75%	4.65	50,196	2%
Z13	Contractors Overhead & Profit	5.00%	13.51	145,927	4%
TOTAL CONSTRUCTION COST BEFORE ESCALATION			**283.75**	**3,064,470**	**93%**
Z30	Escalation	7.68%	21.80	235,393	7%
ESTIMATED CONSTRUCTION COST AT AWARD			**305.54**	**3,299,862**	**100%**
	Construction Contingency	10.00%		329,986	
	Project Soft Costs	25.00%		907,462	
	Owner's Contingency	10.00%		453,731	
ESTIMATED TOTAL COST			**462.13**	**4,991,042**	

Long Branch Elementary School
School Expansion Feasibility Options

Hanscomb Consulting

Option 1

	Quantity	Unit	Rate	Total
A10 Foundations				
Add/Modify spread footings	12	SF	3,200.00	38,400
Modify perimeter wall footing	27	CY	525.00	14,036
Patch 6" thick slab on grade, incl. 6" gravel	1,890	SF	10.00	18,900
				71,336
A20 Basement Construction				
A2010 Basement Excavation				
Excavate/fill as required	140	CY	30.00	4,200
Backfill with excavated material	140	CY	20.00	2,800
				7,000
B10 Superstructure				
B1010 Floor Construction				
Steel frame	24	Tons	4,500.00	109,350
Metal deck & concrete	5,400	SF	11.00	59,400
B1020 Roof Construction				
Steel frame	32	Tons	4,500.00	145,800
Roof decking & insulation	5,400	SF	7.00	37,800
Steel Roof dunnage	1	LS	10,000.00	10,000
				362,350
B20 Exterior Enclosure				
B2010 Exterior Walls				
Brick & stud back-up cavity wall, incl. insulation etc	1,089	SF	40.00	43,560
EIFS to upper floor	3,303	SF	28.00	92,492
Coping	330	LF	35.00	11,550
B2020 Exterior Windows				
Fixed windows (35%)	1,779	SF	65.00	115,616
B2030 Exterior Doors				
Solid exterior doors, complete; double	2	PR	2,800.00	5,600
				268,818

Long Branch Elementary School
School Expansion Feasibility Options

Hanscomb Consulting

Option 1	Quantity	Unit	Rate	Total
B30 Roofing				
B3010 Roof Coverings				
Roof coverings & insulation	5,400	SF	24.00	129,600
B3020 Roof Openings				
Allowance for penetrations	6	EA	1,000.00	6,000
				135,600
C10 Interior Construction				
C1010 Partitions				
Interior partitions allowance	7,290	SF	13.50	98,415
Interior glazing/storefront allowance	4,050	SF	2.75	11,138
Allow for misc. metals and blocking	5,400	SF	2.50	13,500
C1020 Interior Doors				
Interior doors including door, frame & hardware complete, allow				
- Single leaf	16	EA	1,400.00	22,400
- double leaf	2	EA	2,200.00	4,400
C1030 Fittings				
Allowance	6,750	SF	14.00	94,500
				244,353
C30 Interior Finishes				
C3010 Wall Finishes				
Allowance - Includes 15% wall touch up/finish for 1st fl	6,750	SF	4.50	30,375

Long Branch Elementary School
School Expansion Feasibility Options

Hanscomb Consulting

Option 1	Quantity	Unit	Rate	Total
C3020 Floor Finishes				
Allowance - includes 15% floor patching on 1st floor	6,750	SF	9.50	64,125
C3030 Ceiling Finishes				
Allowance - New ceilings floors 1 and 2	10,800	SF	7.50	81,000
Allowance for premium ceilings	1,080	SF	15.00	16,200
				191,700
D20 Plumbing Systems				
Plumbing Fixtures				
Allowance - Plumbing rework at first floor ceiling	5,400	SF	$1.85	9,990
Domestic Water Distribution				
Allowance - Water line distribution rework at 1st fl ceiling	5,400	SF	$2.60	14,040
Sanitary Waste and Vent Distribution				
Allowance - includes rework at 1st floor ceiling	5,400	SF	$2.20	11,880
Storm Distribution				
Allowance - includes rework at 1st floor ceiling	5,400	SF	$1.40	7,560
Other Plumbing Systems				
Allowance - includes rework at 1st floor ceiling	5,400	SF	$1.20	6,480
				49,950
D30 Heating, Ventilation & Air Conditioning				
Allowance - includes some rework on first floor	5,400	SF	$52.00	280,800
				280,800
D40 Fire Protection				
Allowance - All new both floors	10,800	SF	$3.00	32,400
				32,400
D50 Electrical Lighting, Power & Communications				
Allowance - includes rework at 1st fl ceiling	8,100	SF	$42.00	340,200

Long Branch Elementary School
School Expansion Feasibility Options

Hanscomb Consulting

Option 1	Quantity	Unit	Rate	Total
				340,200
E10 Equipment				
E1020 Institutional Equipment				
Allowance	10,800	SF	$4.00	43,200
				43,200
E20 Furnishings				
E2010 Fixed Furnishings				
Window Treatments	1,779	SF	7.00	12,451
General allowance	10,800	SF	2.50	27,000
				39,451
F10 Special Construction				
F1010 Special Structures				
New temporary classrooms	4	EA	$25,000.00	100,000
				100,000
F20 Selective Demolition				
F2010 Building Elements Demolition				
Selective demolition & haul existing bldg & roof	32,400	CF	0.65	21,060
F2020 Hazardous Components Abatement				
Excluded				Excluded
				21,060
G10 Site Preparation				
G1010 Site Clearing				
Allowance for areas around existing building	2,700	SF	1.00	2,700
G1020 Site Demolition and Relocations				
Allow for removal of slab on grade & footings	2,700	SF	2.50	6,750
Allow for relocating underground utilities		LS	15,000.00	

Long Branch Elementary School
School Expansion Feasibility Options

Hanscomb Consulting

Option 1	Quantity	Unit	Rate	Total
G20 Site Improvements				
G2030 Pedestrian Paving				
Allowance	500	SF	30.00	15,000
G2040 Site Development				
Clear & prepare pad for temporary classrooms	7,500	SF	3.00	22,500
Allowance for site walls, ramps etc	1	LS	10,000.00	10,000
G2050 Landscaping				
Allowance	1	LS	15,000.00	15,000
				62,500
G30 Site Mechanical Utilities				
Water - allowance, incl. to temporary classrooms	1	LS	$18,000.00	18,000
Storm drainage - allowance	1	LS	$35,000.00	35,000
Sewer - allowance, incl. to temporary classrooms	1	LS	$35,000.00	35,000
				88,000
G40 Site Electrical Utilities				
G4010 Electrical Distribution				
Allowance, incl. to temporary classrooms	1	LS	22,500.00	22,500
G4020 Site Lighting				
Allowance	1	LS	7,500.00	7,500
G4030 Site Communications & Security				
Allowance	1	LS	7,500.00	7,500
				37,500

6. Schedule

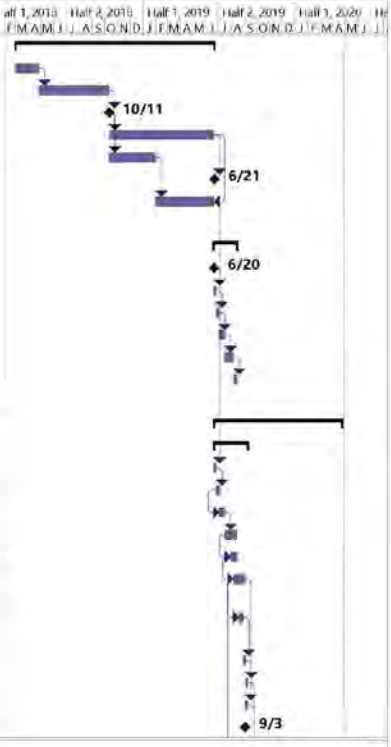
The construction schedule for this option would span over a summer and the next consecutive school year for a total length of roughly eleven (11) months. It assumes starting construction in June when school gets out. The first June that would allow adequate time for the design phase is June 2019. Due to the length of the schedule, the four (4) classrooms impacted by the addition would have to be supported by additional relocatables for one school year.

Below you can find a timeline of the Option 1 schedule including the design phase. A full schedule can be found on the following pages.

Option 1—Vertical Expansion

Schedule Option 1 - Long Branch - One floor vertical expansion

ID	Task Name	Duration	Start	Finish	Predecessors
1	**Design Phase**	**342 days**	**Thu 3/1/18**	**Fri 6/21/19**	
2	Designer procurement	40 days	Thu 3/1/18	Wed 4/25/18	
3	Design development	120 days	Thu 4/26/18	Wed 10/10/18	2
4	Permit Set complete	1 day	Thu 10/11/18	Thu 10/11/18	3
5	Building plan approval/permit	180 days	Fri 10/12/18	Thu 6/20/19	3,4
6	Construction drawings	80 days	Fri 10/12/18	Thu 1/31/19	4
7	Building permit	1 day	Fri 6/21/19	Fri 6/21/19	5
8	General contractor procurement	100 days	Fri 2/1/19	Thu 6/20/19	5FF,6
9					
10	**Install demountable classrooms**	**41 days**	**Thu 6/20/19**	**Thu 8/15/19**	
11	Last Day of School	1 day	Thu 6/20/19	Thu 6/20/19	
12	Mobilize contractor	3 days	Fri 6/21/19	Tue 6/25/19	8,11
13	Site prep for demountables	5 days	Wed 6/26/19	Tue 7/2/19	12
14	U/G utilities for demountables	10 days	Wed 7/3/19	Tue 7/16/19	13
15	Install demountables	15 days	Wed 7/17/19	Tue 8/6/19	14
16	Site concrete - SW/Stairs	7 days	Wed 8/7/19	Thu 8/15/19	15
17					
18	**Building Construction**	**221 days**	**Fri 6/21/19**	**Fri 4/24/20**	
19	**Structure**	**58 days**	**Fri 6/21/19**	**Tue 9/10/19**	
20	Mobilize contractor	3 days	Fri 6/21/19	Tue 6/25/19	8
21	Temp protections	7 days	Wed 6/26/19	Thu 7/4/19	20
22	Roof and select demolition	10 days	Wed 7/3/19	Tue 7/16/19	21SS+5 days
23	Strengthen foundations & columns	20 days	Wed 7/17/19	Tue 8/13/19	22
24	Masonry at stair towers	12 days	Wed 7/31/19	Thu 8/15/19	23SS+10 days
25	Steel frame - new 2nd fl, walls & roof steel	20 days	Wed 8/7/19	Tue 9/3/19	24SS+5 days
26	First elevated floor structural framing	9 days	Mon 8/19/19	Thu 8/29/19	25SS+8 days
27	First elevated fl metal decking	4 days	Fri 8/30/19	Wed 9/4/19	26
28	Slab @ elevated deck prep/pour	4 days	Thu 9/5/19	Tue 9/10/19	27
29	Roof joists and decking	5 days	Wed 9/4/19	Tue 9/10/19	25
30	First Day of School	1 day	Tue 9/3/19	Tue 9/3/19	



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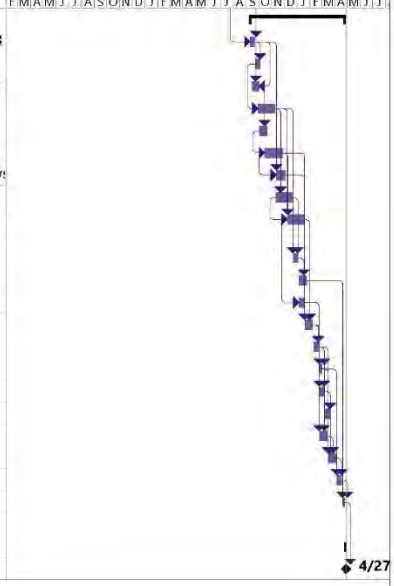
Schedule Option 1 - Long Branch - One floor vertical expansion

ID	Task Name	Duration	Start	Finish	Predecessors
31	**Close in and fit out**	**163 days**	**Wed 9/11/19**	**Fri 4/24/20**	
32	Building exterior wall framing	8 days	Wed 9/11/19	Fri 9/20/19	25SS+7 days,28
33	Exterior wall sheathing	10 days	Mon 9/23/19	Fri 10/4/19	32
34	Roofing	12 days	Mon 9/16/19	Tue 10/1/19	29,32FF+7 days
35	Exterior building skin	30 days	Mon 9/30/19	Fri 11/8/19	33SS+5 days
36	Interior wall framing	14 days	Wed 10/2/19	Mon 10/21/19	34
37	MEP Rough in walls and ceilings	30 days	Wed 10/16/19	Tue 11/26/19	36SS+10 days
38	Set Mechanical Equipment	15 days	Wed 11/13/19	Tue 12/3/19	32,37SS+20 days
39	Windows	30 days	Mon 11/11/19	Fri 12/20/19	35
40	Wall close in	30 days	Mon 12/9/19	Fri 1/17/20	37,35,39SS+20 days
41	Exterior grading	10 days	Mon 12/23/19	Fri 1/3/20	35,39
42	Site concrete - SW/Stairs	15 days	Mon 1/6/20	Fri 1/24/20	41
43	Set door frames	10 days	Mon 1/6/20	Fri 1/17/20	40SS+20 days
44	Ceiling grid and light fixtures	15 days	Mon 1/20/20	Fri 2/7/20	37,40,38
45	Finishes/Paint	10 days	Mon 2/10/20	Fri 2/21/20	44
46	Grilles, registers and diffusers	5 days	Mon 2/24/20	Fri 2/28/20	44,45
47	Elec Trimout	10 days	Mon 2/24/20	Fri 3/6/20	44,45
48	Specialties	10 days	Mon 3/9/20	Fri 3/20/20	47
49	Doors and Hardware	15 days	Mon 2/24/20	Fri 3/13/20	43,45
50	Flooring	15 days	Mon 3/16/20	Fri 4/3/20	45,46,47,49
51	Test and balance	10 days	Mon 4/6/20	Fri 4/17/20	46,50
52	Building Turnover	5 days	Mon 4/20/20	Fri 4/24/20	42,51
53					
54	**Project Completion**	**1 day**	**Mon 4/27/20**	**Mon 4/27/20**	
55	Project Completion	1 day	Mon 4/27/20	Mon 4/27/20	52



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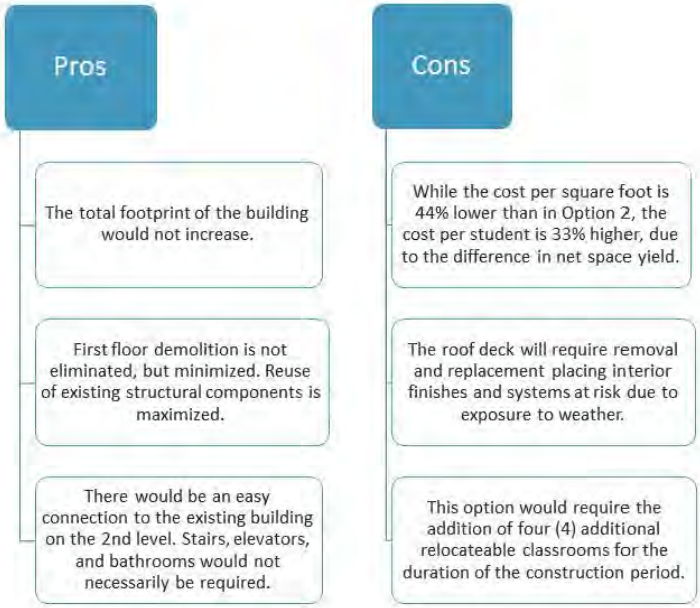
7. Pros & Cons

The team offers the following pros and cons for consideration.



8. Summary

A second-floor addition at the south corner of the school would yield four (4) new classrooms. The total estimated costs to complete this work is $4,991,042 with a construction duration of approximately eleven (11) months, extending over a summer and the consecutive school year. The cost per square foot is relatively low, as the addition consists only of classrooms, without the need for additional support program spaces. Additionally, the connection to the existing school would be relatively simple, without the need for an elevator or additional set of stairs. While the estimated cost per square foot is relatively low, it translates to an investment of $53,667 per seat.

Attempting to build out the structure and return the classrooms on the first floor by the start of school in the Fall may be possible; however, the risks of attempting this include:

- Significant schedule pressure, driving up cost significantly
- Exposure of the school to weather
- Significant risk of not completing the addition in time for the start of school
- Safety risks of working around an occupied space

Therefore, the approach to this option will include removing the existing first-floor four (4) classrooms from use for a year and providing temporary classrooms as "swing" space for the students. These conditions will add cost and will reduce play space and require temporary classrooms.

B. Option 2—New Structure at Blacktop Area

1. Description of Option & Scope of Work

Option 2 includes a new freestanding structure at the current location of the blacktop, adjacent to the gymnasium. This option adds 9,800 SF to the school, which can be used for up to eight (8) additional classrooms, or for other support program space. The building would have four (4) classrooms per floor and would include an internal staircase, elevator, small group bathrooms, and some additional storage space. Under this program, classroom sizes are under 900 square feet each, making them ideal for grades 1–5. Construction duration is anticipated to be fourteen (14) months and would include the following:

- Establish the construction site limits (refer to the site access plan included in this section).
- Install temporary protections to the existing school and around the proposed building site to segregate construction activities, minimize unnecessary damage, and impact areas outside of the construction zone.
- Remove the blacktop and install underground utilities.
- Grade the existing area and construct all structural foundation work.
- Install a new steel-frame two-story structure, with metal stud interior and exterior walls.
- The second floor roof is anticipated to be a conventionally framed bar-joist composite steel and concrete framed deck.
- Rough in for all necessary mechanical, electrical and plumbing and install any new units as required.
- Install the building skin using an exterior brick veneer cavity wall with metal stud backing, sheathing on the first floor, and EIFS on the second floor.
- Install a mechanically-fastened membrane flat roofing over the metal deck.
- Install ribbon or punch windows.
- Fit out the interior spaces of the eight (8) new classrooms ((four (4) per floor)) with impact-resistant drywall, suspended acoustical ceiling, light fixtures, millwork, doors, frames and hardware, paint, and flooring. Flooring is anticipated to be carpet in the classrooms and wearable surface in the corridors.
- Test and balance the air-conditioning system for the classrooms below and the new classrooms to ensure commissioning is effective.
- At the end of construction, turn the site back over to the school and replace any landscaping or grading that was disturbed before the new school year.

The additional permanent capacity of this option is 186 seats based on 23.33 students per classroom. The additional permanent capacity of the school would increase from 533 seats to 719 seats.

2. Plan View

3. Structural & Soil Review

For the construction of a two-story addition to the building, Ehlert Bryan anticipates that the structural systems would be similar to the original building.

1½-metal roof deck over open web steel bar joists spaced at 5'-0" is anticipated for the roof system. Elevated floors would be a composite system consisting of 5-inch normal weight concrete over 2-inch metal deck supported by wide flange beams spaced at 8 feet, on center. The roof and elevated floors would be supported on either steel columns or loadbearing masonry walls. Conventional grade slabs and spread footings bearing at shallow depths below the ground surface are anticipated.

Interior and exterior walls for the building are expected to consist of masonry. Cold-formed metal stud framing will be used where prudent; high durability wall finishes are less important.

The addition would be a separate building, with a fire wall, from the original building, as needed by area calculations. This will also aid in phasing the fire alarm and sprinkler construction relative to the existing systems. A fire wall is anticipated between the new and existing construction. Some renovation to the existing building will be needed to interface the addition to the existing construction. Lateral stability for the addition is best provided using shear action of the interior and exterior masonry walls.

No geotechnical testing was performed for consideration in the performance of this study. However, based on the two (2) sets of original drawings, foundations for both constructions were engineered for an allowable soil bearing pressure of 2,500 PSF. The 1995 drawings also indicated that a geotechnical report was provided at that time. It is reasonable to consider 2,500 PSF for soil bearing since it has been utilized before; however, geotechnical testing would have to be performed at the time of new construction in order to confirm the foundation design parameters and provide a document for permit submission.

4. Site Access

Site access would be restricted to the back of the building. The contractor would most likely need to occupy a few parking spaces during the construction period. The construction fence could be kept close to the footprint of the addition with a small laydown space for materials. The rest of the blacktop area, relocatable classrooms, and playground would all remain as usable space during the school year. Construction traffic would have to travel through the school parking lot. To limit impact of noise and large deliverables to the school, schedule most of the heavy civil and structural construction to be done throughout the summer.

Photo 2.1

Photo 2.2

Photo 2.3

Photo 2.4

5. Estimated Budget

The total estimated cost for this addition is $6,759,665. This includes hard costs, escalation, soft costs, and owner's contingency. Not included in the cost is land acquisition, storm water management, or hazardous waste remediation for site preparation or selective demolition. The breakdown of the estimate can be found on the following pages.

Long Branch Elementary School
School Expansion Feasibility Options

Hanscomb Consulting

Option 2 Summary

			$/SF	TOTAL	%
	Gross Area:		9,600 SF		
A10	Foundations		15.62	153,111	3%
A20	Basement Construction		7.92	77,640	2%
A	**Substructure**		**23.55**	**230,751**	**5%**
B10	Superstructure		37.02	362,800	8%
B20	Exterior Enclosure		38.50	377,254	8%
B30	Roofing		12.51	122,600	3%
B	**Shell**		**88.03**	**862,654**	**19%**
C10	Interior Construction		39.69	388,950	9%
C20	Stairways		3.07	30,080	1%
C30	Interior Finishes		23.00	225,400	5%
C	**Interiors**		**65.76**	**644,430**	**14%**
D10	Conveying Systems		9.18	90,000	2%
D20	Plumbing Systems		8.95	87,710	2%
D30	Heating, Ventilation & Air Conditioning		52.00	509,600	11%
D40	Fire Protection		3.00	29,400	1%
D50	Electrical Lighting, Power & Communications		42.00	411,600	9%
D	**Services**		**115.13**	**1,128,310**	**25%**
E10	Equipment		4.00	39,200	1%
E20	Furnishings		3.98	39,015	1%
E	**Equipment & Furnishings**		**7.98**	**78,215**	**2%**
F10	Special Construction		0.00	0	0%
F20	Selective Demolition		1.02	10,000	0%
F	**Special Construction & Demolition**		**1.02**	**10,000**	**0%**
G10	Site Preparation		4.42	43,275	1%
G20	Site Improvements		14.29	140,000	3%
G30	Site Mechanical Utilities		7.14	70,000	2%
G40	Site Electrical Utilities		3.06	30,000	1%
G90	Other Site Construction		0.00	0	0%
G	**Building Sitework**		**28.91**	**283,275**	**6%**
Z1	Design Contingency	10.00%	33.04	323,763	7%
BUILDING & SITEWORK DIRECT COST BEFORE GC MARK-UPS			**363.41**	**3,561,397**	**80%**
Z10	General Conditions	8.00%	29.07	284,912	6%
Z11	Phasing/Interface	1.00%	3.92	38,463	1%
Z12	Bonds & insurances	1.75%	6.94	67,984	2%
Z13	Contractors Overhead & Profit	5.00%	20.17	197,638	4%
TOTAL CONSTRUCTION COST BEFORE ESCALATION			**423.51**	**4,150,394**	**93%**
Z30	Escalation	7.68%	32.53	318,806	7%
ESTIMATED CONSTRUCTION COST AT AWARD			**456.04**	**4,469,200**	**100%**
	Construction Contingency	10.00%		446,920	
	Project Soft Costs	25.00%		1,229,030	
	Owner's Contingency	10.00%		614,515	
ESTIMATED TOTAL COST			**689.76**	**6,759,665**	

Long Branch Elementary School
School Expansion Feasibility Options

Hanscomb Consulting

Option 2

	Quantity	Unit	Rate	Total
A10 Foundations				
A1010 Standard Foundations				
Spread Footings	20	EA	1,500.00	30,000
Perimeter wall footing	75	CY	525.00	39,472
Elevator pit	1	EA	7,500.00	7,500
Waterproofing to pit walls	180	SF	12.00	2,160
Perimeter foundation drain	290	LF	20.00	5,800
A1020 Special Foundations				
n/a				
A1030 Slab on Grade				
Excavate for SOG	121	CY	12.00	1,453
Dispose off-site	121	CY	25.00	3,026
6" thick slab on grade, incl. 6" gravel	4,900	SF	10.00	49,000
Underslab drainage system	4,900	SF	3.00	14,700
				153,111
A20 Basement Construction				
A2020 Basement Walls				
Foundation walls, 12" CMU, complete	1,475	SF	24.00	35,400
Elevator shaft wall, 8" thick, complete	1,920	SF	22.00	42,240
				77,640
B10 Superstructure				
B1010 Floor Construction				
Steel Frame	29	ton	4,500.00	132,300
First elevated floor decking	4,900	SF	3.50	17,150
First elevated slab on deck	4,900	SF	7.50	36,750
B1020 Roof Construction				
Steel Frame	29	ton	4,500.00	132,300
Roof decking & insulation	4,900	SF	7.00	34,300
Steel roof dunnage	1	LS	10,000.00	10,000
				362,800
B20 Exterior Enclosure				
B2010 Exterior Walls				
Brick veneer insulated cavity wall on stud back up	2,871	SF	40.00	114,840
EIFS to upper level	3,350	SF	28.00	93,786
Coping	290	LF	35.00	10,150

Long Branch Elementary School
School Expansion Feasibility Options

Hanscomb Consulting

Option 2

	Quantity	Unit	Rate	Total
B2020 Exterior Windows				
Windows (25%)	2,074	SF	65.00	134,778
B2030 Exterior Doors				
Glass door, complete; single	2	EA	4,800.00	9,600
Glass door, complete; double	1	PR	10,500.00	10,500
Solid exterior doors, complete; single	2	EA	1,800.00	3,600
				377,254
B30 Roofing				
B3010 Roof Coverings				
Roof coverings & insulation	4,900	SF	24.00	117,600
B3020 Roof Openings				
Allowance for penetrations	5	EA	1,000.00	5,000
				122,600
C10 Interior Construction				
C1010 Partitions				
Interior partitions allowance	9,800	SF	13.50	132,300
Interior glazing/storefront allowance	9,800	SF	2.75	26,950
Allow for misc. metals and blocking	9,800	SF	2.50	24,500
C1020 Interior Doors				
Interior doors including door, frame & hardware complete, allow				
- Single leaf	36	EA	1,400.00	50,400
- double leaf	8	PR	2,200.00	17,600
C1030 Fittings				
Allowance	9,800	SF	14.00	137,200
				388,950
C20 Stairways				
C2010 Stair Construction				
Interior stairs, incl. railings	32	Riser	850.00	27,200
C2020 Stair Finishes				
Paint and sealer egress stair - concrete sealant	32	Riser	90.00	2,880
				30,080

Long Branch Elementary School
School Expansion Feasibility Options

Hanscomb Consulting

Option 2	Quantity	Unit	Rate	Total
C30 Interior Finishes				
C3010 Wall Finishes				
Allowance	9,800	SF	4.50	44,100
C3020 Floor Finishes				
Allowance	9,800	SF	9.50	93,100
C3030 Ceiling Finishes				
Allowance	9,800	SF	7.50	73,500
Allowance for premium ceilings	980	SF	15.00	14,700
				225,400
D10 Conveying Systems				
D1010 Elevators & Lifts				
2-stop elevator	1	EA	90,000.00	90,000
				90,000
D20 Plumbing Systems				
Plumbing Fixtures				
Allowance	9,800	SF	1.80	17,640
Domestic Water Distribution				
Allowance	9,800	SF	2.50	24,500
Sanitary Waste and Vent Distribution				
Allowance	9,800	SF	2.15	21,070
Storm Distribution				
Allowance	9,800	SF	1.35	13,230
Other Plumbing Systems				
Allowance	9,800	SF	1.15	11,270
				87,710
D30 Heating, Ventilation & Air Conditioning				
Allowance	9,800	SF	52.00	509,600
				509,600

Long Branch Elementary School
School Expansion Feasibility Options

Hanscomb Consulting

Option 2

	Quantity	Unit	Rate	Total
D40 Fire Protection				
Allowance	9,800	SF	3.00	29,400
				29,400
D50 Electrical Lighting, Power & Communications				
Allowance	9,800	SF	42.00	411,600
				411,600
E10 Equipment				
E1020 Institutional Equipment				
Allowance	9,800	SF	4.00	39,200
				39,200
E20 Furnishings				
E2010 Fixed Furnishings				
Window treatments	2,074	SF	7.00	14,515
General allowance	9,800	SF	2.50	24,500
				39,015
F20 Selective Demolition				
F2010 Building Elements Demolition				
Allowance - tie in to existing school	1	LS	10,000.00	10,000
F2020 Hazardous Components Abatement				
Excluded				Excluded
				10,000
G10 Site Preparation				
G1010 Site Clearing				
Allowance	14,700	SF	0.75	11,025
G1020 Site Demolition and Relocations				
Allow for concrete paving removal	4,900	SF	2.00	9,800
Allow for miscellaneous selective removal	1	LS	15,000.00	15,000
G1030 Site Earthwork				
Rough grading	4,900	SF	0.50	2,450
Allow for erosion control	1	LS	5,000.00	5,000
G1040 Hazardous Waste Remediation				
Excluded				Excluded

Long Branch Elementary School
School Expansion Feasibility Options

Hanscomb Consulting

Option 2

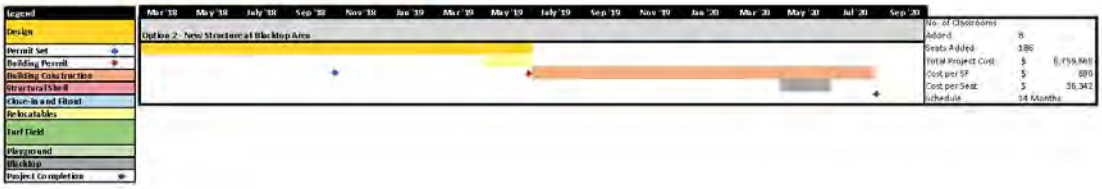
	Quantity	Unit	Rate	Total
				43,275
G20 Site Improvements				
G2010 Roadways				
G2020 Parking Lots				
G2030 Pedestrian Paving Allowance	2,500	SF	30.00	75,000
G2040 Site Development Allowance for site walls, ramps etc	1	LS	50,000.00	50,000
G2050 Landscaping Allowance	1	LS	15,000.00	15,000
				140,000
G30 Site Mechanical Utilities				
Water - allowance	1	LS	$15,000.00	15,000
Storm drainage - allowance	1	LS	$35,000.00	35,000
Sewer - allowance	1	LS	$20,000.00	20,000
				70,000
G40 Site Electrical Utilities				
G4010 Electrical Distribution Allowance	1	LS	10,000.00	10,000
G4020 Site Lighting Allowance	1	LS	12,500.00	12,500
G4030 Site Communications & Security Allowance	1	LS	7,500.00	7,500
				30,000

6. Schedule

The construction schedule for this option would span over a summer and the consecutive school year for a total length of roughly fourteen (14) months. It assumes starting construction in June when school gets out. The first June that would allow adequate time for the design phase is June 2019. This assumes ownership and access to the land not owned by APS at this time can occur by March 2018.

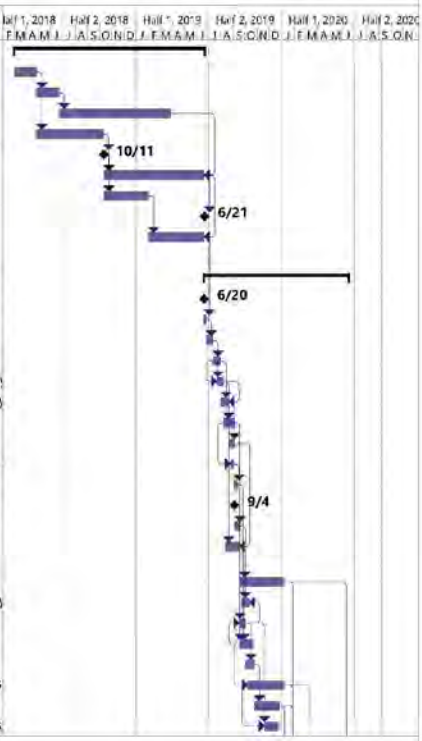
The chart below shows the schedule for Option 2 including the design phase. A full schedule can be found on the next two pages.

Option 2—New Structure at Blacktop Area



Option 2 - Stand alone school addition

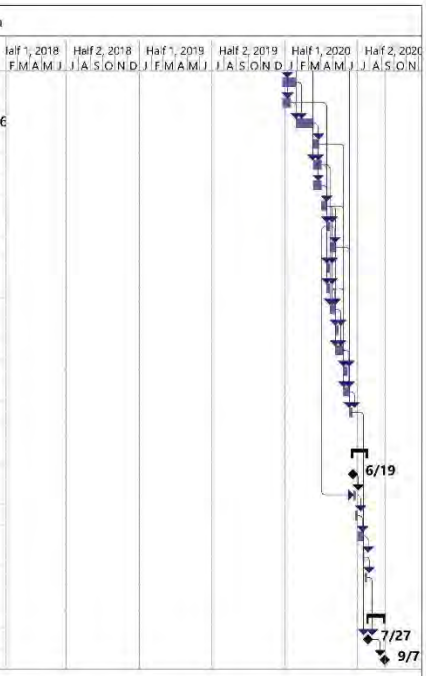
ID	Task Name	Duration	Start	Finish	Predecessors
1	**Design Phase**	**342 days**	**Thu 3/1/18**	**Fri 6/21/19**	
2	Designer procurement	40 days	Thu 3/1/18	Wed 4/25/18	
3	Site plan development	40 days	Thu 4/26/18	Wed 6/20/18	2
4	Site plan approval	200 days	Thu 6/21/18	Wed 3/27/19	3
5	Design development	120 days	Thu 4/26/18	Wed 10/10/18	2
6	Permit Set complete	1 day	Thu 10/11/18	Thu 10/11/18	5
7	Building plan approval/permit	180 days	Fri 10/12/18	Thu 6/20/19	5,4FF,6
8	Construction drawings	80 days	Fri 10/12/18	Thu 1/31/19	6
9	Building permit	1 day	Fri 6/21/19	Fri 6/21/19	7
10	General contractor procurement	100 days	Fri 2/1/19	Thu 6/20/19	7FF,8
11					
12	**Building Construction**	**260 days**	**Thu 6/20/19**	**Wed 6/17/20**	
13	Last day of school	1 day	Thu 6/20/19	Thu 6/20/19	
14	Mobilize contractor	3 days	Fri 6/21/19	Tue 6/25/19	10
15	Clearing, grading & erosion control	12 days	Wed 6/26/19	Thu 7/11/19	14
16	U/G Site utilities	14 days	Fri 7/12/19	Wed 7/31/19	15
17	Foundations	12 days	Tue 7/23/19	Wed 8/7/19	15,16SS+7 da
18	U/G MEP Rough In	15 days	Thu 8/1/19	Wed 8/21/19	16,17FF+5 da
19	Steel frame - two story	20 days	Thu 8/8/19	Wed 9/4/19	17
20	Slab on grade	10 days	Thu 8/22/19	Wed 9/4/19	18
21	2nd floor metal deck	5 days	Mon 8/26/19	Mon 9/2/19	19SS+12 days
22	F, R, P 2nd floor composite slab	8 days	Tue 9/3/19	Thu 9/12/19	21
23	First Day of School	1 day	Wed 9/4/19	Wed 9/4/19	
24	Roof joists and decking	10 days	Thu 9/5/19	Wed 9/18/19	19
25	Masonry at core, elevator and bathrooms	25 days	Tue 8/13/19	Mon 9/16/19	20FF+8 days,17
26	Elevator install	80 days	Tue 9/17/19	Mon 1/6/20	25
27	Roofing	15 days	Mon 9/23/19	Fri 10/11/19	24,28FF+7 da
28	Building exterior wall framing	12 days	Tue 9/17/19	Wed 10/2/19	20,29SS
29	Building Interior wall framing	25 days	Tue 9/17/19	Mon 10/21/19	20,25,22
30	Exterior wall sheathing	15 days	Thu 10/3/19	Wed 10/23/19	28
31	MEP Rough in walls and ceilings	65 days	Tue 10/8/19	Mon 1/6/20	29SS+15 days
32	Exterior building skin	45 days	Thu 10/24/19	Wed 12/25/19	30
33	Set Mechanical Equipment	25 days	Tue 11/19/19	Mon 12/23/19	31SS+30 days



Page 1

Option 2 - Stand alone school addition

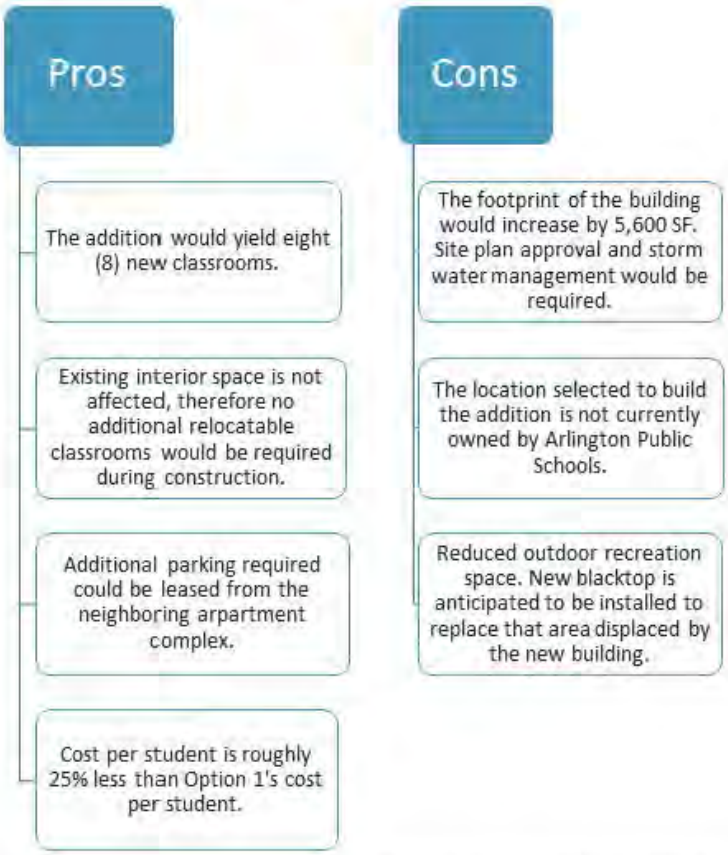
ID	Task Name	Duration	Start	Finish	Predecessors
34	Windows	25 days	Thu 12/26/19	Wed 1/29/20	32
35	Entry storefront/glazing	15 days	Thu 12/26/19	Wed 1/15/20	32
36	Wall close in	30 days	Thu 1/30/20	Wed 3/11/20	31,32,34,35,26
37	Set door frames	10 days	Thu 3/12/20	Wed 3/25/20	36
38	Ceiling grid and light fixtures	15 days	Thu 3/12/20	Wed 4/1/20	36,31
39	Tile	15 days	Thu 3/12/20	Wed 4/1/20	36
40	Finishes/Paint	10 days	Thu 4/2/20	Wed 4/15/20	38,39
41	Exterior grading	5 days	Thu 4/16/20	Wed 4/22/20	35,40
42	Site concrete - SW/Stairs	12 days	Thu 4/23/20	Fri 5/8/20	41
43	Plumbing Fixtures	5 days	Thu 4/16/20	Wed 4/22/20	39,40
44	Grilles, registers and diffusers	5 days	Thu 4/16/20	Wed 4/22/20	38,40
45	Elec Trimout	10 days	Thu 4/23/20	Wed 5/6/20	38,40,44
46	Specialties	5 days	Thu 5/7/20	Wed 5/13/20	40,45
47	Flooring	15 days	Thu 5/7/20	Wed 5/27/20	40,44,45
48	Doors and Hardware	7 days	Thu 5/28/20	Fri 6/5/20	40,37,47
49	Test and balance	10 days	Thu 5/28/20	Wed 6/10/20	44,47
50	Building Turnover	5 days	Thu 6/11/20	Wed 6/17/20	49,42,26
51					
52	**Blacktop**	**26 days**	**Fri 6/19/20**	**Fri 7/24/20**	
53	Last day of school	1 day	Fri 6/19/20	Fri 6/19/20	
54	Grade for blacktop	4 days	Mon 6/22/20	Thu 6/25/20	41SS,53
55	Install new blacktop	3 days	Fri 6/26/20	Tue 6/30/20	54
56	Install playground equipment	10 days	Wed 7/1/20	Tue 7/14/20	55
57	Striping	3 days	Wed 7/15/20	Fri 7/17/20	56
58	Fencing	5 days	Mon 7/20/20	Fri 7/24/20	57
59					
60	**Project Completion**	**31 days**	**Mon 7/27/20**	**Mon 9/7/20**	
61	Project Completion	1 day	Mon 7/27/20	Mon 7/27/20	50,58
62	First Day of School	1 day	Mon 9/7/20	Mon 9/7/20	61



Page 2

7. Pros & Cons

The team offers the following pros and cons for consideration.



8. Summary

The stand-alone two-story addition would yield eight (8) new classrooms. The total project cost to complete this option is estimated to be $6,759,665, with a construction duration of fourteen (14) months, extending over two (2) summers and a school term year. While the cost is estimated to be $690/SF and is significantly higher than Option 1, this option translates to a cost of $36,342 per seat. In addition, the new wing could accommodate additional support program space until the building capacity is required to meet future enrollment. Finally, construction can:

- Occur during normal business hours
- Be segregated from the on-going school operation to maximize safety and reduce risk to the contractor
- Be connected to the school relatively easily
- Result in more efficient investment (greater value for the dollar invested)

A. List of Drawings

1972 Plans

- Architectural Sheets:
  - A1
  - A2
  - A3
  - A4
  - A5
  - A6
  - A7
  - A8
  - A9
  - A10
  - A11
  - A12
  - A13
  - A14
  - A15
  - A16
  - A17
  - A18
  - A19
  - A20
- Structural Sheets:
  - S1
  - S2
  - S3
  - S4
  - S5
  - S6
- Mechanical Sheets:
  - M1
  - M2
  - M3
  - M4
- Plumbing Sheets:
  - P1
  - P2
  - P3
- Electrical Sheets:
  - E1
  - E2
  - E3
  - E4
  - E5
  - E6
  - E7
  - E8

1992 Plans

Cover Sheet

- Site Plan
- Drainage Divides & Erosion & Sediment Control Plan
- Waterline & Storm Water Detention Profile & Details
- Existing Conditions/Drainage Divides

1999 Plans

- Information Technology Sheets:
  - IT1
  - IT2
  - IT3
  - IT4
  - IT5

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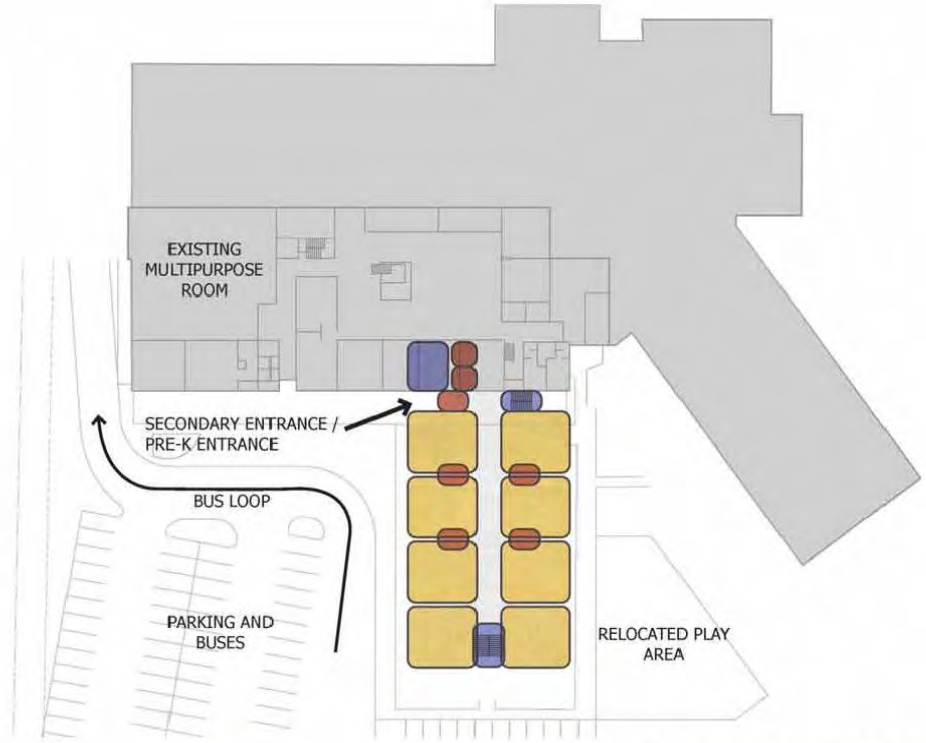
Appendix A: Oakridge (2011)

OAKRIDGE ELEMENTARY SCHOOL



CLASSROOM | CORE + SUPPORT | SERVICES

N

SCALE 1: 50

LOWER (ADDITION ENTRY) LEVEL PLAN

SHWGROUP

ARLINGTON PUBLIC SCHOOLS
EXPANSION FEASIBILITY STUDY
NOVEMBER 2011

Appendix A: Nottingham (2011)

NOTTINGHAM ELEMENTARY SCHOOL

Addition:18 classrooms max
Stand alone: 16 classrooms

EXISTING SITE PLAN

PROPOSED SITE PLAN

LEGEND

- EXISTING
- RENOVATION
- NEW WORK
- PROPERTY LINE
- SETBACK

KEY

A. EXISTING SCHOOL
B. PLAYGROUND
C. KINDERGARTEN PLAYGROUND
D. EXISTING RELOCATABLES
E. EXISTING PARKING
F. SOCCER FIELD
G. BLACKTOP PLAY AREA
H. PROPOSED AREA OF RENOVATION
I. PROPOSED ADDITION
J. AMPHITHEATRE
K. NEW PARKING
L. EARLY CHILDHOOD CENTER

N

0 100 200 400
1"=200'-0" SCALE OF FEET

QUINN EVANS ARCHITECTS

SITE PLANS

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

NOTTINGHAM ELEMENTARY SCHOOL

QUINN EVANS ARCHITECTS

PROPOSED MASSING
VIEW FROM SOUTHEAST

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

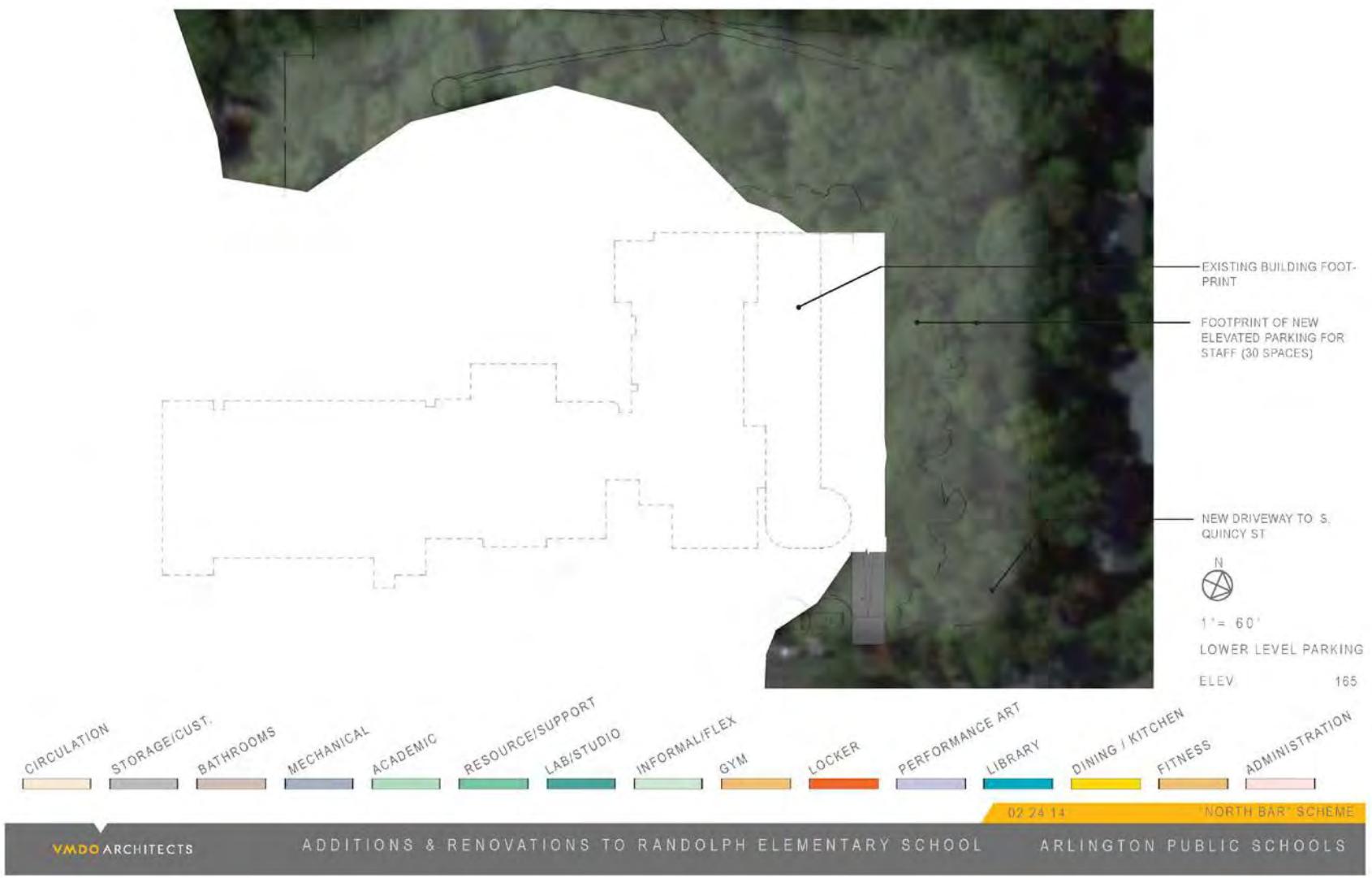
Appendix A: Randolph (2014)

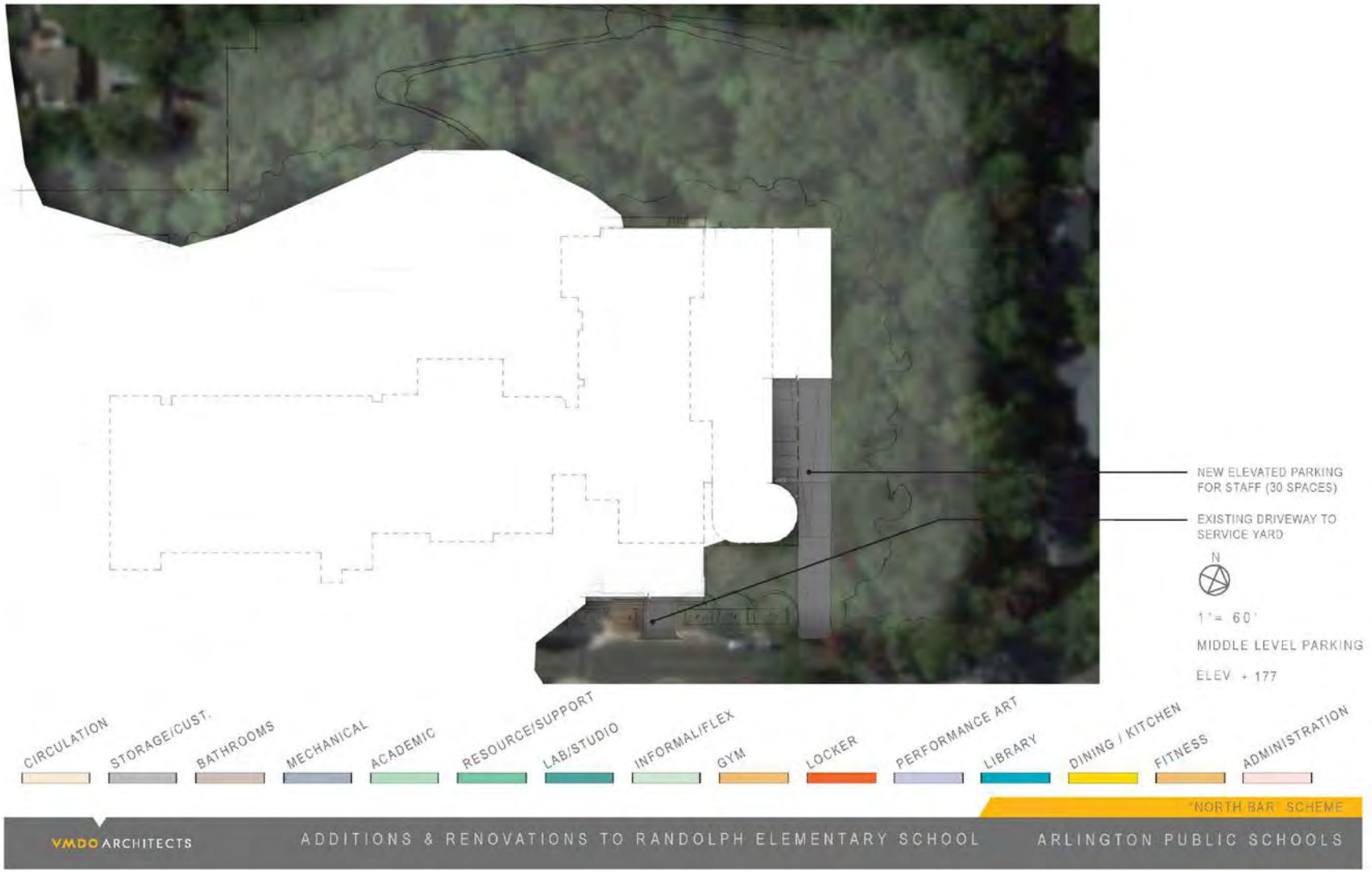
VIEW FROM NORTHEAST

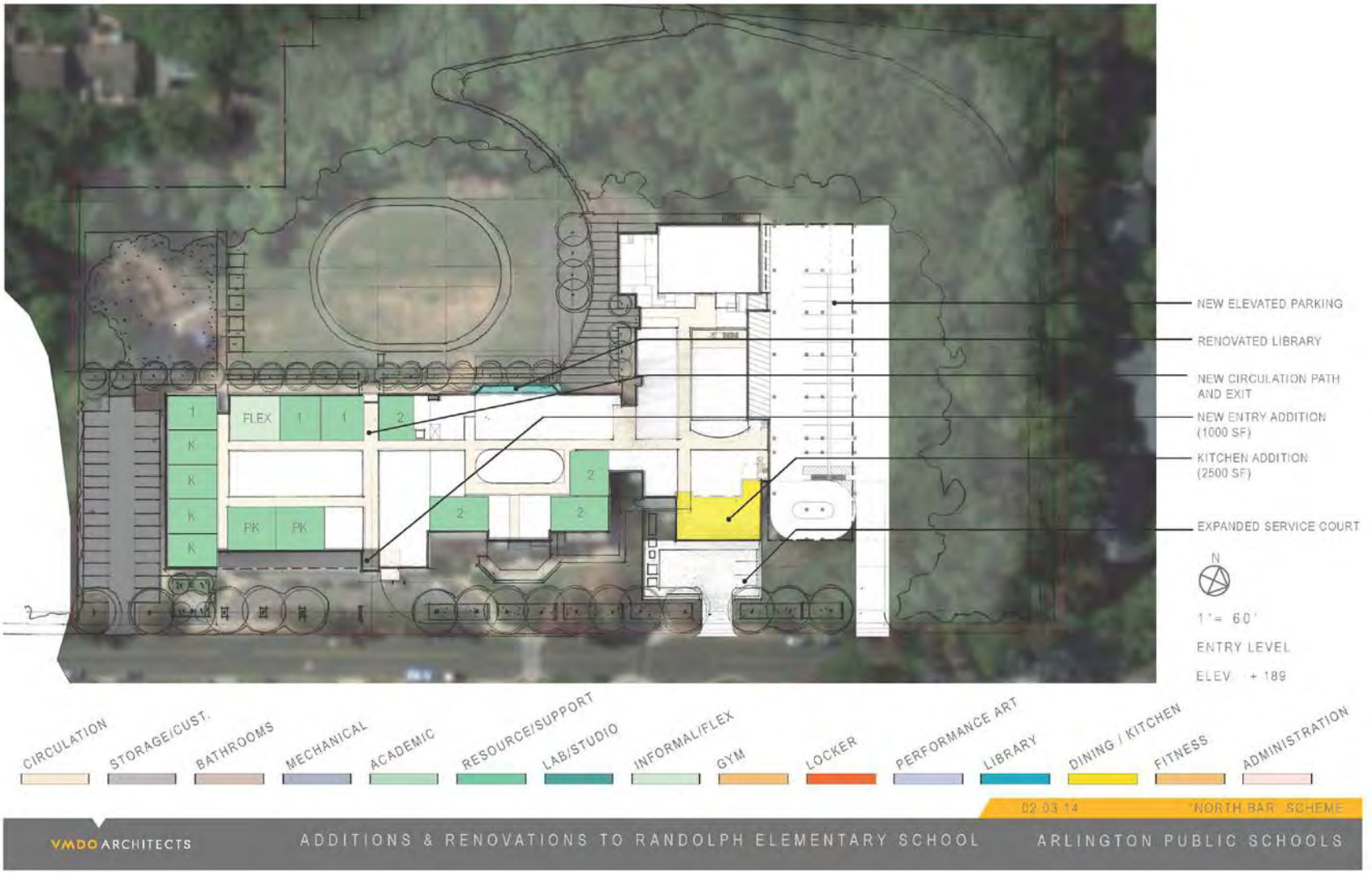
VIEW FROM SOUTHWEST

02.24.14 SITE PLAN "NORTH BAR" SCHEME

VMDO ARCHITECTS ADDITIONS & RENOVATIONS TO RANDOLPH ELEMENTARY SCHOOL ARLINGTON PUBLIC SCHOOLS







02.24.14 "NORTH BAR" SCHEME, VIEW FROM NE

VMDO ARCHITECTS ADDITIONS & RENOVATIONS TO RANDOLPH ELEMENTARY SCHOOL ARLINGTON PUBLIC SCHOOLS

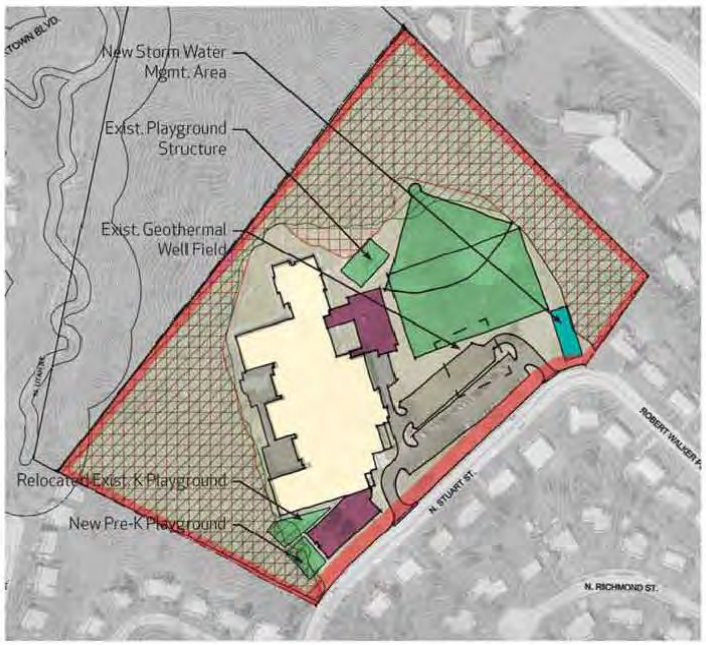
02.24.14 "NORTH BAR" SCHEME: VIEW FROM SW

VMDO ARCHITECTS ADDITIONS & RENOVATIONS TO RANDOLPH ELEMENTARY SCHOOL ARLINGTON PUBLIC SCHOOLS

Appendix A: Taylor (2011)

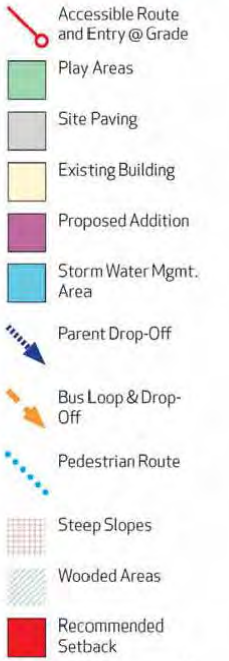
Taylor Elementary School

Addition:10 classrooms max
Stand alone: 6 classrooms max



Zoning and Site Constraints Plan

Site Circulation Plan



b|g|a
Bowie Gridley Architects

Site Diagrams

Arlington Public Schools
Feasibility Study
November 2011

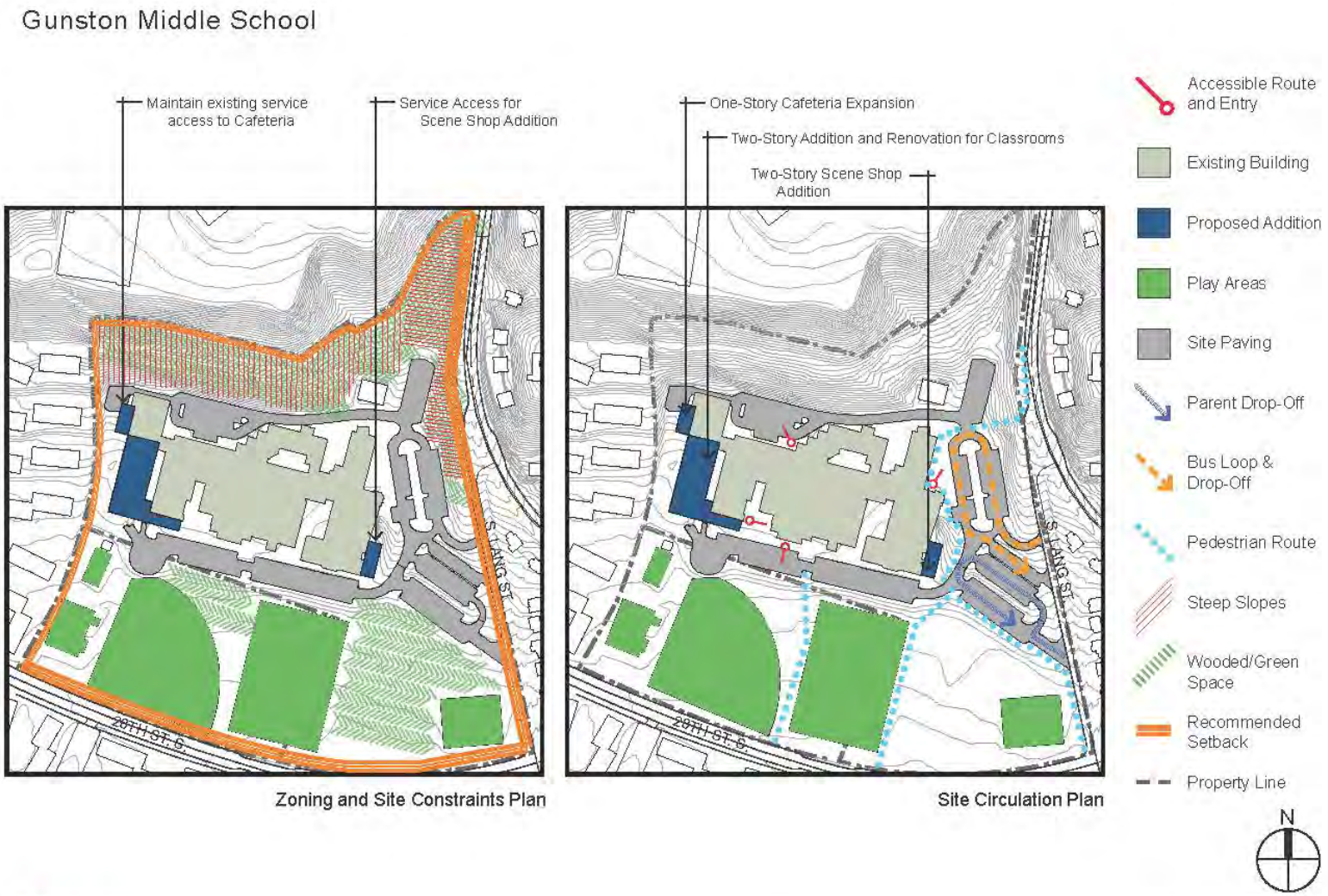
Taylor Elementary School

b|g|a
Bowie Gridley Architects

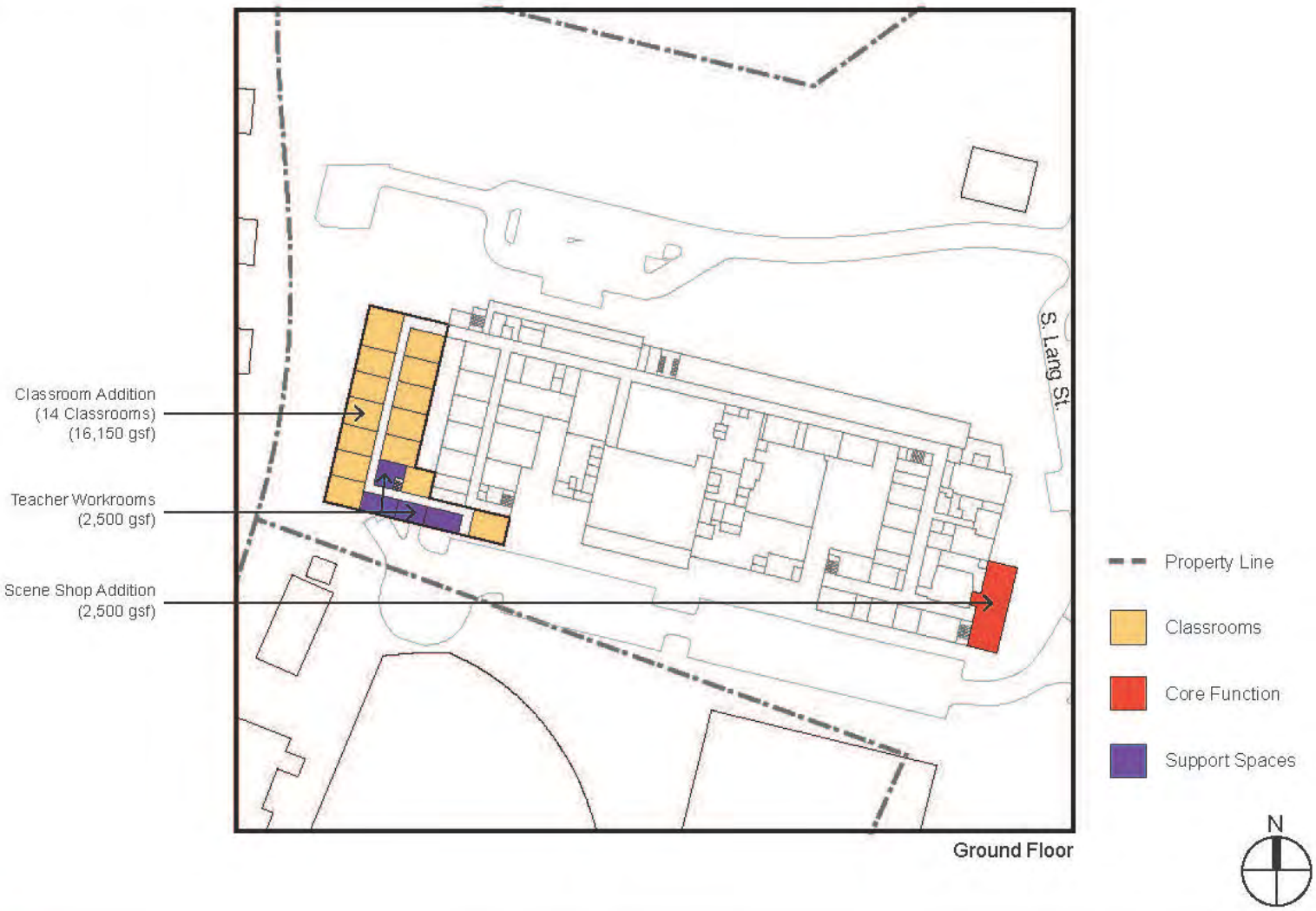
Massing Diagrams

Arlington Public Schools
Feasibility Study
November 2011

Appendix A: Gunston (2014)



Gunston Middle School

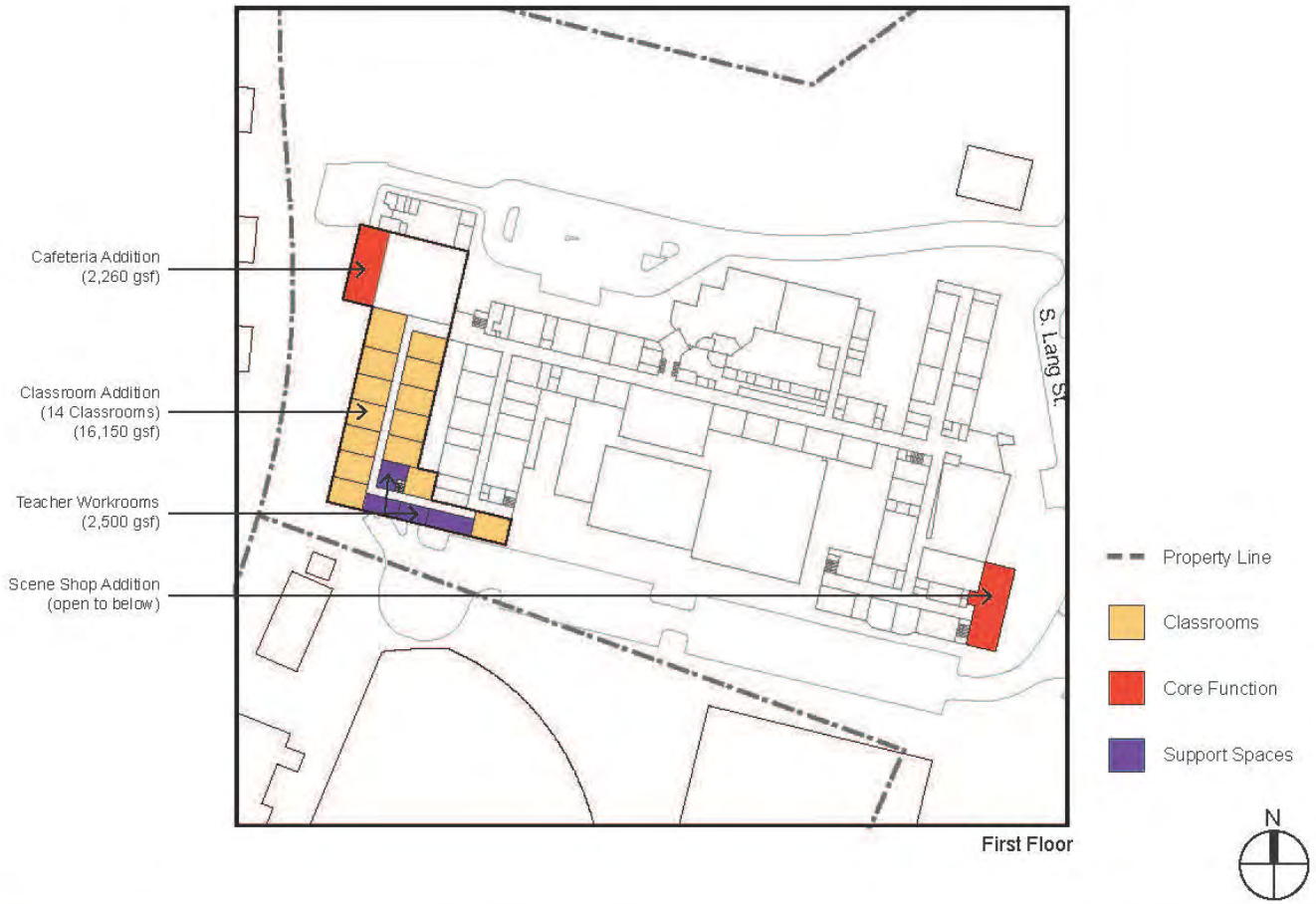


b|g|a
Bowie Gridley Architects

Building Diagrams

Arlington Public Schools
Feasibility Study
March 3, 2014

Gunston Middle School



b|g|a
Bowie Gridley Architects

Building Diagrams

Arlington Public Schools
Feasibility Study
March 3, 2014

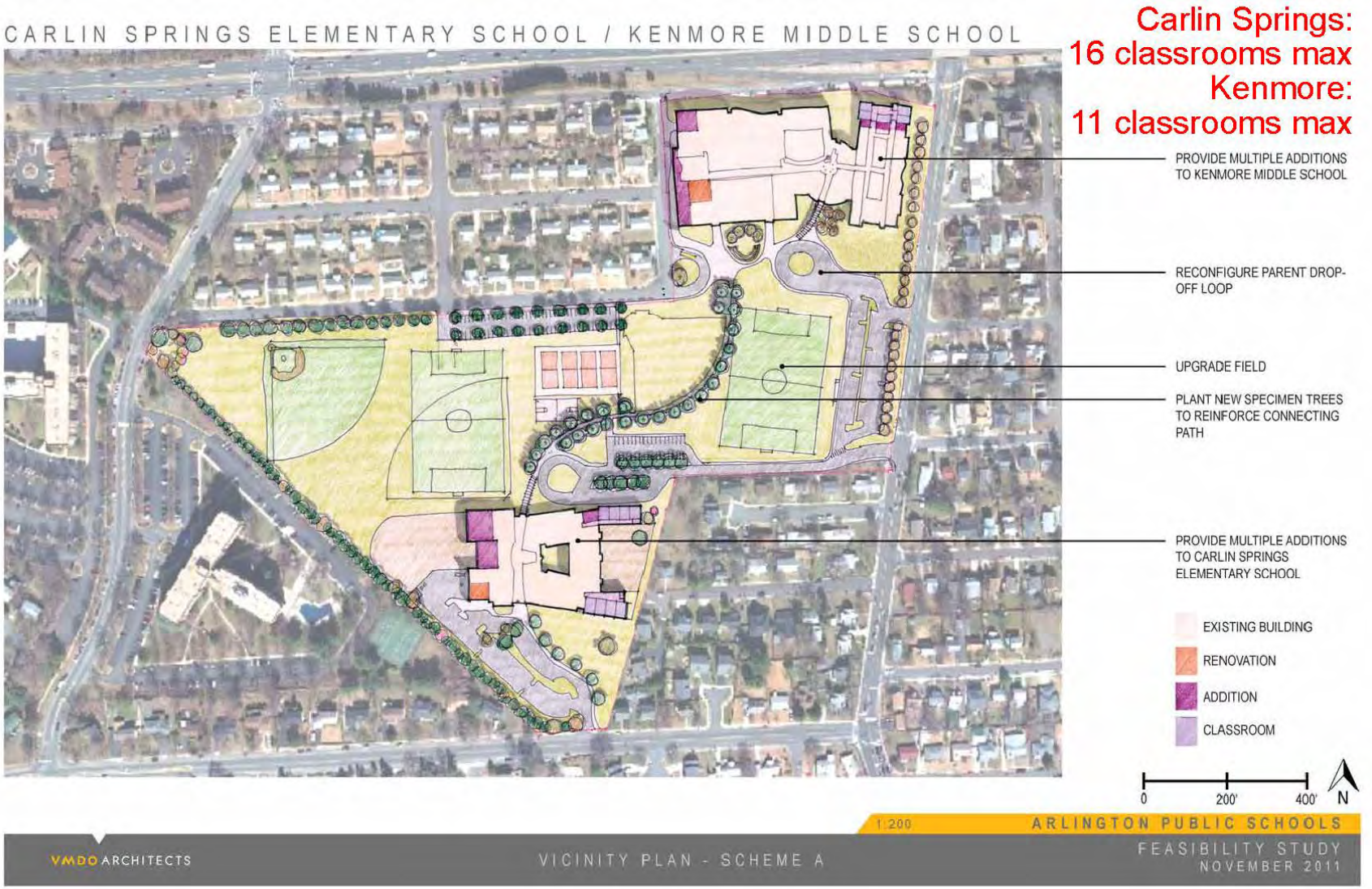
Gunston Middle School

b|g|a
Bowie Gridley Architects

Massing Diagrams

Arlington Public Schools
Feasibility Study
March 3, 2014

Appendix A: Kenmore (2011)



CARLIN SPRINGS ELEMENTARY SCHOOL / KENMORE MIDDLE SCHOOL

Addition:
8 classrooms
New School:
25 classrooms

PROVIDE MODEST ADDITIONS TO KENMORE MIDDLE SCHOOL - NO NET CHANGE IN CAPACITY

RE-ORIENT AND UPGRADE FIELD AS AN ORGANIZING ELEMENT BETWEEN MIDDLE SCHOOL & NEW SCHOOL

BUILD NEW SCHOOL (CAPACITY = 650 STUDENTS) FOR EITHER UPPER ELEMENTARY OR LOWER MIDDLE SCHOOL

IMPROVE EXISTING BUS LOOP; SHARE WITH NEW SCHOOL

PROVIDE MODEST ADDITION TO CARLIN SPRINGS ELEMENTARY SCHOOL - NO NET CHANGE IN CAPACITY

EXISTING BUILDING
RENOVATION
ADDITION
CLASSROOM

0 200' 400' N

1:200

ARLINGTON PUBLIC SCHOOLS

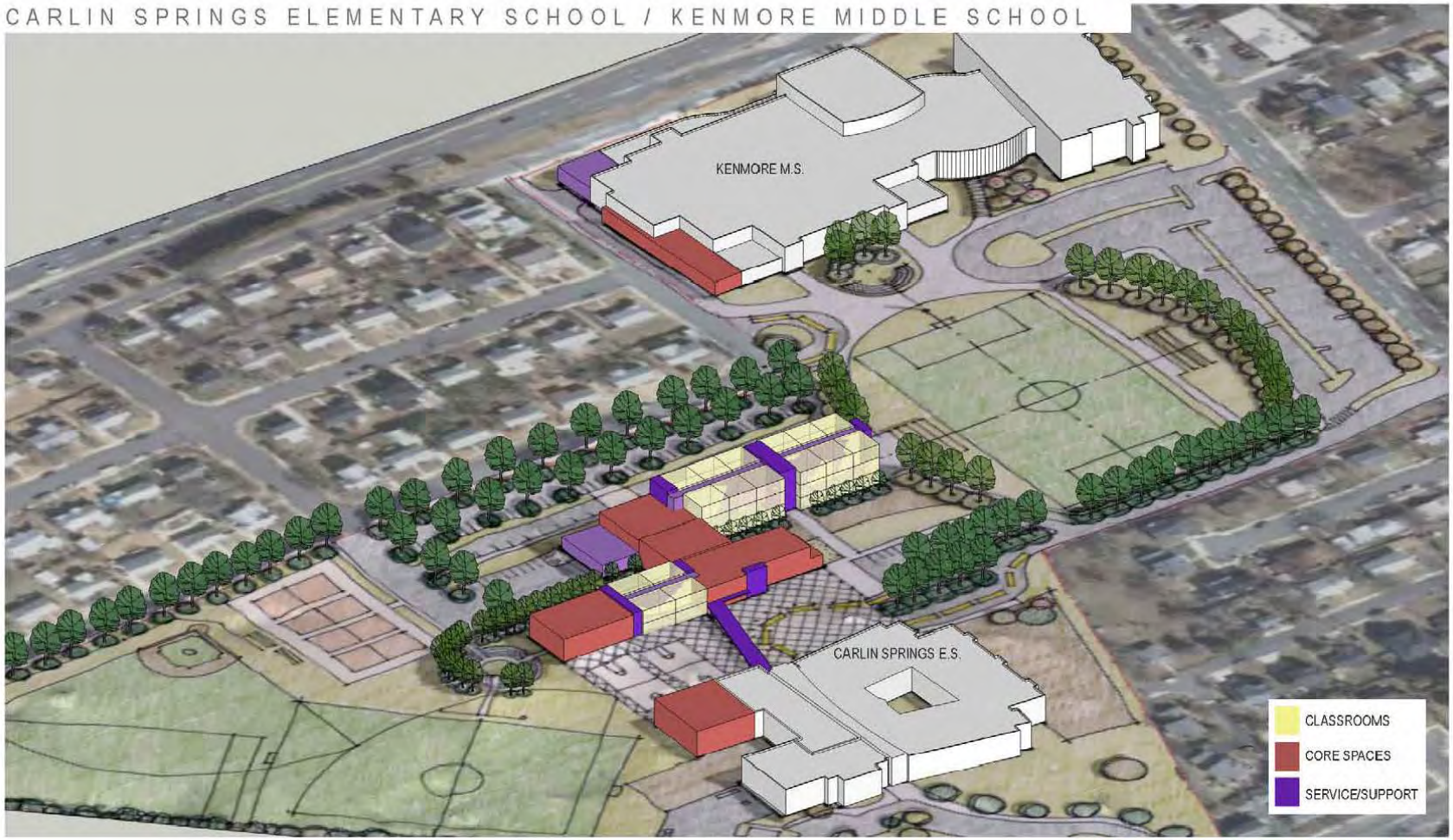
VMDO ARCHITECTS

VICINITY PLAN - SCHEME B

FEASIBILITY STUDY
NOVEMBER 2011

All Arlington Public Schools (APS) budget and operations decisions are based on the best information available at the time. Staff and community members are reminded that funding forecasts from Arlington County and the state may change, based on many external factors. Similarly, student enrollment and projections are based on the best available information, but are also subject to change due to employment, housing and other economic factors. For these reasons, APS and the Arlington School Board may adjust future budget allocations, staffing and other operations decisions to reflect the existing community and operating landscape.

CARLIN SPRINGS ELEMENTARY SCHOOL / KENMORE MIDDLE SCHOOL



ARLINGTON PUBLIC SCHOOLS

VMDO ARCHITECTS

MASSING STUDY LOOKING NORTHEAST

FEASIBILITY STUDY
NOVEMBER 2011

Appendix A: Jefferson (2011)

Thomas Jefferson Middle School

Perkins Eastman

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Thomas Jefferson Middle School

Perkins Eastman

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Thomas Jefferson Middle School

The Thomas Jefferson Middle School site presents the opportunity to expand the existing building. The current middle school features an International Baccalaureate program and houses approximately 670 students. The existing school could expand to an enrollment of approximately 900 and with additions enrollment could potentially be increased beyond 900. The school building also features a large community center and gym and is adjacent to County properties featuring a large park and parking, both used by the school and the community. The proposed addition concept for the middle school:

- Expands the existing building providing new indoor/outdoor teaching spaces for the arts adjacent to the theater on under utilized site area on APS property;
- Creates a new civic presence and front door for the school on 2nd Street S. and S. Old Glebe Road that also visually screens the existing loading docks;
- Creates a new day lit food service/multi-purpose room convenient to the loading dock;
- Enables the expansion of the grade-level houses into the vacated art and food service spaces within the existing building.

As shown in the concept the site would allow for an addition of approximately 30,000 GSF bringing the total area of the existing middle school building to approximately 250,000 GSF on APS property. In addition to accommodating additional enrollment in the existing middle school, 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 ground source heat pump system to expand the existing building. Photovoltaics could also be integrated using a Power Purchase Agreement.
Further due diligence investigation of these sites would include geotechnical engineering to determine subsurface soil bearing capacity.

Middle School main entrance

View towards Middle School main entrance from parking lot

Proposed Location for new Main Entrance Addition

Location of proposed Arts Addition

Perkins Eastman

EXECUTIVE SUMMARY

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Thomas Jefferson Middle 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	219,070	406,814	159,953	-	-	-	116,000**	200**	864**	212,265**
Proposed	161,746	-	77,125	-	-	-	-6,326 SF	-23 Spaces (from Corner Lot)		
							-11,933 SF	-33 Spaces (from Community Center)		
							+1,200 SF	+5 Spaces (at New School Entrance)		

** Estimates based on aerial photographs
*** new accessible parking spaces

Perkins Eastman

EXISTING CONDITIONS ANALYSIS

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

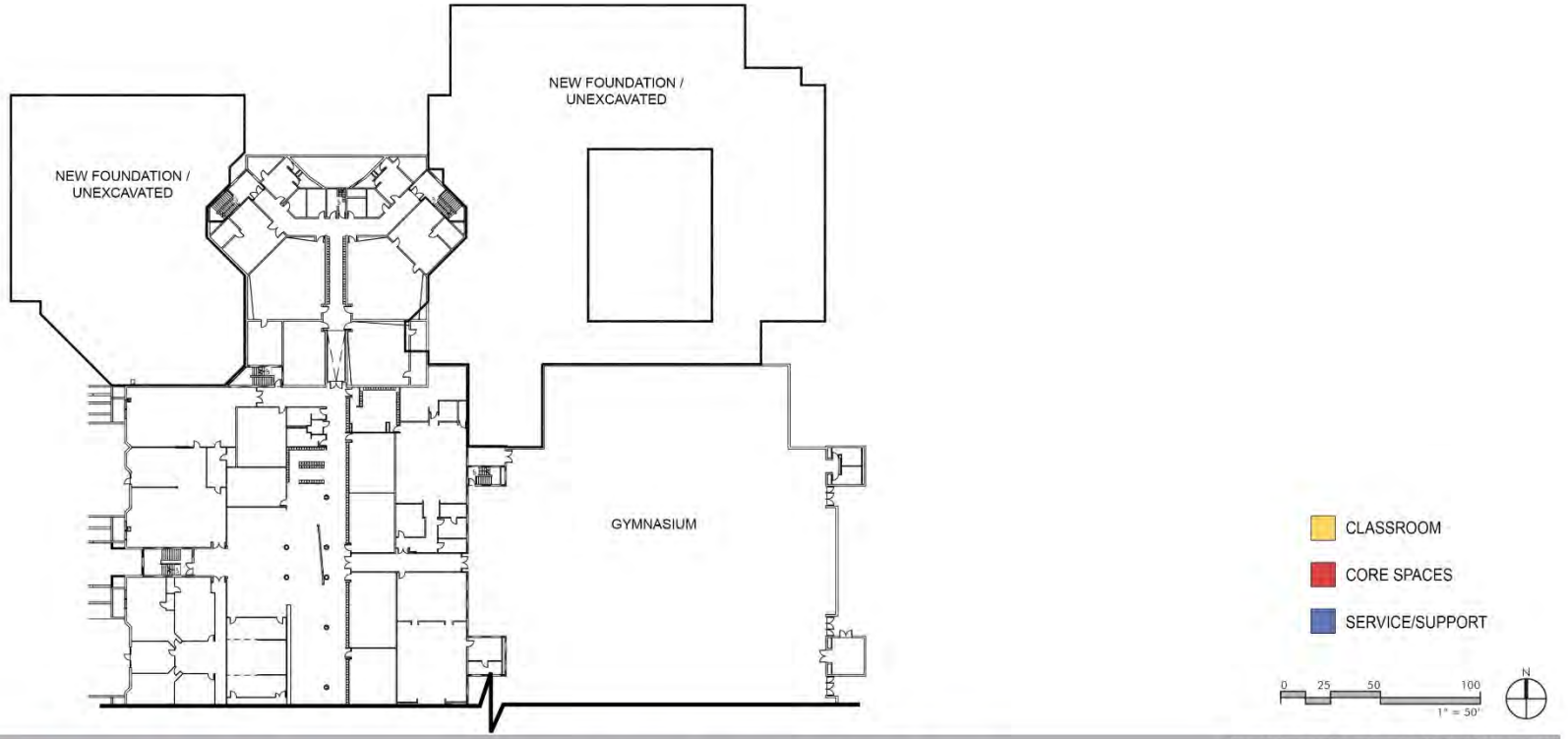
Thomas Jefferson Middle School

Perkins Eastman

ILLUSTRATIVE PLAN

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Thomas Jefferson Middle School

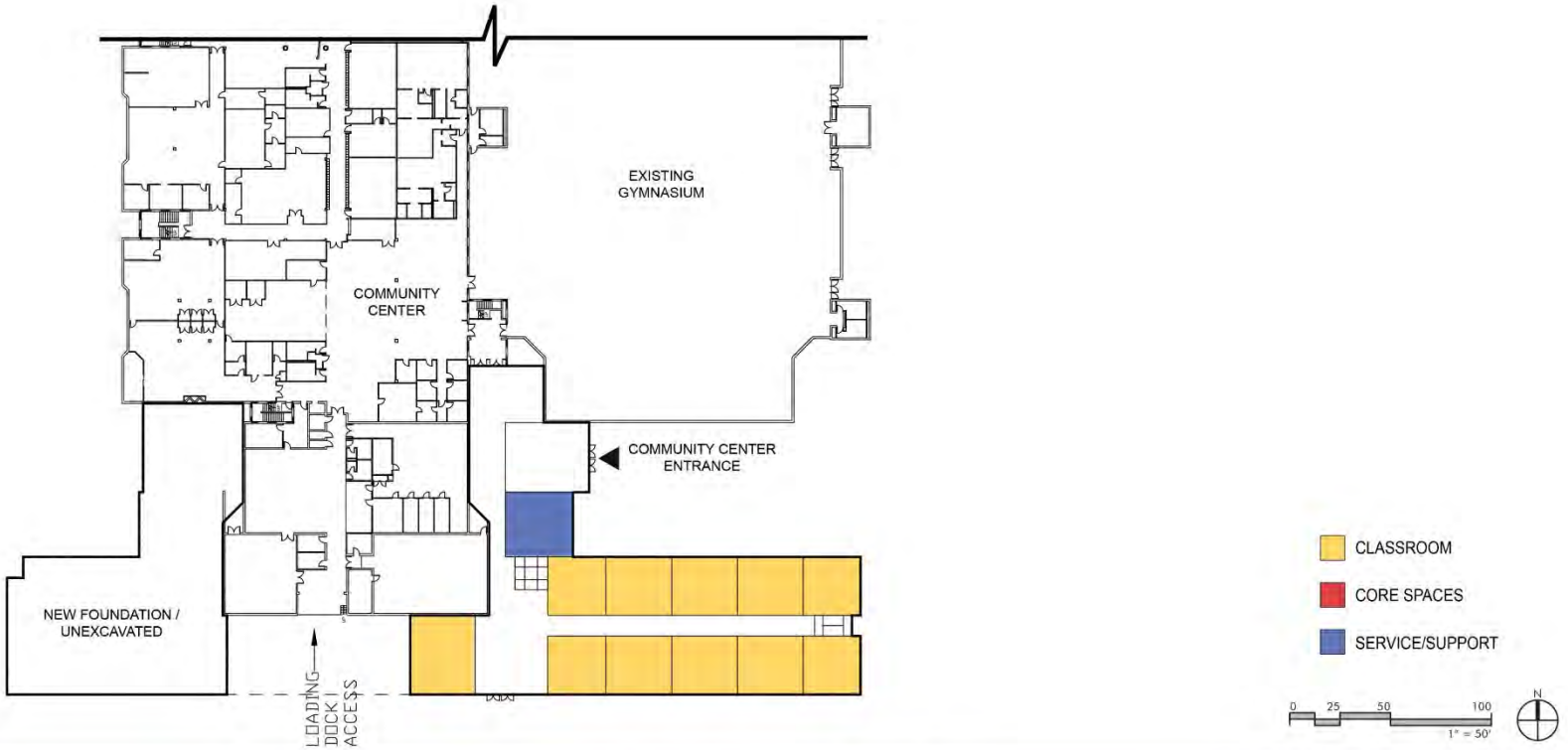


Perkins Eastman

FIRST FLOOR PLAN - North

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Thomas Jefferson Middle School



Perkins Eastman

FIRST FLOOR PLAN - South

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Thomas Jefferson Middle School

CLASSROOM
CORE SPACES
SERVICE/SUPPORT

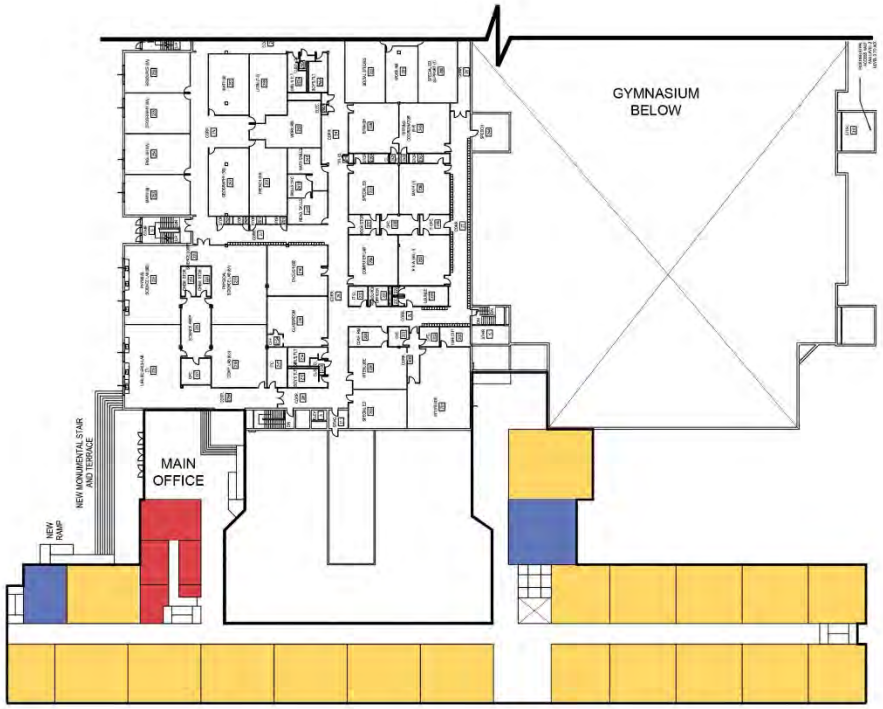
0 25 50 100
1" = 50'
N

Perkins Eastman

SECOND FLOOR PLAN - North

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Thomas Jefferson Middle School



CLASSROOM

CORE SPACES

SERVICE/SUPPORT

0 25 50 100
1" = 50'

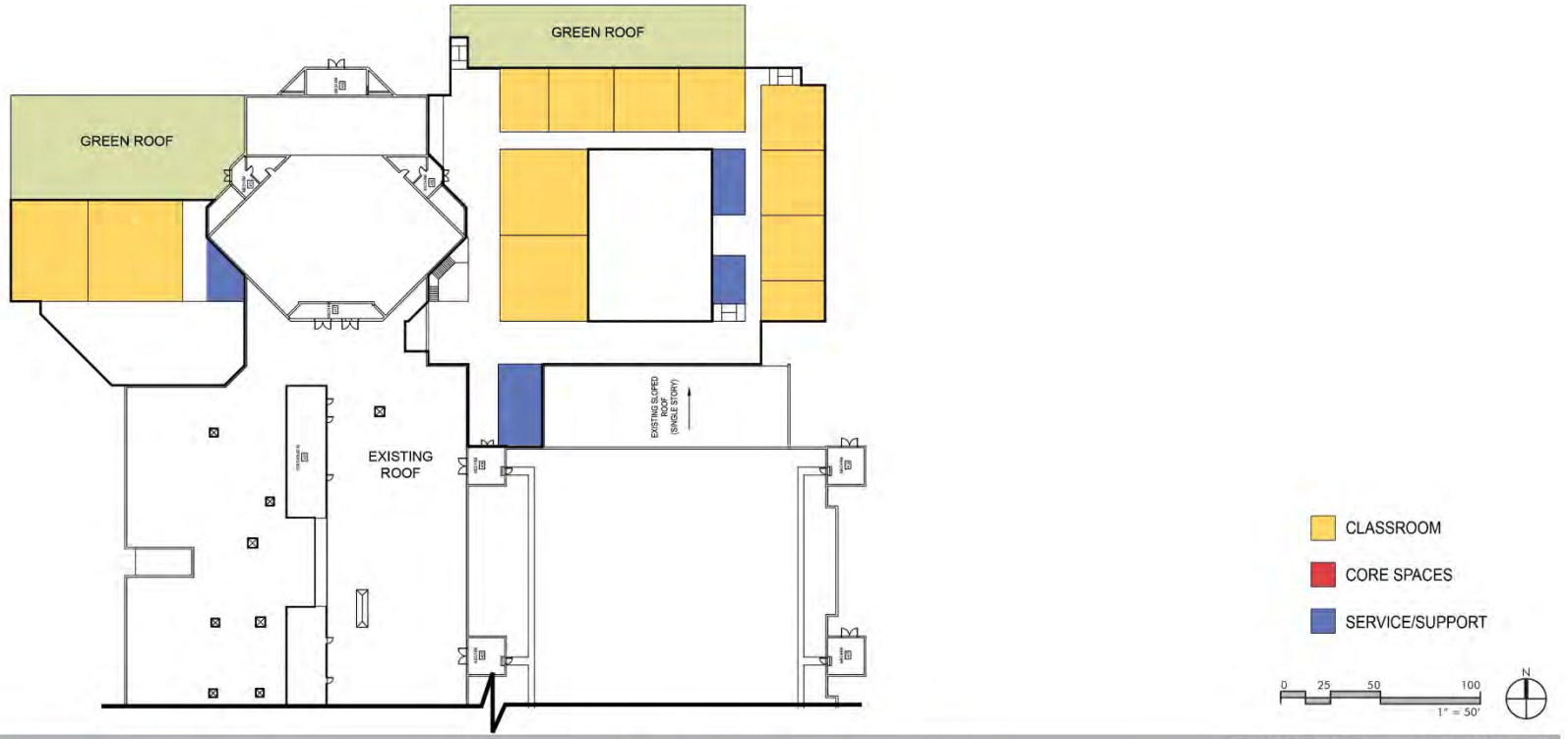
N

Perkins Eastman

SECOND FLOOR PLAN - South

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Thomas Jefferson Middle School

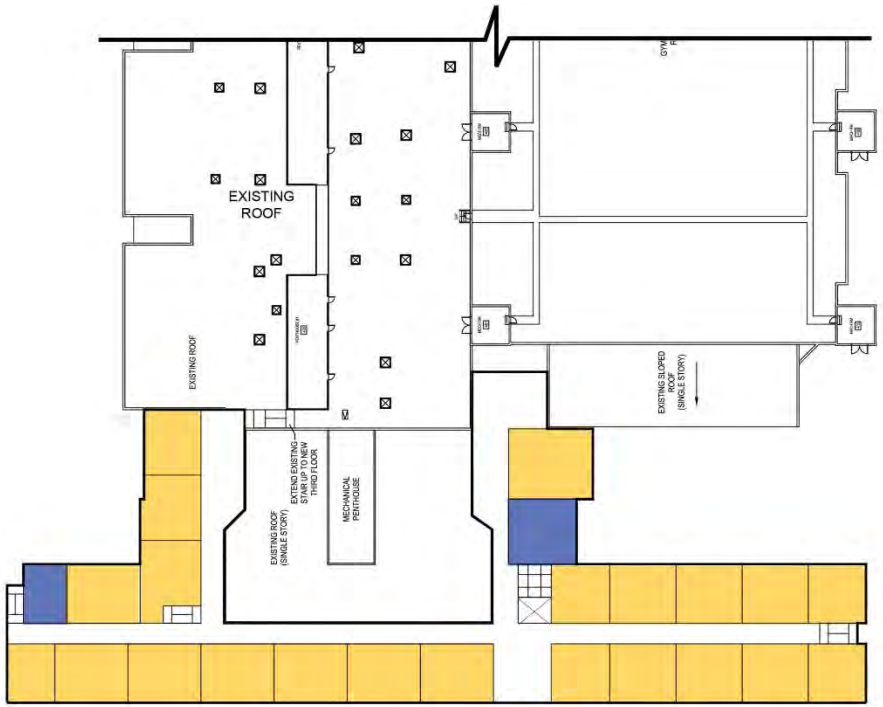


Perkins Eastman

THIRD FLOOR PLAN - North

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Thomas Jefferson Middle School



CLASSROOM

CORE SPACES

SERVICE/SUPPORT

0 25 50 100
1" = 50'

N

Perkins Eastman

THIRD FLOOR PLAN - South

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Thomas Jefferson Middle School

Perkins Eastman

3-D IMAGE

ARLINGTON PUBLIC SCHOOLS
FEASIBILITY STUDY
NOVEMBER 2011

Thomas Jefferson Middle School

OVERALL COST DISCUSSION

I. BUDGET ESTIMATE - CONSTRUCTION OF ADDITION TO EXISTING MIDDLE SCHOOL (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.

28,822 s.f. x $80 / s.f. = **$2,305,760**

MECHANICAL DESIGN NARRATIVE

I. DESIGN INTENT:

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.

Thomas Jefferson Middle School

PLUMBING SCHEMATIC DESIGN NARRATIVE

I. 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.

II. POTABLE WATER SYSTEM:

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

III. 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.

IV. SANITARY AND STORM PIPING SYSTEM:

New systems will be installed inside the Piping materials shall be schedule 40 DWV pressure type PVC with solvent joints for both above ground and below grade applications new additions and the building drains shall extend outside as discussed above. Standard weight cast iron, with no hub, or bell and spigot connections will be used where PVC is not allowed by code.

V. 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.

VI. 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.

VII. 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.

Thomas Jefferson Middle School

ELECTRICAL DESIGN NARRATIVE:

I. **BUILDING UTILIZATION VOLTAGE AND SERVICE:** The building amps utilizing one 1,200 amp will require a 1,600 amp electrical service 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.

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 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.

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 incorporate 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. Expansion modules and additional power and battery supplies will be added to the existing system.

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.

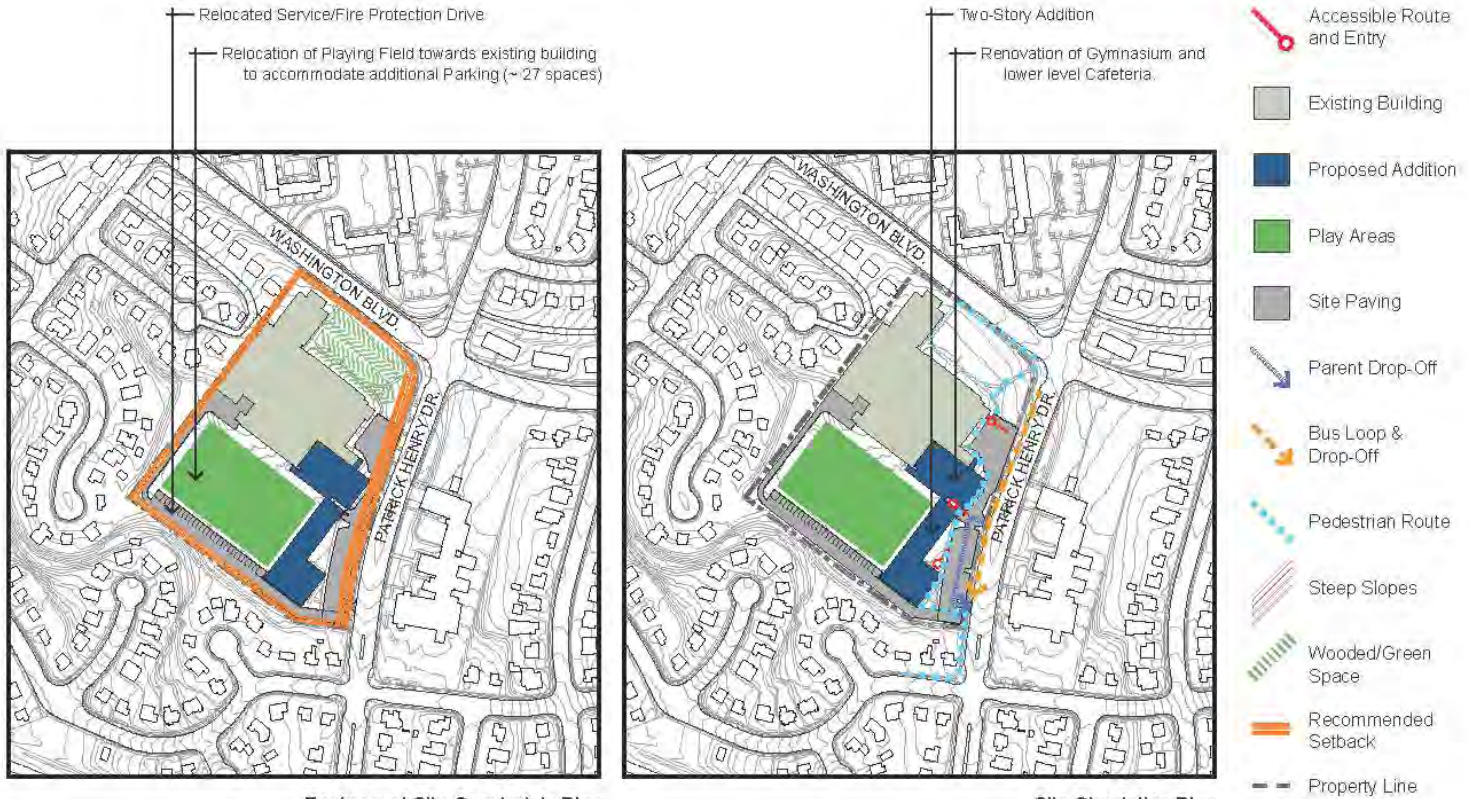
X. **SECURITY SYSTEMS:** The existing security system shall be extended throughout the new additions.

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.

Appendix A: Swanson (2014)

Swanson Middle School



b|g|a
Bowie Gridley Architects

Site Diagrams

Arlington Public Schools
Feasibility Study
March 3, 2014

Swanson Middle School

b|g|a
Bowie Gridley Architects

Building Diagrams

Arlington Public Schools
Feasibility Study
March 3, 2014

Swanson Middle School

b|g|a
Bowie Gridley Architects

Building Diagrams

Arlington Public Schools
Feasibility Study
March 3, 2014

Swanson Middle School

b|g|a
Bowie Gridley Architects

Building Diagrams

Arlington Public Schools
Feasibility Study
March 3, 2014

Swanson Middle School

b|g|a
Bowie Gridley Architects

Massing Diagrams

Arlington Public Schools
Feasibility Study
March 3, 2014

Appendix A: Williamsburg (2011)

Williamsburg Middle School

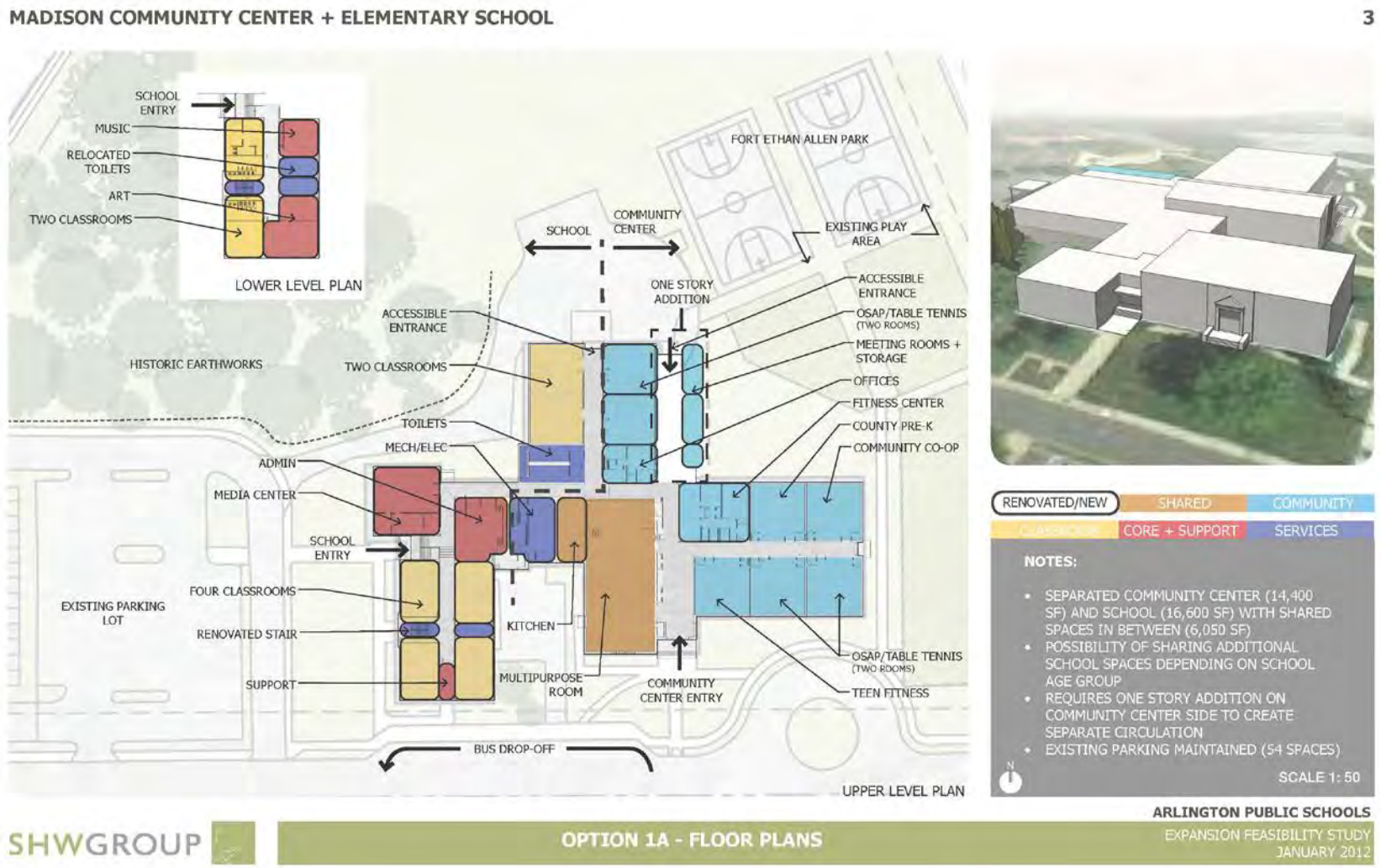
32 classrooms max

b|g|a
Bowie Gridley Architects

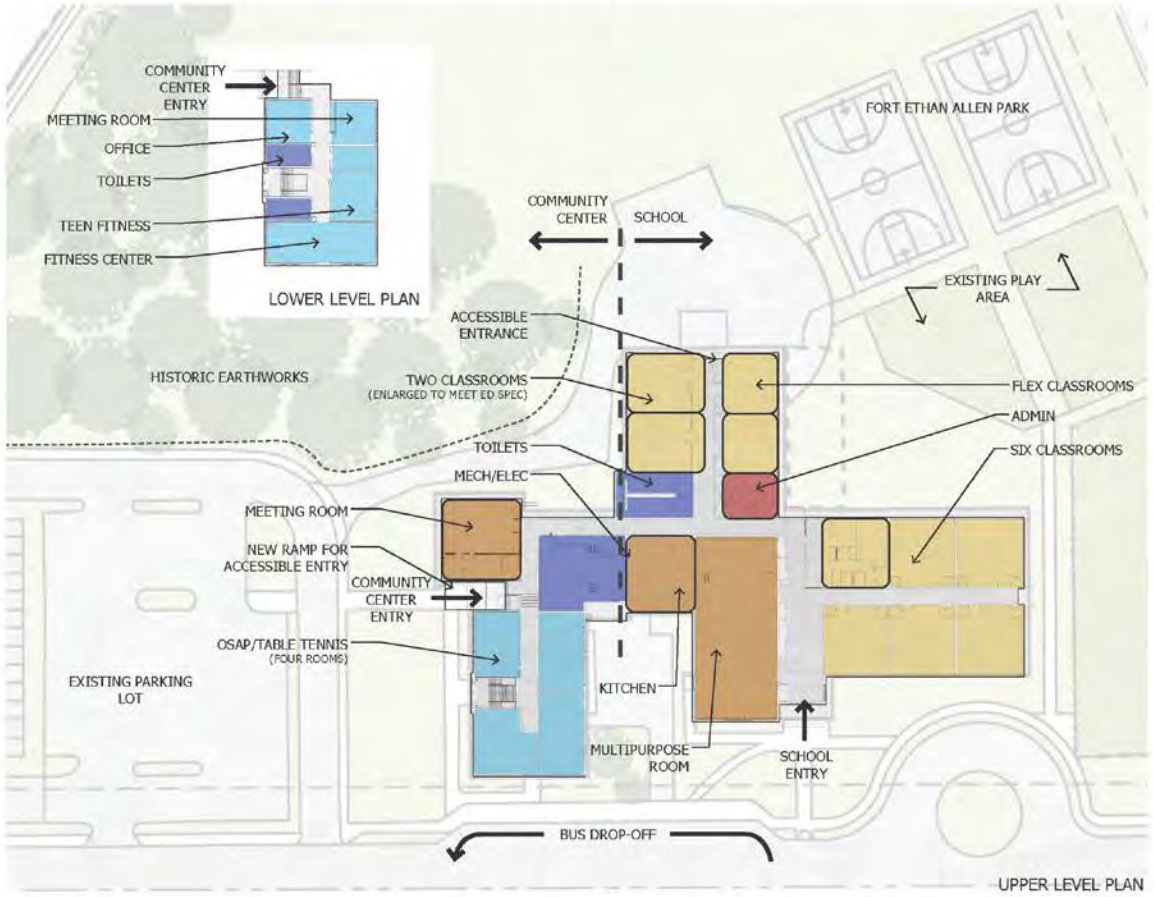
Massing Diagrams

Arlington Public Schools
Feasibility Study
November 2011

Appendix A: Madison Community Center (2012)



MADISON COMMUNITY CENTER + ELEMENTARY SCHOOL



RENOVATED/NEW | SHARED | COMMUNITY

CLASSROOM | CORE + SUPPORT | SERVICES

NOTES:

- SEPARATED COMMUNITY CENTER (11,330 SF) AND SCHOOL (16,200 SF) WITH SHARED SPACES (7160 SF) IN BETWEEN
- POSSIBILITY OF SHARING ADDITIONAL SCHOOL SPACES DEPENDING ON SCHOOL AGE GROUP
- REQUIRES ONE STORY ADDITION ON COMMUNITY CENTER SIDE TO CREATE SEPARATE CIRCULATION
- SCHOOL SUITABLE FOR PRE-K CENTER WITH CLASSROOMS AT GRADE NEAR PLAY AREA
- EXISTING PARKING MAINTAINED (54 SPACES)

N

SCALE 1: 50

ARLINGTON PUBLIC SCHOOLS

SHWGROUP

OPTION 1B - FLOOR PLANS

EXPANSION FEASIBILITY STUDY
JANUARY 2012

ARLINGTON PUBLIC SCHOOLS

SHWGROUP

OPTION 2 - SITE PLAN

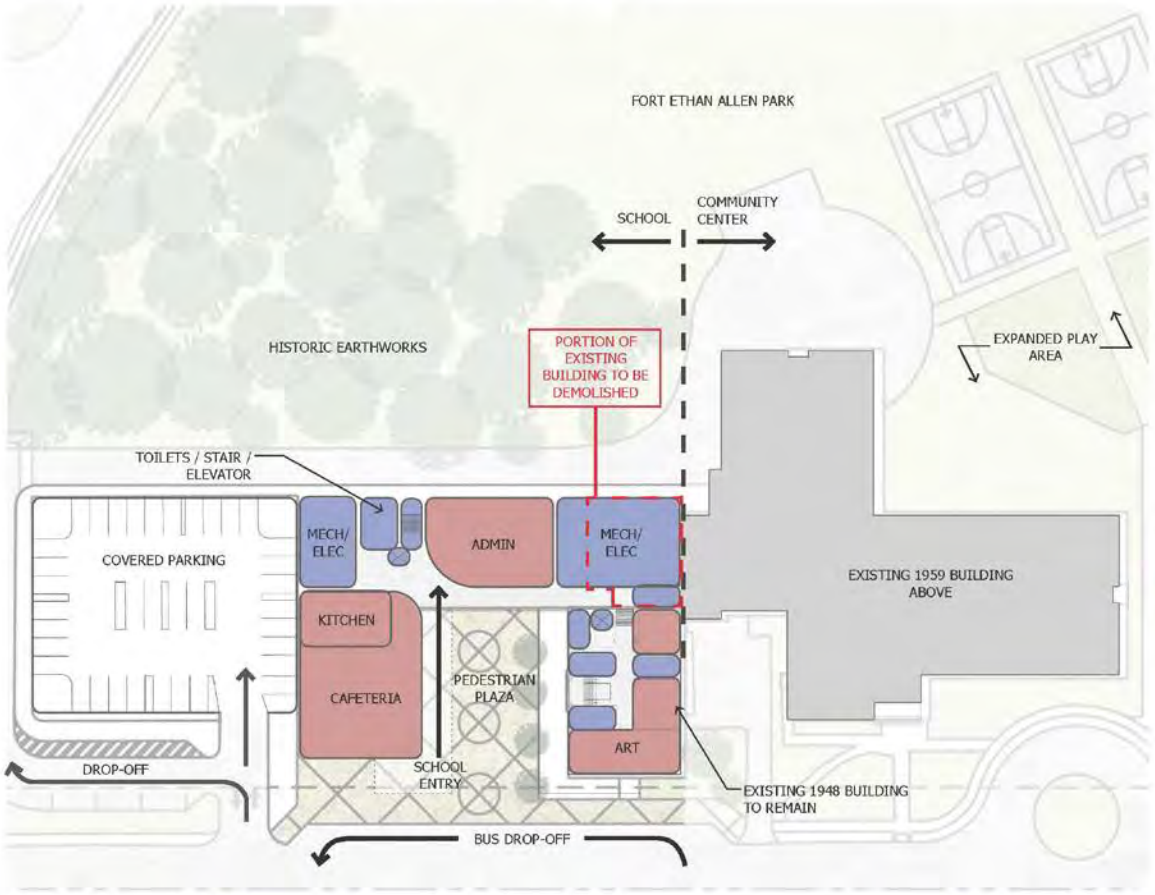
EXPANSION FEASIBILITY STUDY
JANUARY 2012

ARLINGTON PUBLIC SCHOOLS

SHWGROUP

OPTION 2 - SITE PLAN

EXPANSION FEASIBILITY STUDY
JANUARY 2012



RENOVATED/NEW | SHARED | COMMUNITY
CORE + SUPPORT | SERVICES

NOTES:

- COVERED PARKING ENTRANCE AT GRADE
- SCHOOL ENTRANCE AT FIRST FLOOR
- PEDESTRIAN PLAZA CREATES FOREGROUND FOR 1948 SCHOOL BUILDING

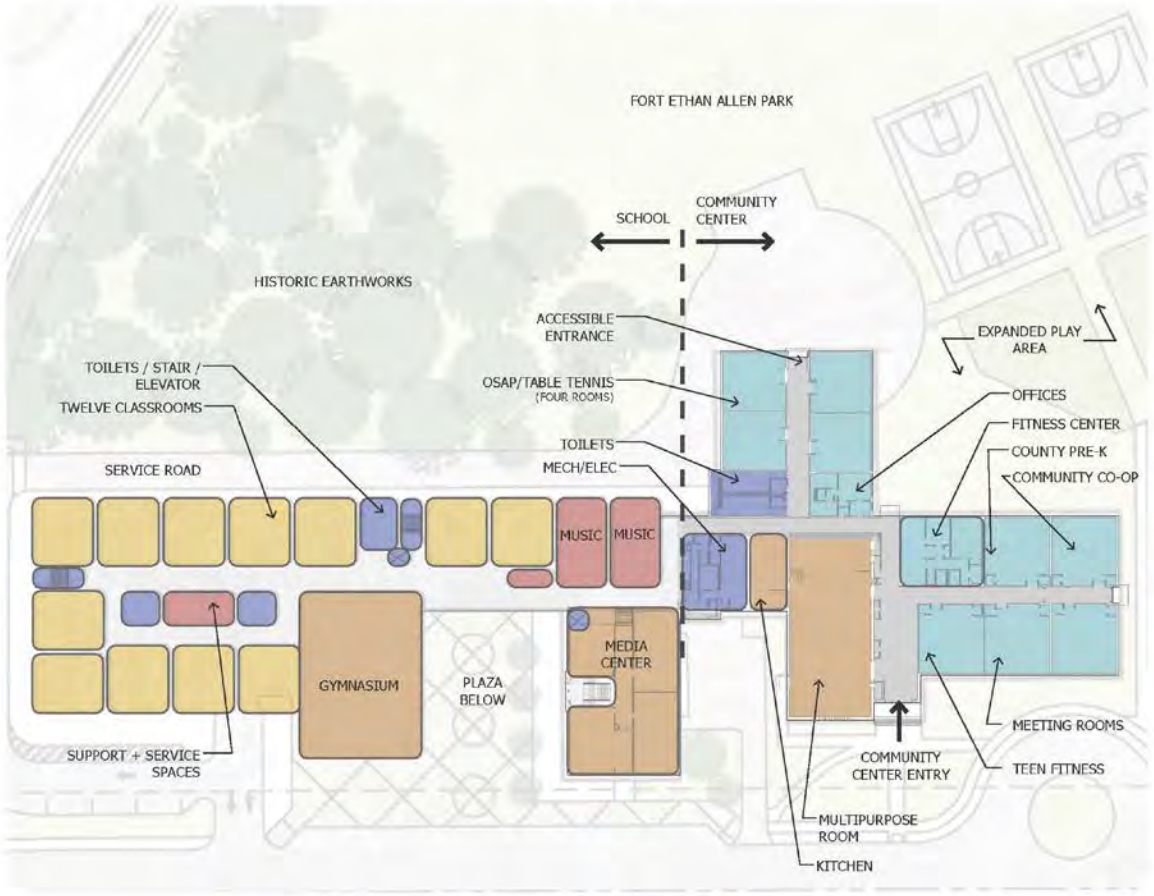
SCALE 1: 50

ARLINGTON PUBLIC SCHOOLS

SHWGROUP

OPTION 2 - FIRST FLOOR PLAN

EXPANSION FEASIBILITY STUDY
JANUARY 2012



RENOVATED/NEW | SHARED | COMMUNITY
CLASSROOM | CORE + SUPPORT | SERVICES

NOTES:

- COMMUNITY CENTER (22,800 SF) IN EXISTING BUILDING AND FULL ELEMENTARY SCHOOL ADDITION/RENOVATION (74,000 SF)
- COMMUNITY CENTER ENTRANCE ON SECOND LEVEL
- OPPORTUNITY TO SHARE LARGE CORE SPACES, SUCH AS MEDIA CENTER, MULTIPURPOSE ROOM AND GYMNASIUM
- POSSIBILITY OF SHARING ADDITIONAL SCHOOL SPACES DEPENDING ON SCHOOL AGE GROUP

N

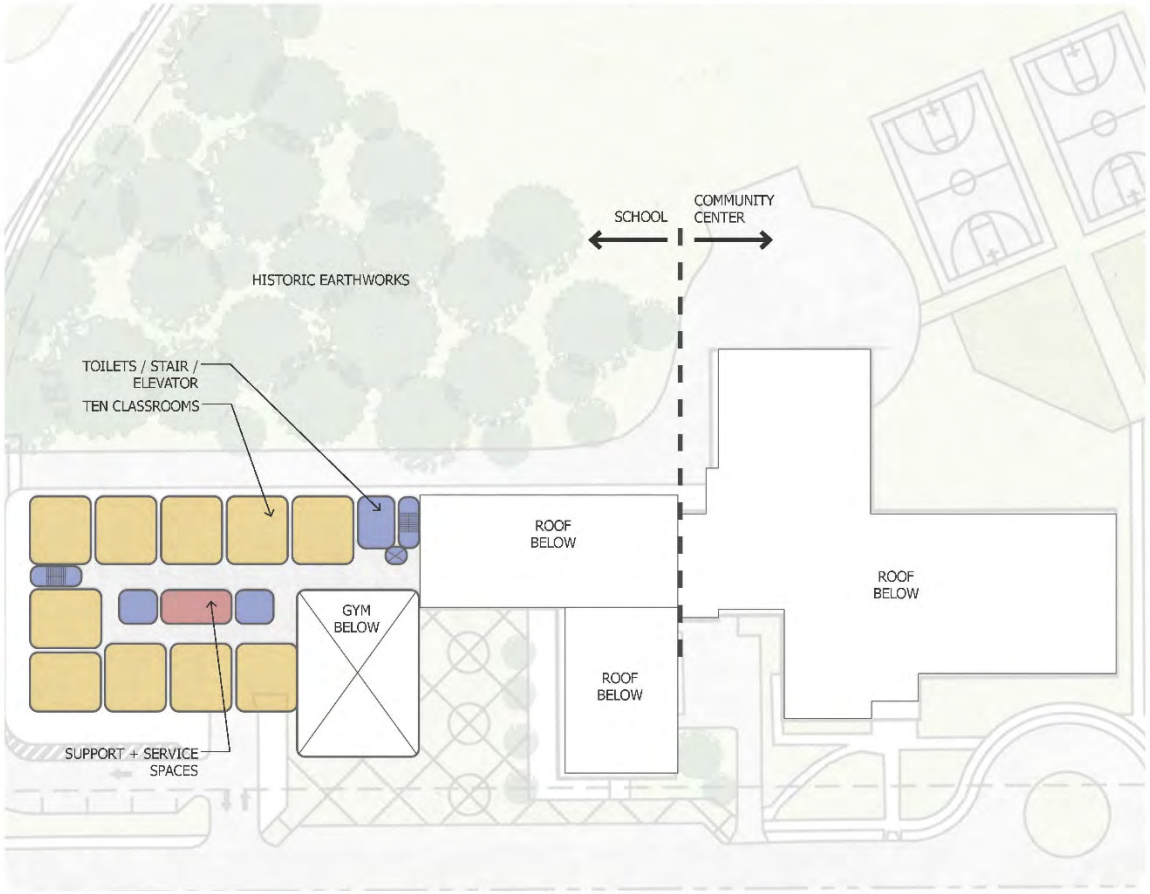
SCALE 1: 50

ARLINGTON PUBLIC SCHOOLS

SHWGROUP

OPTION 2 - SECOND FLOOR PLAN

EXPANSION FEASIBILITY STUDY
JANUARY 2012



RENOVATED/NEW | SHARED | COMMUNITY

CLASSROOM | CORE + SUPPORT | SERVICES

NOTES:

- THIRD FLOOR OVER CLASSROOM WING
- TWO STORIES ABOVE GRADE AT OLD GLEBE ROAD

N

SCALE 1: 50

ARLINGTON PUBLIC SCHOOLS

SHWGROUP

OPTION 2 - THIRD FLOOR PLAN

EXPANSION FEASIBILITY STUDY
JANUARY 2012

MADISON COMMUNITY CENTER + ELEMENTARY SCHOOL

SHWGROUP

SITE PLAN

ARLINGTON PUBLIC SCHOOLS
EXPANSION FEASIBILITY STUDY
FEBRUARY 2012

MADISON COMMUNITY CENTER + ELEMENTARY SCHOOL

ARLINGTON PUBLIC SCHOOLS

SHWGROUP

SITE PLAN

EXPANSION FEASIBILITY STUDY
FEBRUARY 2012

SHARED COMMUNITY
CLASSROOM CORE + SUPPORT SERVICES

NOTES:

- PARTIAL FIRST FLOOR AT LOW POINT IN SITE TOPOGRAPHY
- ENTRY FROM BUS LOOP IS AT GRADE
- CREATES "FINE ARTS WING" FOR SCHOOL, ART ROOM HAS DIRECT VIEWS TO THE EXTERIOR DUE TO SLOPE IN TOPOGRAPHY

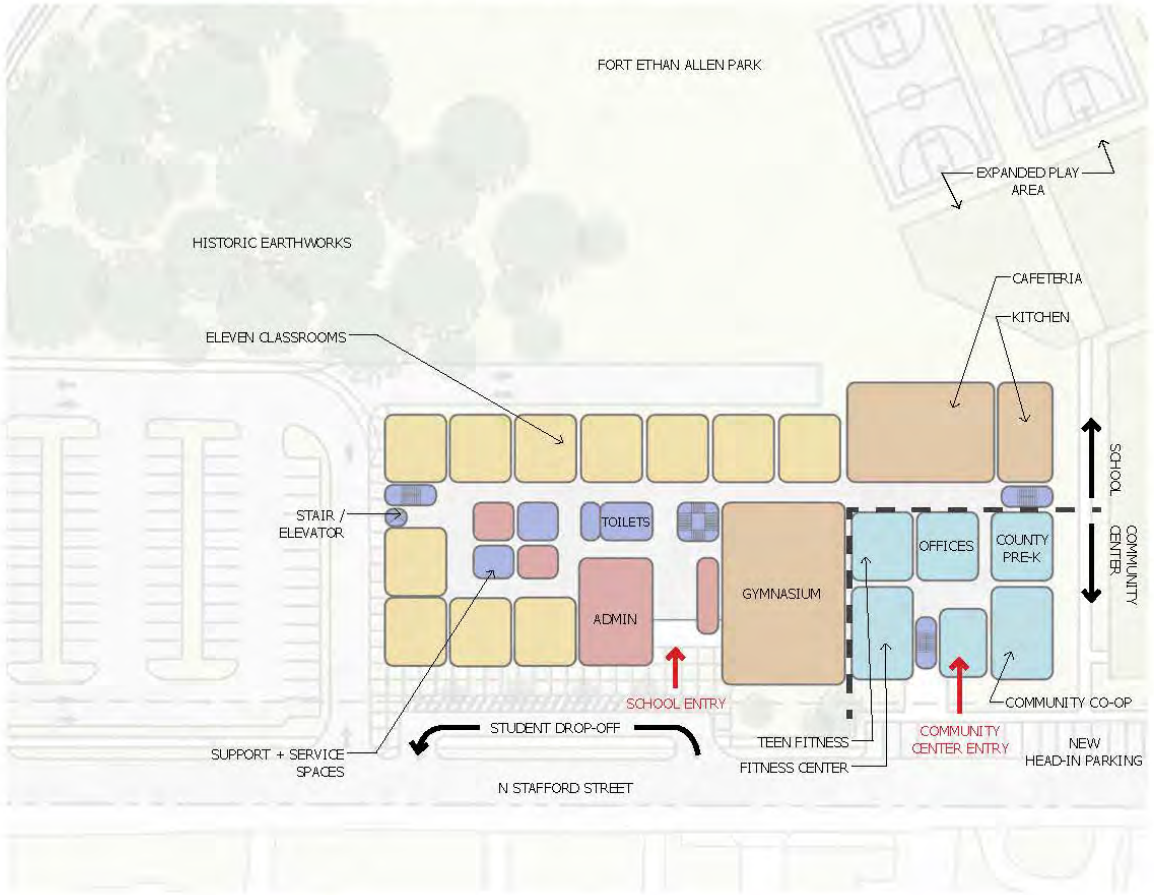
SCALE 1: 50

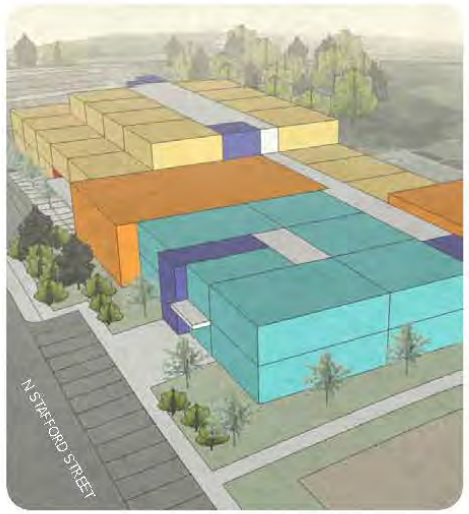
ARLINGTON PUBLIC SCHOOLS

SHWGROUP

FIRST FLOOR PLAN

EXPANSION FEASIBILITY STUDY
FEBRUARY 2012





SHARED | COMMUNITY
CLASSROOM | CORE + SUPPORT | SERVICES

NOTES:

- COMMUNITY CENTER PROGRAM IS 16,400 SF AND ELEMENTARY SCHOOL IS 90,500 SF, TOTAL BUILDING IS 106,900 SF
- BOTH COMMUNITY CENTER AND SCHOOL ENTRIES ARE AT GRADE FROM N STAFFORD STREET
- OPPORTUNITY TO SHARE LARGE CORE SPACES, SUCH AS MEDIA CENTER, CAFETERIA AND GYM
- POSSIBILITY OF SHARING ADDITIONAL SCHOOL SPACES DEPENDING ON SCHOOL AGE GROUP

N

SCALE 1: 50

ARLINGTON PUBLIC SCHOOLS

SHWGROUP

SECOND FLOOR PLAN (ENTRY LEVEL)

EXPANSION FEASIBILITY STUDY
FEBRUARY 2012

SHARED | COMMUNITY

CLASSROOM | CORE + SUPPORT | SERVICES

NOTES:

- THIRD FLOOR OVER SCHOOL AND COMMUNITY CENTER
- TWO STORIES ABOVE GRADE AT N STAFFORD STREET

N

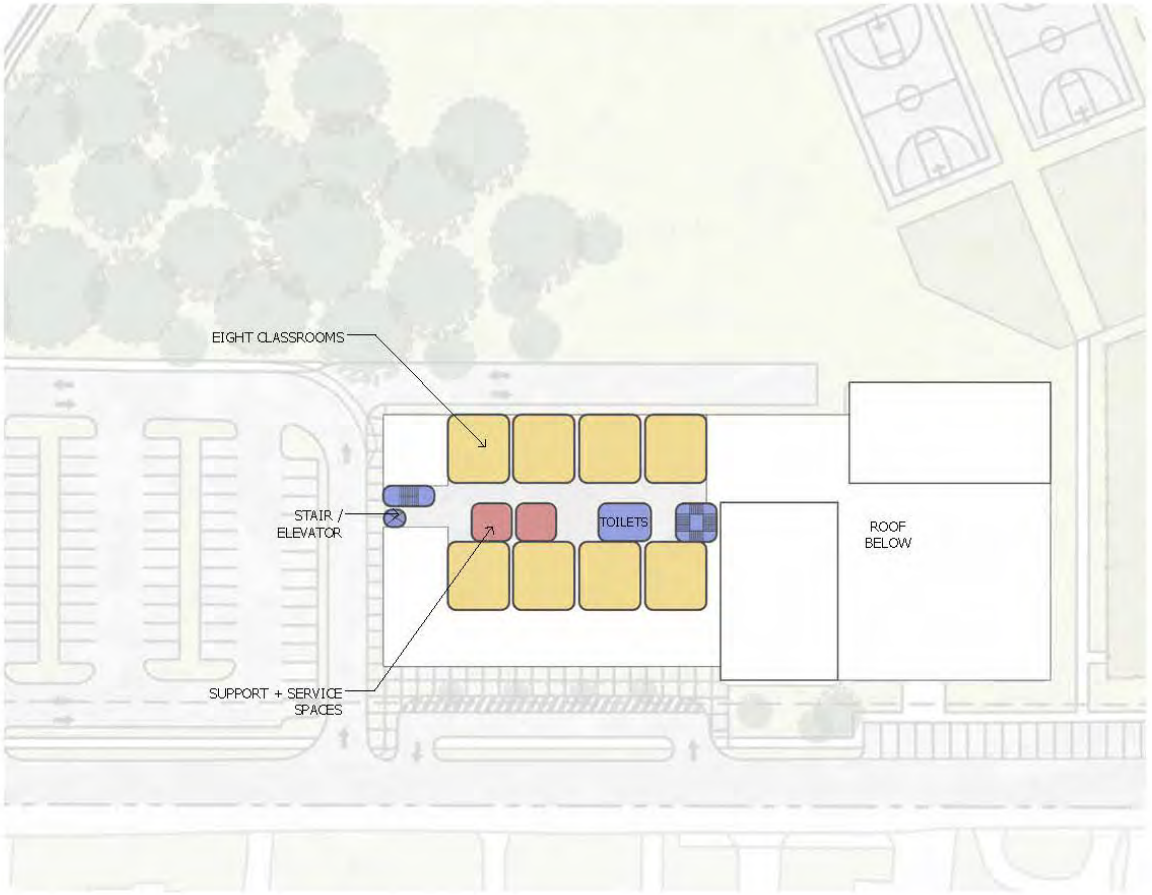
SCALE 1: 50

ARLINGTON PUBLIC SCHOOLS

SHWGROUP

THIRD FLOOR PLAN

EXPANSION FEASIBILITY STUDY
FEBRUARY 2012



SHARED | COMMUNITY
CLASSROOM | CORE + SUPPORT | SERVICES

NOTES:

- TIERED FOURTH FLOOR STEPS BACK AT THE STREET FACE OF THE BUILDING

N

SCALE 1: 50

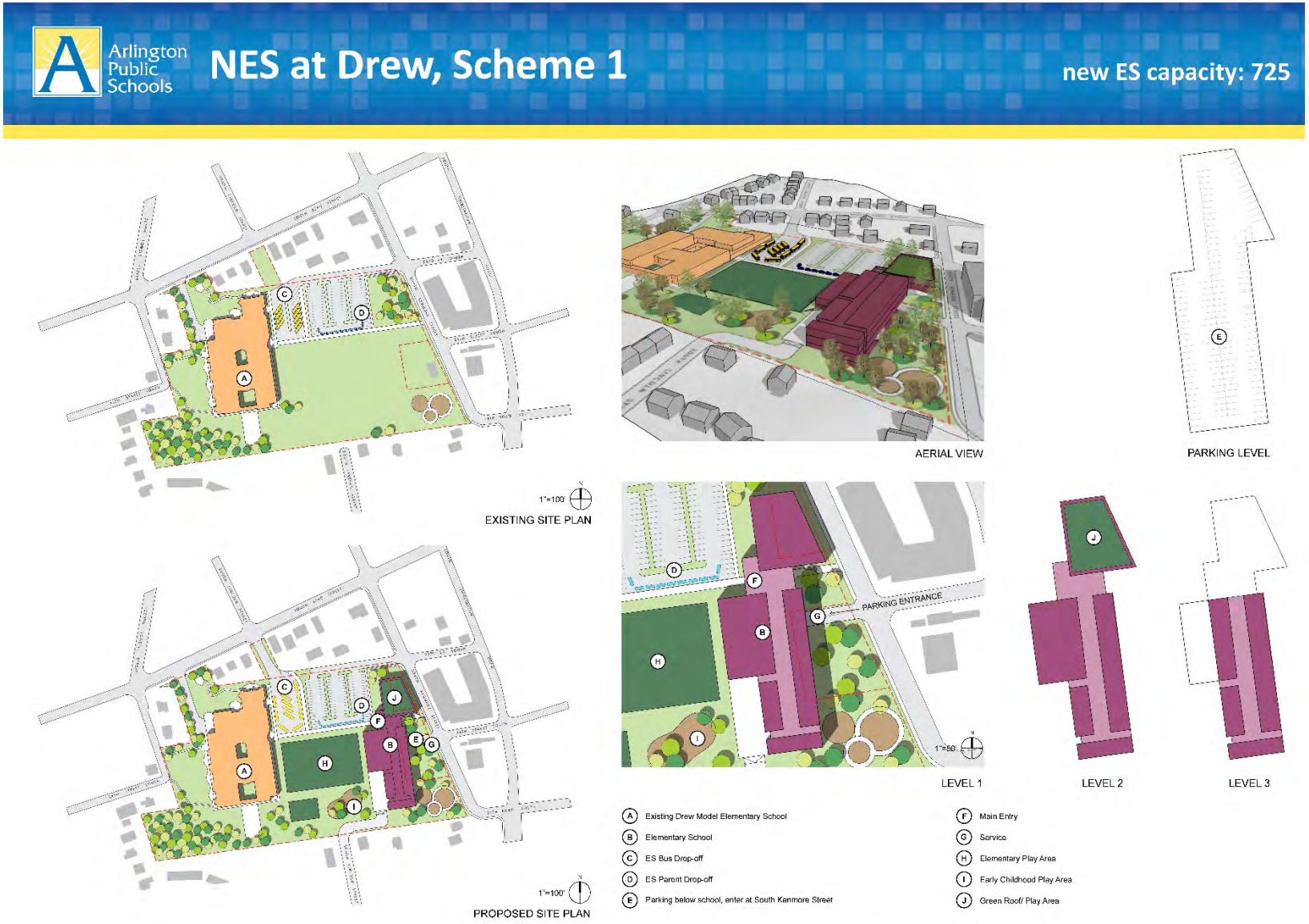
ARLINGTON PUBLIC SCHOOLS

SHWGROUP

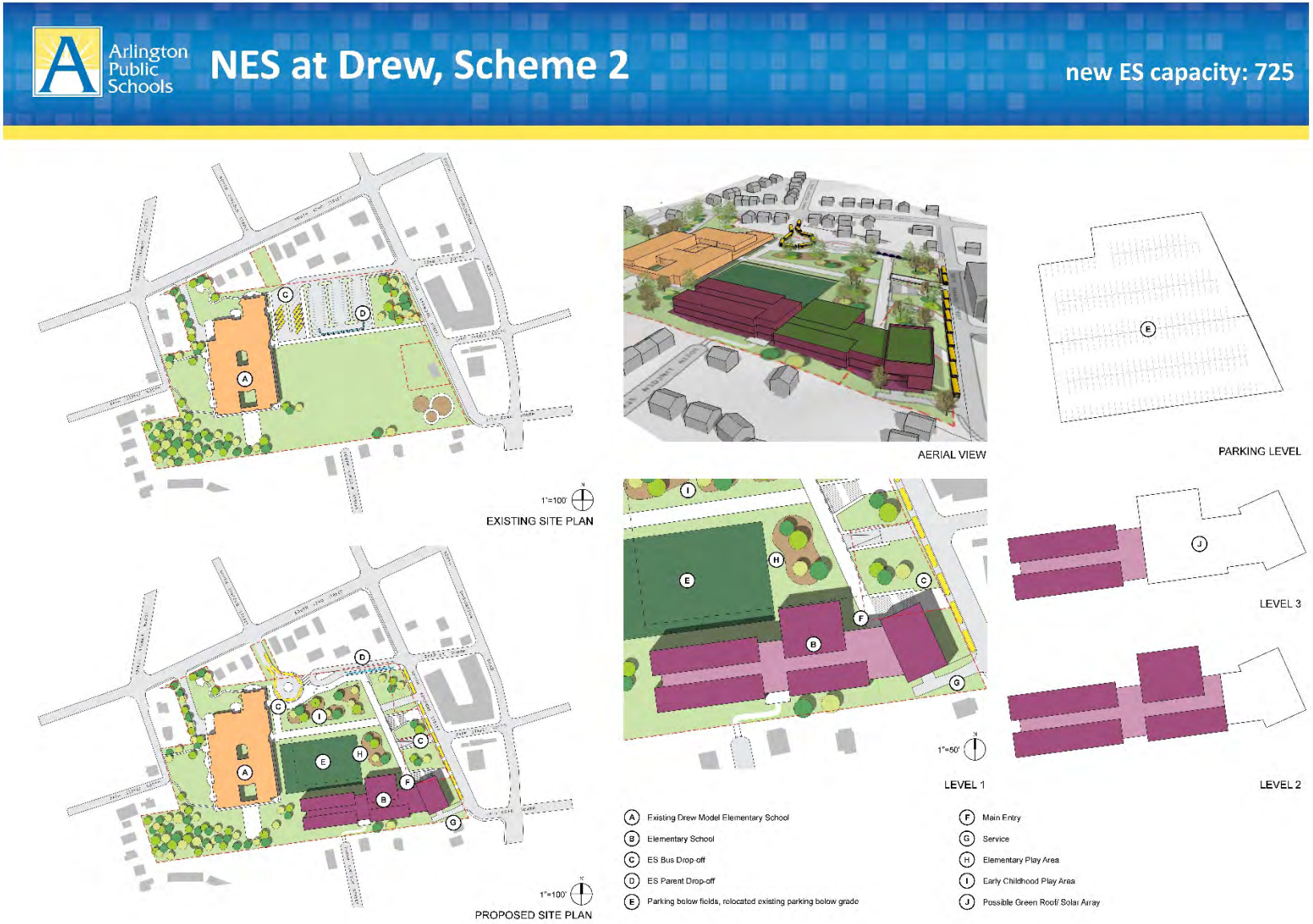
FOURTH FLOOR PLAN

EXPANSION FEASIBILITY STUDY
FEBRUARY 2012

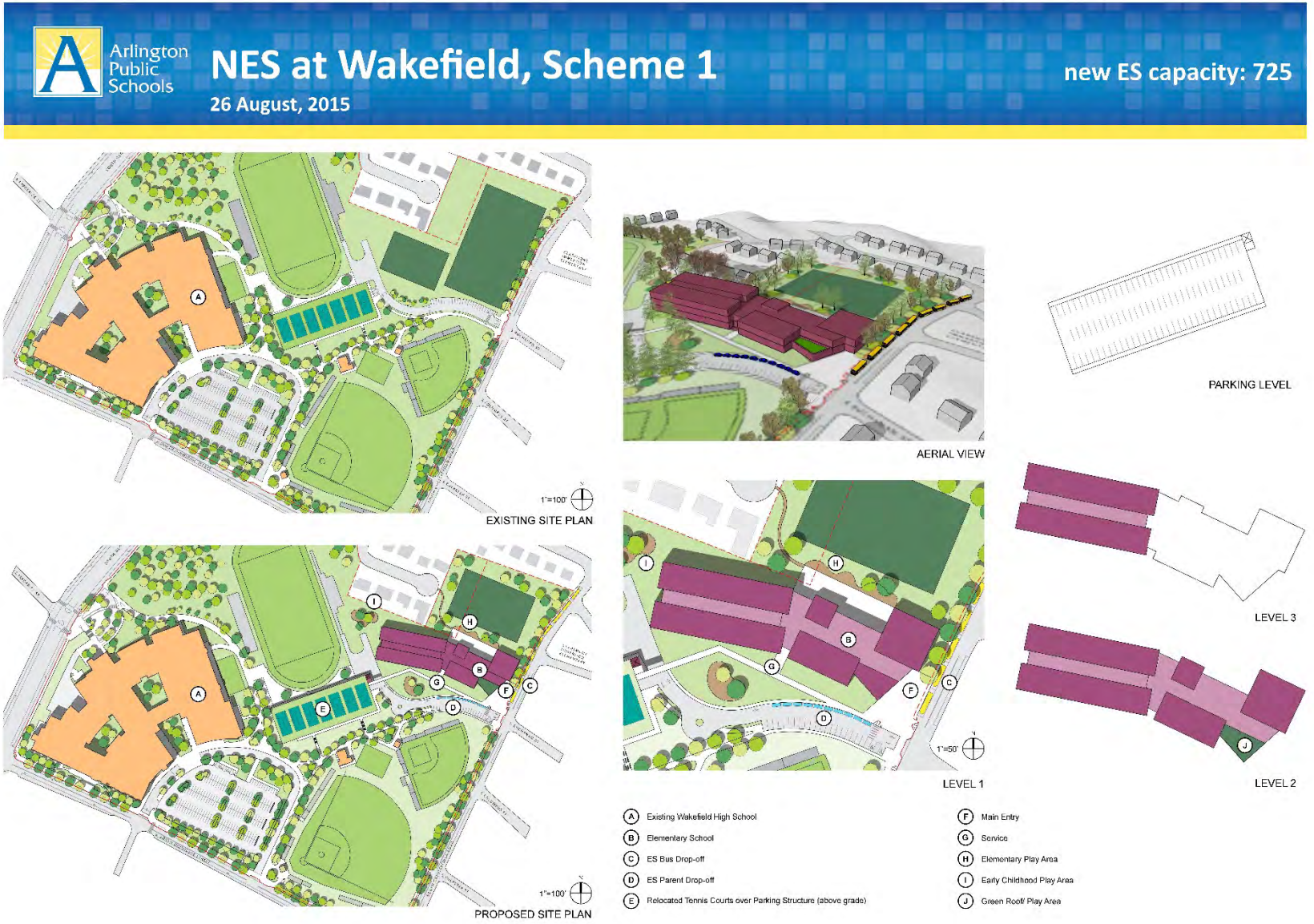
Appendix A: Drew Scheme 1 (2015)



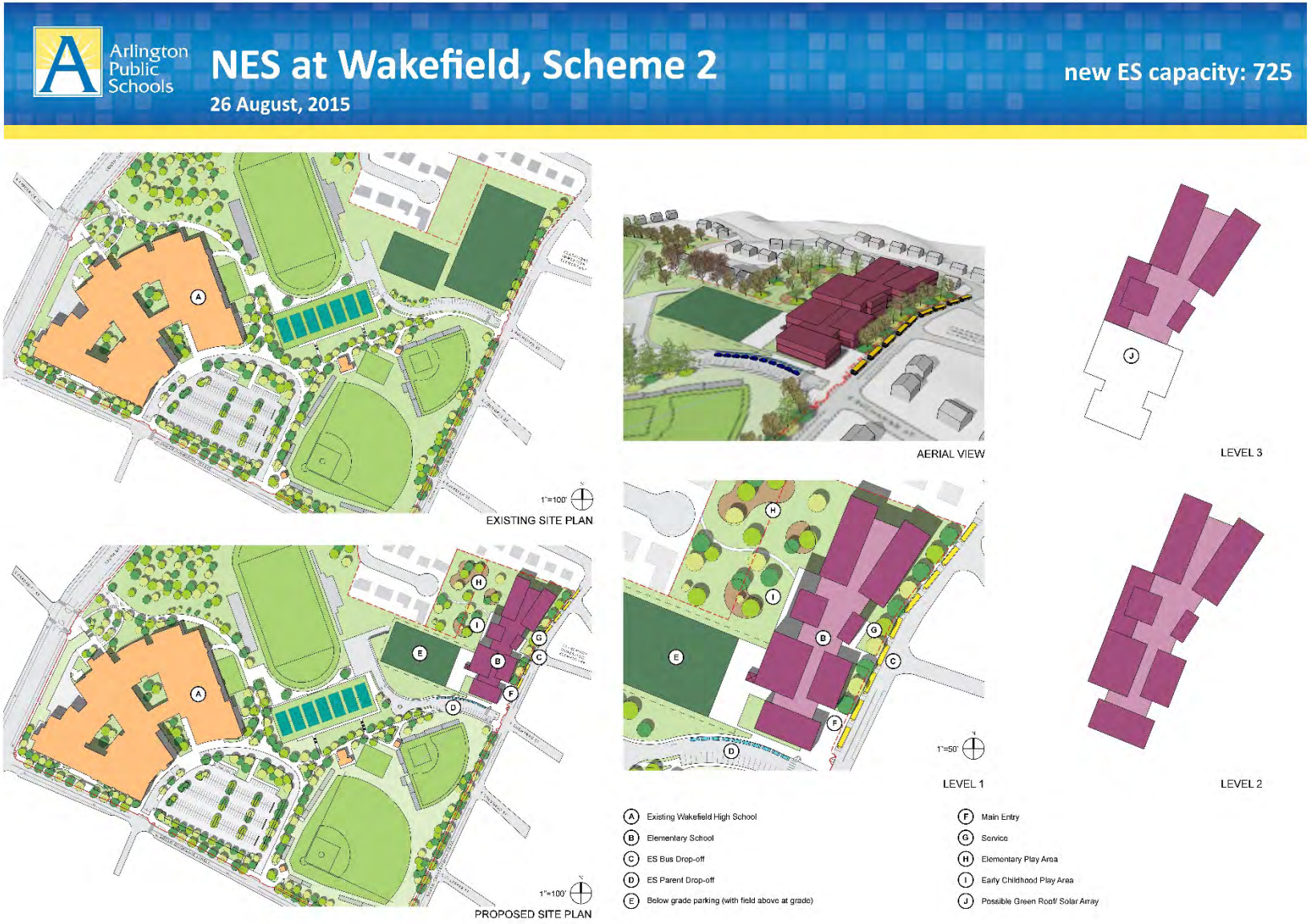
Appendix A: Drew Scheme 2 (2015)



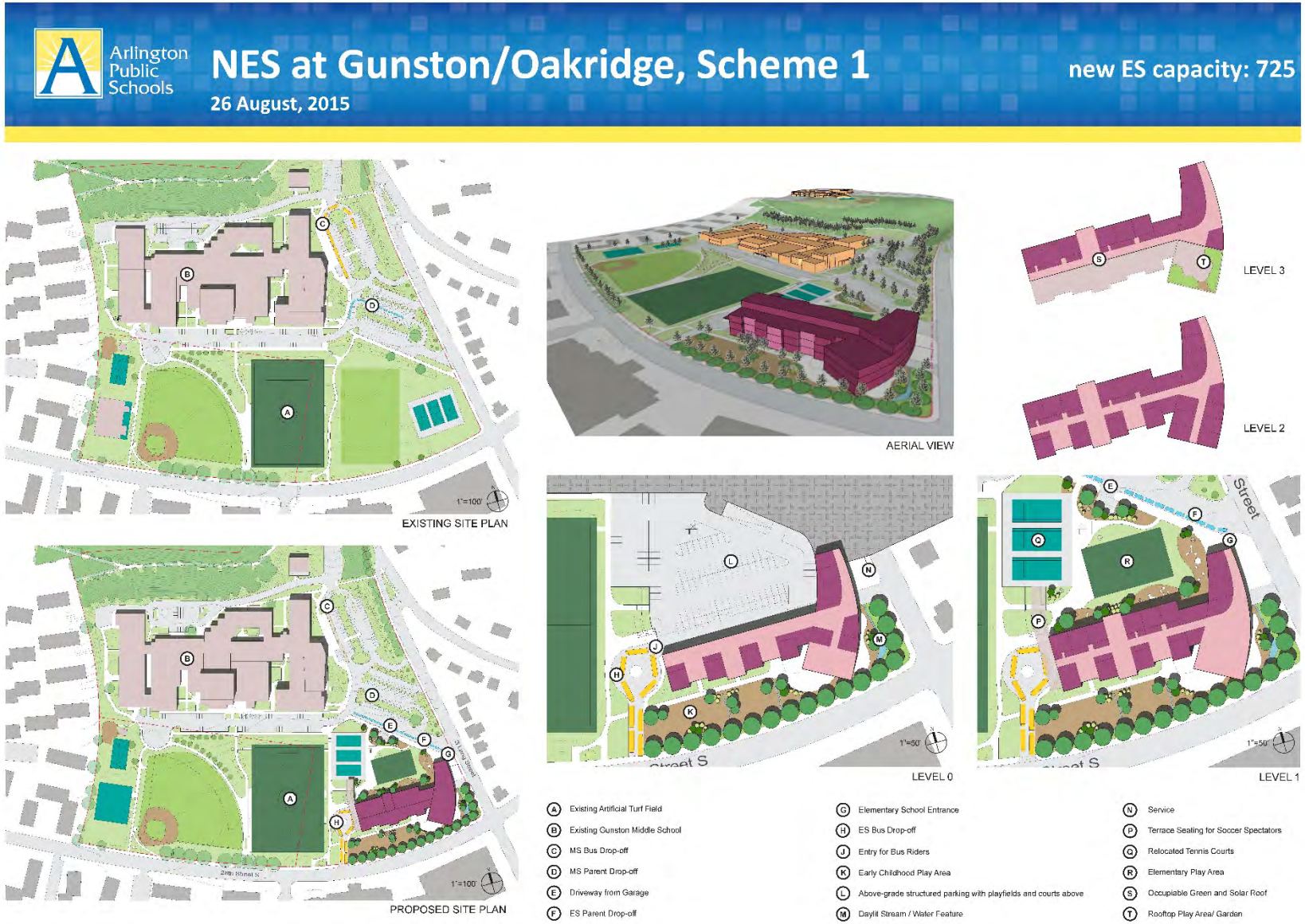
Appendix A: Wakefield Scheme 1 (2015)



Appendix A: Wakefield Scheme 2 (2015)



Appendix A: Gunston Scheme 1 (2015)



Appendix A: Gunston Scheme 2 (2015)