



Arlington
Public
Schools



ARLINGTON PUBLIC SCHOOLS

TASK #2—ARLINGTON SCIENCE FOCUS ELEMENTARY

Feasibility Study Revised 8/25/17



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1. EXECUTIVE SUMMARY

In response to the challenges of enrollment growth and limited land resources in Arlington County, Arlington Public 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 & Dunlavy** 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 (P_g) – 25 PSF
 - Snow Importance Factor – 1.10
 - Flat-roof snow load (p_f) – 22 PSF
 - Snow exposure factor (C_e) – 1.0
 - Thermal factor (C_t) – 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
 - S_s – 0.160g
 - S_1 – 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 ($f_y=33$ 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.

D. Site Description

The Arlington Science Focus Elementary School is located at 1501 N. Lincoln Street, Arlington, Virginia. On the South end of the school, APS owns a large blacktop area, a playground and an expansive field where the current

relocatable classrooms are located to the north of the current school footprint. In addition, APS owns a large area of sloped forest space with several existing easements. Below is a graphic of the site limitations of the school.



E. Overview of Options

Option 1

Option 1 involves excavating a crawl space underneath the existing school. This option would yield four (4) additional classrooms adding approximately 4,900 square feet to the school. In 2015 APS bid out this package and received a bid price of \$4,453,000. In today's dollars total cost for the project including escalation, soft costs and contingencies is \$7,359,694, at the cost of \$79,137 per seat. The proposed construction schedule would be high risk and is from the time school gets out in June until the following November for a total of four (4) months.

Option 2

Option 2 proposes to add a new freestanding building structure on the south side of the school in the current location of the relocatable classrooms and would occupy a portion of the playground. In this scenario, the relocatable classrooms are proposed to be relocated to the school's

existing blacktop recreation surface. The new structure would connect through a new corridor at the front of the school adjacent to the music room. Three different options that vary in size and costs have been researched and are described in the following sub-sections:

Option 2A

This option would yield four (4) classrooms and would add approximately 5400 square feet to the school. The total estimated cost of this option is \$5,071,577, which translates to a cost of \$54,533 per seat. The proposed construction schedule would start when the school year ends in June and would last until July of the next year for a total of fourteen (14) months.

Option 2B

This option would yield six (6) classrooms, and would add approximately 7,200 square feet to the school. The total estimated cost of this option is \$5,909,927, estimated to cost \$42,214 per seat. The proposed construction schedule would start when the school year ends in June and last until the July of the next year for a total of fourteen (14) months.

Option 2C

This option doubles the size of option 2B by adding a second story to the proposed addition. This option would yield twelve (12) classrooms and would add approximately 14,200 square feet to the school. The total estimated cost of this option is \$9,517,669, estimated to cost \$33,992 per seat. The proposed construction schedule would start when the school year ends in June and last until the July of the next year for a total of fourteen (14) months.

Option 3

Option 3 anticipates a new freestanding building structure on the north side of the school on the adjacent property which is adjacent to steep terrain and is heavily wooded. This option would include removing tree's and cutting into the hill by building large retaining walls to support the hill. The structure would connect to the back of the school through an enclosed breezeway. This option would yield up to ten (10) classrooms and add approximately 10,340 square feet to the school. The estimated cost is \$8,341,596— a cost of \$35,801 per seat. The proposed construction schedule would start when the school year ends in June and last until the July of the next year for a total of fourteen (14) months.

Option 4

Option 4 proposed to add a vertical addition over the existing three- (3-) classroom wing on the west end of the school. This option would include demolishing the three existing classrooms and constructing a new two-story structure in its place. The addition would not increase the school's overall footprint. Access to the proposed construction area is difficult thus presenting constructability challenges. Two different options within these parameters have been researched and are described in the following sub-sections.

Option 4A

Option 4A is a two-story vertical addition on the east side of the school. This option would yield up to five (5) additional classrooms and add approximately 4,876 square feet to the school at an estimated cost of \$7,687,333, at \$66,270 per seat. The proposed construction schedule would start when the school year ends in June and last until the July of the next year for a total of fourteen (14) months.

Option 4B

Option 4b is a three-story vertical addition over the three (3) classrooms on the east side of the school. This option would yield up to nine (9) additional classrooms and add approximately 9,752 additional square feet to the school. The cost would be \$10,307,477, at \$49,083 per seat. The proposed construction schedule would start when the school year ends in June and last until the August of the next year for a total of fifteen (15) months.

3. OPTIONS

A. Option 1 - Crawl Space

1. Description of Option & Scope of Work

The current building has 4,900 SF of unexcavated below-grade space occupied by virgin soil. The original task was to assess the 2015 design and bid scope of work and explore ways to make the project more cost effective. The 2015 scope was to remove all the dirt and build out the space into four (4) usable classrooms. These classrooms would be designed to be under 900 square feet each making them ideal for grades 1–5. It is our assessment that this option has the highest risk with the highest cost yielding the least amount of usable space due to extensive structural modifications and has challenging access to the construction area.

The schedule for this scope of work would have a proposed construction duration of four (4) months and would include the following:

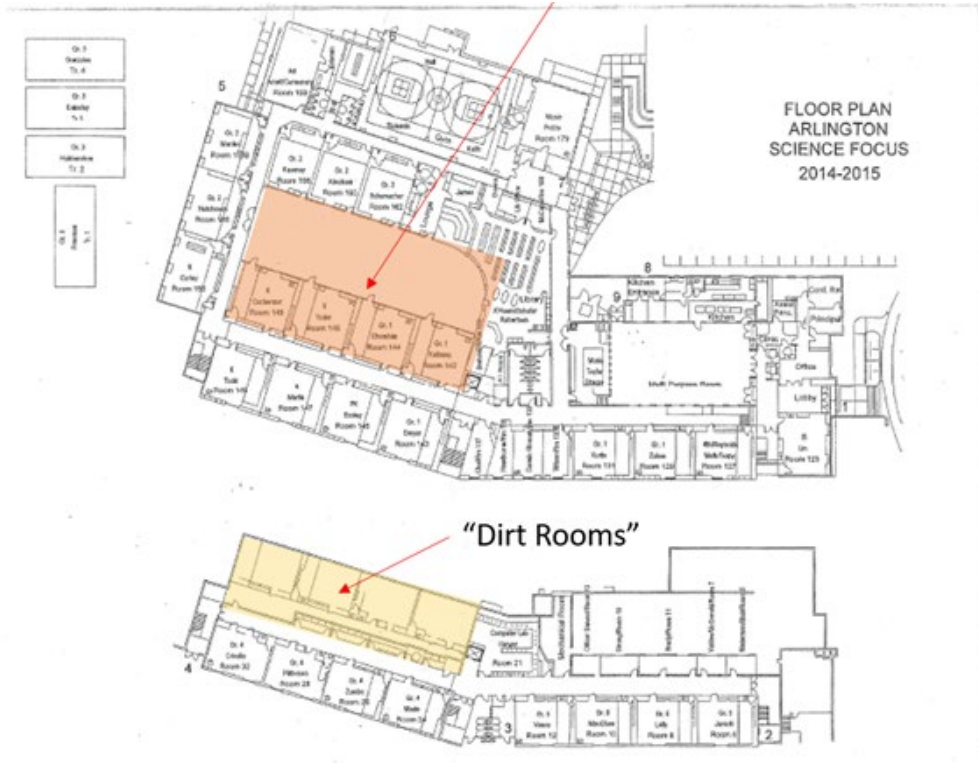
- Establish the construction site limitations and install fencing. *(Please refer to the site access plan included in this section)*
- Install temporary protections in the existing school to minimize unnecessary damage and impact areas outside of the construction zone.
- Install support of excavation within the dirt rooms to support the upper floor and roof.
- Excavate dirt and courtyard where necessary to install a light well for the new classrooms.
- Strengthen the existing structure to accommodate the structural weight of the addition.
- Backfill new retaining wall in the courtyard for program space.
- Rough in all necessary mechanical, electrical, and

plumbing and install new heating and cooling units as required.

- Install the exterior building skin, glazing, and roofing to match the existing skin in place.
- Fit out the interior of the four (4) new classrooms to include millwork, doors frames and hardware, paint, and flooring.
- Test and balance the mechanical system of the existing structure, and the new 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.
- Provide 50 additional parking spaces in the northern lower field area.

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 553 seats to 646 seats.

2. Plan View



3. Structural & Soil Review

The scope of the Dirt Room Project primarily consists of foundations work, shoring, and underpinning. Some heavy steel framing is used to support the existing floor structure where the original concrete columns are 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.

Given that a feasible design was engineered and construction drawings were prepared in 2015, the structural review for this option is more about devising construction methods that would allow for a quicker construction and lower cost rather than establishing structural feasibility. The high cost of this option is a function of the complex process, much of which is the contractor's means and methods.

The 2015 drawings set shows a design that includes a concrete areaway wall utilizing soil nailing, and long steel beams for temporary support of the existing structure that bear on mini-pile shoring towers. These systems would seem to be difficult, at best, to install given the limited access for heavy equipment to the courtyard, and limited available courtyard width for inserting long beams under the building.

Some considerations to simplify this already complex effort might include:

- Use of more standard soldier piles with wood lagging and helical anchor type tie-backs for excavation of the areaway. A one-sided concrete wall may be considered for placement against the shoring for the permanent wall.
- Use of bracket piles along the exterior wall to temporarily provide support to the exterior wall until the excavation is complete and a permanent masonry wall may be constructed.
- Use of pipe style helical piles installed through holes cut in the elevated floor for the temporary support of the existing concrete floor system. Once installed, and as the excavation below advances, the pipe shaft of the piles may be encased with a pipe and grout filled so that the exposed pile functions as a column. These components are removed, and the holes in the floor are patched once the permanent support beam is installed.

- Construction of temporary openings in the corridor and perimeter walls to the north to allow small excavation equipment to remove earth.
- Use of heavy steel beams and tube columns instead of the concrete framing specified to expedite installation and eliminate curing time.

While these considerations might help reduce the complexity of the construction to some degree, the construction of this option will remain a difficult and complex scope of work. The challenges include: extensive excavation, extensive temporary support required, and other difficult types of heavy construction such as underpinning, and shoring and bracing work.

4. Site Access

Access to this area of the building could be achieved from the northern outdoor side walk, not to interfere with school functions. Construction activities are expected outside the windows of the classrooms, and student traffic on the sidewalk would be restricted. The picture below depicts the route of access to the stairwell.

Inside the building, the staircase has direct access to the corridor leading to the dirt rooms. The schedule is

designed to have the core and shell construction completed during summer break to ensure that soil removal and heavy structural work would not impact school functions or the safety of students.

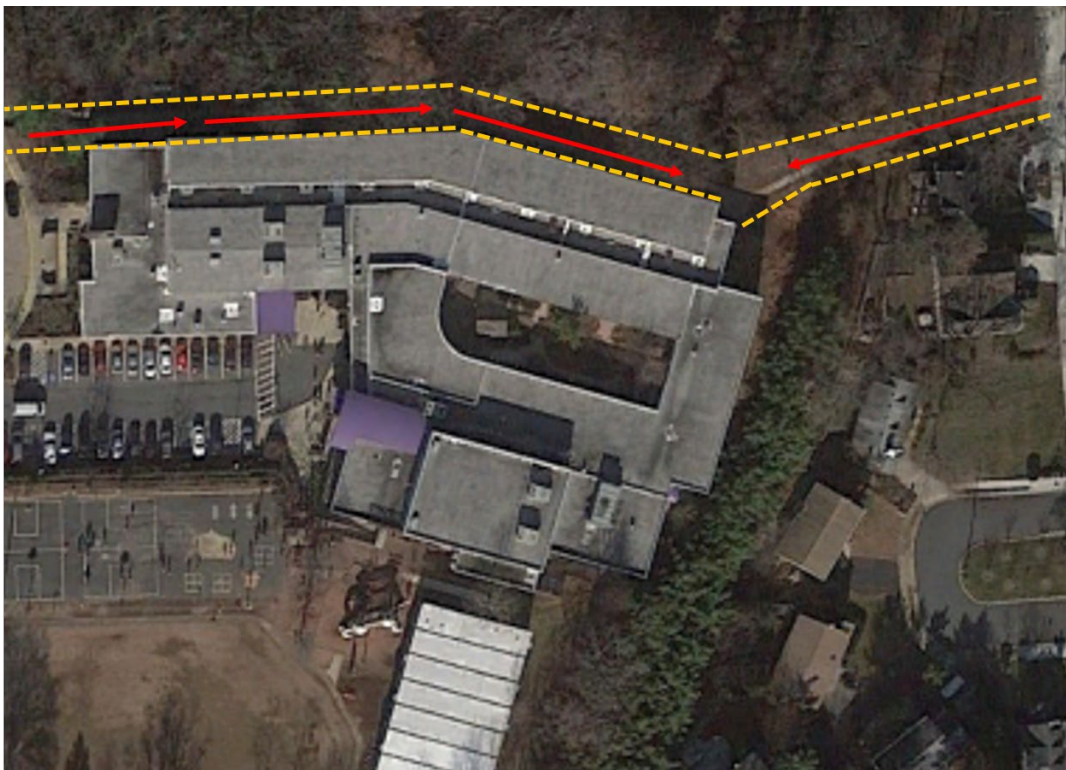




Photo 1.1 Inside the dirt area



Photo 1.2 Inside the dirt area



Photo 1.3 Exterior door that would provide access to the construction area



Photo 1.4 Courtyard garden that would be disturbed by the construction

5. Estimated Budget

The total estimated project cost for this addition is \$7,359,694. This includes the cost of the proposal received by APS in 2015 (**\$4,453,000**) for the work in addition to escalation, soft costs, and contingencies.

Arlington Science Focus Elementary School School Expansion Feasibility Options



Original Option 1 Summary

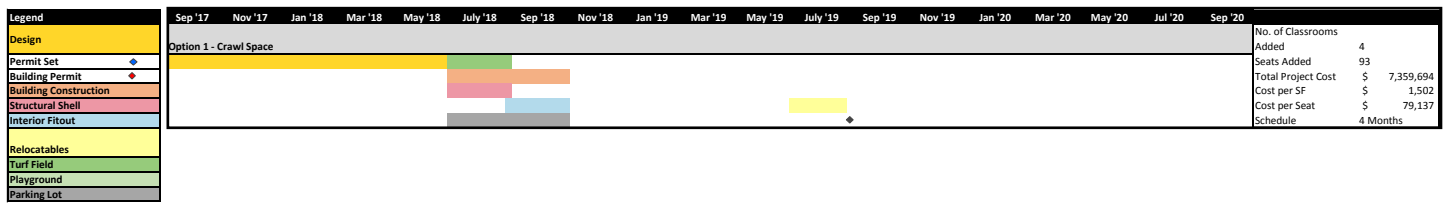
Construction Cost from 2015 Bid

		\$/SF	TOTAL
	Gross Area:	4,900 SF	
TOTAL CONSTRUCTION COST BEFORE ESCALATION		908.78	4,453,000
	Escalation	84.27	412,913
ESTIMATED CONSTRUCTION COST AT AWARD		993.04	4,865,913
	Construction Contingency	10.00%	486,591
	Project Soft Costs	25.00%	1,338,126
	Owner's Contingency	10.00%	669,063
ESTIMATED TOTAL COST		1,501.98	7,359,694

6. Schedule

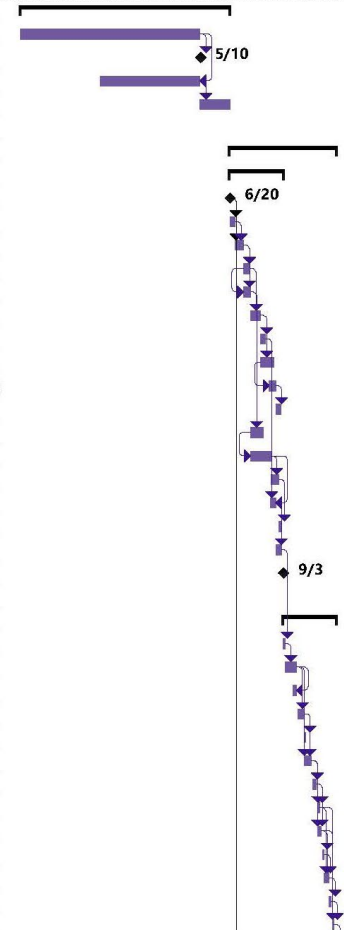
The proposed construction schedule for this option would span over a summer and the next consecutive fall for a total length of roughly four (4) months.

Below is a timeline of the option 1 schedule including the design phase. A full project schedule is included in the next two pages.



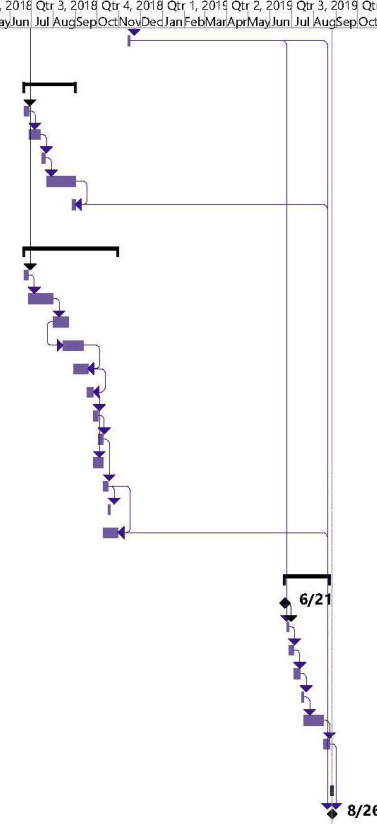
Schedule Option 1 - Dirt Rooms

ID	Task Name	Duration	Start	Finish	Predecessors
1	Design/Permit Phase	210 days	Thu 8/31/17	Wed 6/20/18	
2	Building plan approval/ permit	180 days	Thu 8/31/17	Wed 5/9/18	
3	Building permit	1 day	Thu 5/10/18	Thu 5/10/18	2
4	General contractor procurement	100 days	Thu 12/21/17	Wed 5/9/18	2FF
5	Design and approval of Support of Excavation	30 days	Thu 5/10/18	Wed 6/20/18	4
6					
7	Building Construction	108 days	Wed 6/20/18	Fri 11/16/18	
8	Structural shell	54 days	Wed 6/20/18	Mon 9/3/18	
9	Last Day of School	1 day	Wed 6/20/18	Wed 6/20/18	
10	Mobilize contractor	5 days	Thu 6/21/18	Wed 6/27/18	9
11	Establish erosion control and fencing	8 days	Thu 6/28/18	Mon 7/9/18	10,9
12	Support of excavation	7 days	Tue 7/10/18	Wed 7/18/18	11
13	Support of exist. fdns - temp shoring	8 days	Tue 7/10/18	Thu 7/19/18	11,12SS
14	Exterior excavation	10 days	Fri 7/20/18	Thu 8/2/18	12,13
15	U/G Site utilities - Drainage for light well	5 days	Fri 8/3/18	Thu 8/9/18	14
16	F, R and pour light well retaining wall	12 days	Fri 8/3/18	Mon 8/20/18	14
17	Retaining wall cure	7 days	Wed 8/15/18	Thu 8/23/18	16SS+8 da
18	Backfill retaining wall, grade and landscape	5 days	Fri 8/24/18	Thu 8/30/18	17
19	Interior excavation	12 days	Fri 7/20/18	Mon 8/6/18	13
20	Foundations and underpinning	20 days	Fri 7/20/18	Thu 8/16/18	19SS
21	Construct exterior wall	7 days	Fri 8/17/18	Mon 8/27/18	20
22	U/G MEP Rough In	6 days	Thu 8/16/18	Thu 8/23/18	15,20FF+5
23	Windows	4 days	Tue 8/28/18	Fri 8/31/18	21
24	Slab on grade	6 days	Fri 8/24/18	Fri 8/31/18	22
25	First Day of School	1 day	Mon 9/3/18	Mon 9/3/18	
26					
27	Interior Fitout	55 days	Mon 9/3/18	Fri 11/16/18	
28	Building Interior wall framing	3 days	Mon 9/3/18	Wed 9/5/18	24
29	MEP Rough in walls and ceilings	12 days	Thu 9/6/18	Fri 9/21/18	28
30	Set Mechanical Equipment	5 days	Mon 9/17/18	Fri 9/21/18	29FF
31	Wall close in and finish	7 days	Mon 9/24/18	Tue 10/2/18	29
32	Set door frames	2 days	Wed 10/3/18	Thu 10/4/18	31
33	Ceiling grid and light fixtures	8 days	Wed 10/3/18	Fri 10/12/18	29,31
34	Finishes/Paint	5 days	Mon 10/15/18	Fri 10/19/18	33
35	Grilles, registers and diffusers	3 days	Mon 10/22/18	Wed 10/24/18	33,34
36	Elec Trimout	5 days	Mon 10/22/18	Fri 10/26/18	33,34
37	Specialties	2 days	Mon 10/29/18	Tue 10/30/18	36
38	Flooring	5 days	Wed 10/31/18	Tue 11/6/18	37,35,36
39	Doors and Hardware	3 days	Wed 11/7/18	Fri 11/9/18	38
40	Test and balance	2 days	Mon 11/12/18	Tue 11/13/18	35,36,39



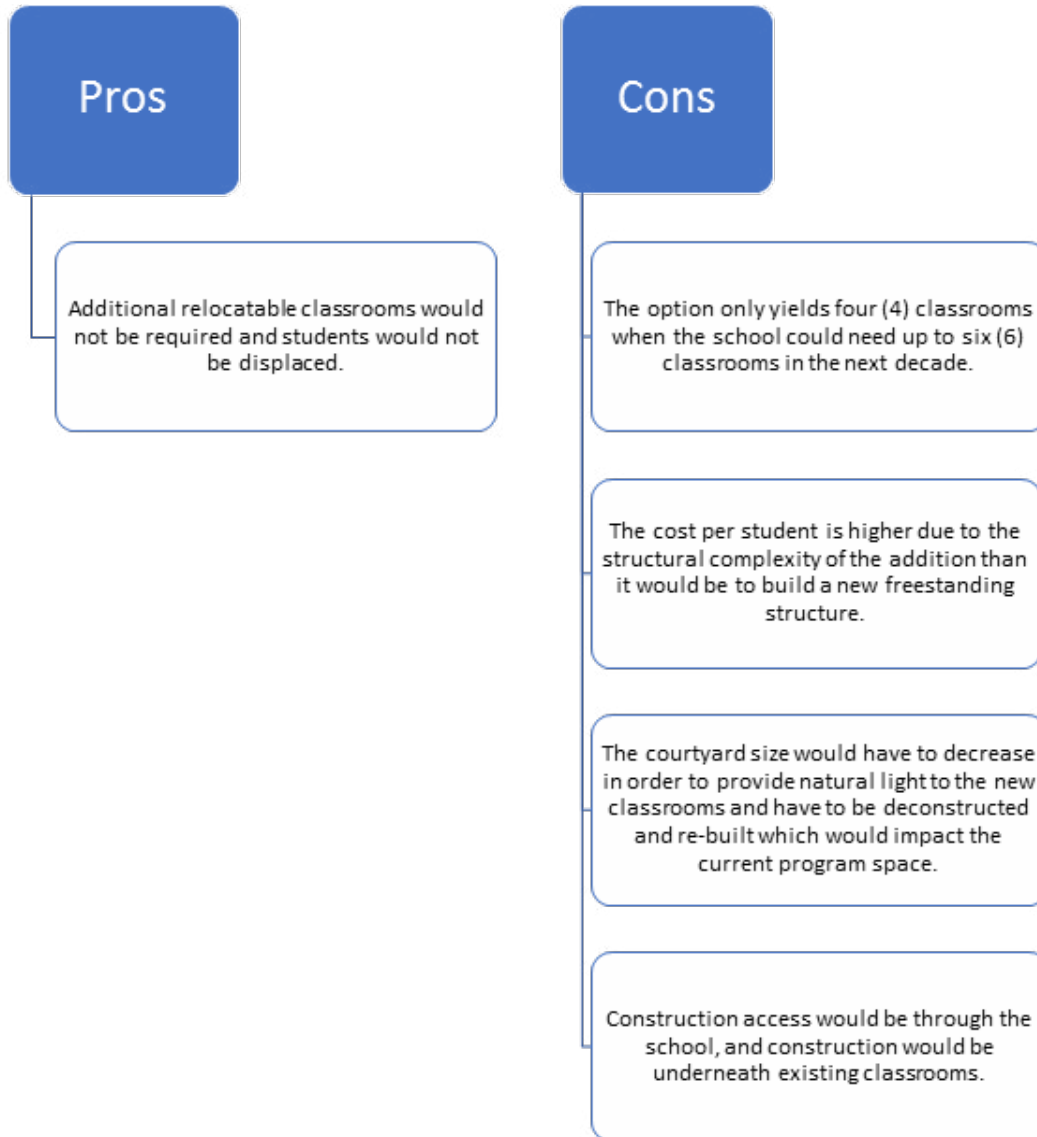
Schedule Option 1 - Dirt Rooms

ID	Task Name	Duration	Start	Finish	Predecessors	3, 2017 Qtr 4, 2017 Qtr 1, 2018 Qtr 2, 2018 Qtr 3, 2018 Qtr 4, 2019 Qtr 1, 2019 Qtr 2, 2019 Qtr 3, 2019 Qtr 4, 2020 Qtr 1, 2020 Qtr 2, 2020 Qtr 3, 2020 Qtr 4, 2021 Qtr 1, 2021 Qtr 2, 2021 Qtr 3, 2021 Qtr 4, 2022 Qtr 1, 2022 Qtr 2, 2022 Qtr 3, 2022 Qtr 4, 2023 Qtr 1, 2023 Qtr 2, 2023 Qtr 3, 2023 Qtr 4, 2024 Qtr 1, 2024 Qtr 2, 2024 Qtr 3, 2024 Qtr 4, 2025 Qtr 1, 2025 Qtr 2, 2025 Qtr 3, 2025 Qtr 4, 2026 Qtr 1, 2026 Qtr 2, 2026 Qtr 3, 2026 Qtr 4, 2027 Qtr 1, 2027 Qtr 2, 2027 Qtr 3, 2027 Qtr 4, 2028 Qtr 1, 2028 Qtr 2, 2028 Qtr 3, 2028 Qtr 4, 2029 Qtr 1, 2029 Qtr 2, 2029 Qtr 3, 2029 Qtr 4, 2030 Qtr 1, 2030 Qtr 2, 2030 Qtr 3, 2030 Qtr 4, 2031 Qtr 1, 2031 Qtr 2, 2031 Qtr 3, 2031 Qtr 4, 2032 Qtr 1, 2032 Qtr 2, 2032 Qtr 3, 2032 Qtr 4, 2033 Qtr 1, 2033 Qtr 2, 2033 Qtr 3, 2033 Qtr 4, 2034 Qtr 1, 2034 Qtr 2, 2034 Qtr 3, 2034 Qtr 4, 2035 Qtr 1, 2035 Qtr 2, 2035 Qtr 3, 2035 Qtr 4, 2036 Qtr 1, 2036 Qtr 2, 2036 Qtr 3, 2036 Qtr 4, 2037 Qtr 1, 2037 Qtr 2, 2037 Qtr 3, 2037 Qtr 4, 2038 Qtr 1, 2038 Qtr 2, 2038 Qtr 3, 2038 Qtr 4, 2039 Qtr 1, 2039 Qtr 2, 2039 Qtr 3, 2039 Qtr 4, 2040 Qtr 1, 2040 Qtr 2, 2040 Qtr 3, 2040 Qtr 4, 2041 Qtr 1, 2041 Qtr 2, 2041 Qtr 3, 2041 Qtr 4, 2042 Qtr 1, 2042 Qtr 2, 2042 Qtr 3, 2042 Qtr 4, 2043 Qtr 1, 2043 Qtr 2, 2043 Qtr 3, 2043 Qtr 4, 2044 Qtr 1, 2044 Qtr 2, 2044 Qtr 3, 2044 Qtr 4, 2045 Qtr 1, 2045 Qtr 2, 2045 Qtr 3, 2045 Qtr 4, 2046 Qtr 1, 2046 Qtr 2, 2046 Qtr 3, 2046 Qtr 4, 2047 Qtr 1, 2047 Qtr 2, 2047 Qtr 3, 2047 Qtr 4, 2048 Qtr 1, 2048 Qtr 2, 2048 Qtr 3, 2048 Qtr 4, 2049 Qtr 1, 2049 Qtr 2, 2049 Qtr 3, 2049 Qtr 4, 2050 Qtr 1, 2050 Qtr 2, 2050 Qtr 3, 2050 Qtr 4, 2051 Qtr 1, 2051 Qtr 2, 2051 Qtr 3, 2051 Qtr 4, 2052 Qtr 1, 2052 Qtr 2, 2052 Qtr 3, 2052 Qtr 4, 2053 Qtr 1, 2053 Qtr 2, 2053 Qtr 3, 2053 Qtr 4, 2054 Qtr 1, 2054 Qtr 2, 2054 Qtr 3, 2054 Qtr 4, 2055 Qtr 1, 2055 Qtr 2, 2055 Qtr 3, 2055 Qtr 4, 2056 Qtr 1, 2056 Qtr 2, 2056 Qtr 3, 2056 Qtr 4, 2057 Qtr 1, 2057 Qtr 2, 2057 Qtr 3, 2057 Qtr 4, 2058 Qtr 1, 2058 Qtr 2, 2058 Qtr 3, 2058 Qtr 4, 2059 Qtr 1, 2059 Qtr 2, 2059 Qtr 3, 2059 Qtr 4, 2060 Qtr 1, 2060 Qtr 2, 2060 Qtr 3, 2060 Qtr 4, 2061 Qtr 1, 2061 Qtr 2, 2061 Qtr 3, 2061 Qtr 4, 2062 Qtr 1, 2062 Qtr 2, 2062 Qtr 3, 2062 Qtr 4, 2063 Qtr 1, 2063 Qtr 2, 2063 Qtr 3, 2063 Qtr 4, 2064 Qtr 1, 2064 Qtr 2, 2064 Qtr 3, 2064 Qtr 4, 2065 Qtr 1, 2065 Qtr 2, 2065 Qtr 3, 2065 Qtr 4, 2066 Qtr 1, 2066 Qtr 2, 2066 Qtr 3, 2066 Qtr 4, 2067 Qtr 1, 2067 Qtr 2, 2067 Qtr 3, 2067 Qtr 4, 2068 Qtr 1, 2068 Qtr 2, 2068 Qtr 3, 2068 Qtr 4, 2069 Qtr 1, 2069 Qtr 2, 2069 Qtr 3, 2069 Qtr 4, 2070 Qtr 1, 2070 Qtr 2, 2070 Qtr 3, 2070 Qtr 4, 2071 Qtr 1, 2071 Qtr 2, 2071 Qtr 3, 2071 Qtr 4, 2072 Qtr 1, 2072 Qtr 2, 2072 Qtr 3, 2072 Qtr 4, 2073 Qtr 1, 2073 Qtr 2, 2073 Qtr 3, 2073 Qtr 4, 2074 Qtr 1, 2074 Qtr 2, 2074 Qtr 3, 2074 Qtr 4, 2075 Qtr 1, 2075 Qtr 2, 2075 Qtr 3, 2075 Qtr 4, 2076 Qtr 1, 2076 Qtr 2, 2076 Qtr 3, 2076 Qtr 4, 2077 Qtr 1, 2077 Qtr 2, 2077 Qtr 3, 2077 Qtr 4, 2078 Qtr 1, 2078 Qtr 2, 2078 Qtr 3, 2078 Qtr 4, 2079 Qtr 1, 2079 Qtr 2, 2079 Qtr 3, 2079 Qtr 4, 2080 Qtr 1, 2080 Qtr 2, 2080 Qtr 3, 2080 Qtr 4, 2081 Qtr 1, 2081 Qtr 2, 2081 Qtr 3, 2081 Qtr 4, 2082 Qtr 1, 2082 Qtr 2, 2082 Qtr 3, 2082 Qtr 4, 2083 Qtr 1, 2083 Qtr 2, 2083 Qtr 3, 2083 Qtr 4, 2084 Qtr 1, 2084 Qtr 2, 2084 Qtr 3, 2084 Qtr 4, 2085 Qtr 1, 2085 Qtr 2, 2085 Qtr 3, 2085 Qtr 4, 2086 Qtr 1, 2086 Qtr 2, 2086 Qtr 3, 2086 Qtr 4, 2087 Qtr 1, 2087 Qtr 2, 2087 Qtr 3, 2087 Qtr 4, 2088 Qtr 1, 2088 Qtr 2, 2088 Qtr 3, 2088 Qtr 4, 2089 Qtr 1, 2089 Qtr 2, 2089 Qtr 3, 2089 Qtr 4, 2090 Qtr 1, 2090 Qtr 2, 2090 Qtr 3, 2090 Qtr 4, 2091 Qtr 1, 2091 Qtr 2, 2091 Qtr 3, 2091 Qtr 4, 2092 Qtr 1, 2092 Qtr 2, 2092 Qtr 3, 2092 Qtr 4, 2093 Qtr 1, 2093 Qtr 2, 2093 Qtr 3, 2093 Qtr 4, 2094 Qtr 1, 2094 Qtr 2, 2094 Qtr 3, 2094 Qtr 4, 2095 Qtr 1, 2095 Qtr 2, 2095 Qtr 3, 2095 Qtr 4, 2096 Qtr 1, 2096 Qtr 2, 2096 Qtr 3, 2096 Qtr 4, 2097 Qtr 1, 2097 Qtr 2, 2097 Qtr 3, 2097 Qtr 4, 2098 Qtr 1, 2098 Qtr 2, 2098 Qtr 3, 2098 Qtr 4, 2099 Qtr 1, 2099 Qtr 2, 2099 Qtr 3, 2099 Qtr 4, 2100 Qtr 1, 2100 Qtr 2, 2100 Qtr 3, 2100 Qtr 4
41	Building Turnover	3 days	Wed 11/14/18	Fri 11/16/18	40	
42						
43	Turf Field	52 days	Thu 6/21/18	Fri 8/31/18		
44	Grade for turf field	5 days	Thu 6/21/18	Wed 6/27/18	9	
45	U/G utilities for turf field (storm and elec)	12 days	Thu 6/28/18	Fri 7/13/18	44	
46	Fine grade	5 days	Mon 7/16/18	Fri 7/20/18	45	
47	Install turf field	30 days	Mon 7/23/18	Fri 8/31/18	46	
48	Perimeter fencing	5 days	Mon 8/27/18	Fri 8/31/18	47FF	
49						
50	Parking Lot	94 days	Thu 6/21/18	Tue 10/30/18		
51	Mobilize contractor	4 days	Thu 6/21/18	Tue 6/26/18	9	
52	Clear and grub	25 days	Wed 6/27/18	Tue 7/31/18	51	
53	Relocate utilities	15 days	Wed 8/1/18	Tue 8/21/18	52	
54	U/G Site utilities	20 days	Wed 8/15/18	Tue 9/11/18	53SS+10 d	
55	Rough grade/cut&fill	15 days	Wed 8/29/18	Tue 9/18/18	54FF+5 day	
56	Curb and gutter	7 days	Mon 9/17/18	Tue 9/25/18	55FF+5 day	
57	Fine grade	5 days	Wed 9/26/18	Tue 10/2/18	56	
58	Stone base	5 days	Wed 10/3/18	Tue 10/9/18	57	
59	Site lighting	10 days	Wed 9/26/18	Tue 10/9/18	56	
60	Paving	5 days	Wed 10/10/18	Tue 10/16/18	58	
61	Striping	3 days	Wed 10/17/18	Fri 10/19/18	60	
62	Site concrete - SW/Stairs	15 days	Wed 10/10/18	Tue 10/30/18	60FF+10 d	
63						
64	Demountables Removal	46 days	Fri 6/21/19	Fri 8/23/19		
65	Last Day of School	1 day	Fri 6/21/19	Fri 6/21/19		
66	Mobilize contractor	3 days	Mon 6/24/19	Wed 6/26/19	41,65	
67	Deconstruct demountables	5 days	Thu 6/27/19	Wed 7/3/19	66	
68	Remove demountables	7 days	Thu 7/4/19	Fri 7/12/19	67	
69	Grading	3 days	Mon 7/15/19	Wed 7/17/19	68	
70	Restore playground	20 days	Thu 7/18/19	Wed 8/14/19	69	
71	Site concrete - SW/Stairs	7 days	Thu 8/15/19	Fri 8/23/19	70	
72						
73	Project Completion	1 day	Mon 8/26/19	Mon 8/26/19		
74	Project Completion	1 day	Mon 8/26/19	Mon 8/26/19	41,48,62,71	



7. Pros & Cons

The team offers the following pros and cons for consideration.



8. Summary

In conclusion, Option 1 would yield four (4) new classrooms. The cost to complete this option was bid and rejected by APS at the cost of \$4,453,000 in 2015. The total project cost is estimated to be \$7,359,694. The time to complete the project is four (4) months which would take place during a summer and consecutive fall semester. The

schedule and the proposed scope of work are both a high risk due to the required extensive structural modifications. In addition, the construction location is a challenge that contributes to a high cost per number of classrooms added. In comparison to the other options, this option yields the least number of classrooms for the most amount of money for a value of \$79,137 per seat.

B. Option 2—New Structure at Current Relocatable Classrooms and Playground

1. Description of Option & Scope of Work

The options outlined below describe constructing a new freestanding structure built to the south of the school in the current location of the relocatable classrooms and playground area. Three (3) different size additions were explored. Each addition would connect to the south wing of the school around the music room but would be built as a separate, freestanding structure with its own fire alarm system. These classrooms would be designed to be under 900 square feet each making them ideal for grades 1-5. Plan views of the different size options are included on the next page.

The proposed construction schedule for this scope of work would have a duration of fourteen (14) months and would include the following:

- Establish the construction site limitations, and install fencing as well as sediment and erosion control. *(Please refer to the site access plan included in this section)*
- Relocate the existing relocatable classrooms to the blacktop, and the playgroup equipment to the new play area.
- Grade the existing area and construct all structural foundation work.
- Install a new structure including the mid-level floor, steel framing for walls, and a new roof over the addition. *(More information on the structure can be found in the structural review to follow)*
- Rough in all necessary mechanical, electrical, and plumbing and install new heating and cooling units as required.
- Install the exterior building skin, glazing, and roofing to match the existing skin in place.
- Fit out the interior of the space with new classrooms to include millwork, doors frames and hardware, paint, and flooring.
- Convert the existing exterior ramp into an interior ramp, handicap lift, and staircase to adjust between floor elevations.
- Add boys and girls bathrooms for the wing and the

outdoor play area.

- Test and balance the mechanical system to the existing structure, 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.
- Provide a parking lot with 50 additional parking spaces in the lower field area.
- Add a new turf field.

Option 2A

By selecting this option, the school would add four (4) additional classrooms or possible program space adding roughly 4,900 square feet of space to the school. The permanent capacity of the school would increase by 93 seats going, from 553 to 646.

Option 2B

By selecting this option, the school would add six (6) additional classrooms or possible program space adding roughly 7,200 square feet of space to the school. The permanent capacity of the school would increase by 140 seats, going from 553 to 692.

Option 2C

By selecting this option, the school would add twelve (12) additional classrooms or possible program space adding roughly 14,200 square feet of space to the school. The permanent capacity of the school would increase by 280 seats, going from 553 to 833.

2. Plan View

Option 2A



Option 2B



Option 2B



3. Structural & Soil Review (Similar for Options 2A, 2B, and 2C)

For the construction of a one-level or two-level, at-grade, addition to the building in the current location of the modular structure, Ehlert Bryan anticipates that the structural systems would be as follows:

1½ metal roof deck over open web steel bar joists spaced at 5'-0" is anticipated for the roof system. The roof would be supported by either steel columns or load-bearing masonry walls. Conventional grade slabs and spread footings bearing at shallow depths below the ground surface are anticipated.

Interior walls for the building are expected to consist of masonry and/or cold-formed metal. Cold-formed metal stud framing will be used where prudent, and high-durability wall finishes are less important. The exterior wall would consist of cold-formed metal framing with a brick veneer.

The addition would be in a separate fire alarm system from the original building, as needed by area calculations, but also to phase the fire alarm and sprinkler construction relative to the existing systems. A fire wall between the new and the existing construction is anticipated. Some

renovation to the existing building will be needed to interface the addition to the existing.

Lateral stability for the addition is best provided using the shear action of the interior masonry walls, and concentric steel bracing where it is more effective.

Based on the review of the existing drawings, foundations were engineered for allowable soil bearing pressure of 3,000 PSF. Consequently, it is reasonable to assume that the addition could be constructed on spread footings bearing at a shallow depth below the ground surface at a maximum allowable bearing pressure of 3,000 PSF. However, geotechnical testing would have to be performed at the time of new construction to confirm the foundation design parameters and provide a document for permit submission.

4. Site Access (Similar for Options 2A, 2B, and 2C)

All construction activity can be accessed from the far south west corner of the field through an existing double gate. This would eliminate construction traffic adjacent to the school.





Photo 2.1 Current location of the playground and relocatable classrooms



Photo 2.2 Existing playground and relocatable classroom location south of the existing school.



Photo 2.3 Existing exterior ramp



Photo 2.4 Approximate location of Option 2 addition

5. Estimated Budget

The breakdown of all three estimates can be found on the following pages. The budgets do not include the cost for the turf field.

Option 2A Total—\$5,071,577

Arlington Science Focus Elementary School School Expansion Feasibility Options



Option 2A Summary

			\$/SF	TOTAL	%
	Gross Area:		5,400 SF		
A10	Foundations		24.14	130,378	4%
A20	Basement Construction		12.08	65,210	2%
A	Substructure		36.22	195,588	6%
B10	Superstructure		35.85	193,600	6%
B20	Exterior Enclosure		49.83	269,108	8%
B30	Roofing		21.24	114,700	3%
B	Shell		106.93	577,408	17%
C10	Interior Construction		37.71	203,650	6%
C20	Stairways		1.99	10,720	0%
C30	Interior Finishes		23.00	124,200	4%
C	Interiors		62.70	338,570	10%
D10	Conveying Systems		4.63	25,000	1%
D20	Plumbing Systems		11.00	59,400	2%
D30	Heating, Ventilation & Air Conditioning		52.00	280,800	8%
D40	Fire Protection		3.00	16,200	0%
D50	Electrical Lighting, Power & Communications		42.00	226,800	7%
D	Services		112.63	608,200	18%
E10	Equipment		3.50	18,900	1%
E20	Furnishings		4.11	22,186	1%
E	Equipment & Furnishings		7.61	41,086	1%
F10	Special Construction		16.67	90,000	3%
F20	Selective Demolition		1.85	10,000	0%
F	Special Construction & Demolition		18.52	100,000	3%
G10	Site Preparation		11.02	59,500	2%
G20	Site Improvements		53.01	286,250	9%
G30	Site Mechanical Utilities		18.98	102,500	3%
G40	Site Electrical Utilities		22.22	120,000	4%
G90	Other Site Construction		0.00	0	0%
G	Building Sitework		105.23	568,250	17%
Z1	Design Contingency	10.00%	44.98	242,910	7%
BUILDING & SITEWORK DIRECT COST BEFORE GC MARK-UPS			494.82	2,672,012	80%
Z10	General Conditions	8.00%	39.59	213,761	6%
Z11	Phasing/Interface	1.00%	5.34	28,858	1%
Z12	Bonds & insurances	1.75%	9.45	51,006	2%
Z13	Contractors Overhead & Profit	5.00%	27.46	148,282	4%
TOTAL CONSTRUCTION COST BEFORE ESCALATION			576.65	3,113,918	93%
Z30	Escalation	7.68%	44.29	239,191	7%
ESTIMATED CONSTRUCTION COST AT AWARD			620.95	3,353,109	100%
	Construction Contingency	10.00%		335,311	
	Project Soft Costs	25.00%		922,105	
	Owner's Contingency	10.00%		461,052	
ESTIMATED TOTAL COST			939.18	5,071,577	

Arlington Science Focus Elementary School
School Expansion Feasibility Options



Option 2A

	Quantity	Unit	Rate	Total
A10 Foundations				
Assume pile foundations		SF	18.00	
Spread footings	6	Ea	1,500.00	9,000
Perimeter wall footing	97	CY	525.00	51,178
6" thick slab on grade, incl. 6" gravel	5,400	SF	10.00	54,000
Underslab drainage system	5,400	SF	3.00	16,200
Elevator pit		EA	6,500.00	
				130,378
A20 Basement Construction				
A2010 Basement Excavation				
Excavate for lower level	200	CY	30.00	6,000
Dispose off-site	170	CY	25.00	4,250
Backfill with excavated material	30	CY	30.00	900
Allow for rock excavation		CY	250.00	
A2020 Basement Walls				
CMU foundation walls, 12" thick	1,790	SF	20.00	35,800
Waterproofing to walls	3,580	SF	3.00	10,740
Perimeter foundation drain	376	LF	20.00	7,520
				65,210
B10 Superstructure				
B1010 Floor Construction				
<i>No work</i>				
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
				193,600
B20 Exterior Enclosure				
B2010 Exterior Walls				
Brick veneer insulated cavity wall on stud back up	3,722	SF	40.00	148,896
Coping	376	LF	35.00	13,160
B2020 Exterior Windows				
Windows (25%)	1,241	SF	65.00	80,652
B2030 Exterior Doors				
Glass door, complete; double	2	PR	10,500.00	21,000
Solid exterior doors, complete; single	3	EA	1,800.00	5,400
				269,108

Arlington Science Focus Elementary School
School Expansion Feasibility Options



Option 2A

	Quantity	Unit	Rate	Total
B30 Roofing				
B3010 Roof Coverings				
Roof coverings & insulation	5,400	SF	15.00	81,000
Misc roof specialties	5,400	SF	5.50	29,700
B3020 Roof Openings				
Allowance for penetrations	4	EA	1,000.00	4,000
				114,700
C10 Interior Construction				
C1010 Partitions				
Interior partitions allowance	5,400	SF	13.50	72,900
Interior glazing/storefront allowance	5,400	SF	2.75	14,850
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	5,400	SF	14.00	75,600
				203,650
C20 Stairways				
C2010 Stair Construction				
Interior stairs, incl. railings	8	Riser	1,250.00	10,000
C2020 Stair Finishes				
Paint and sealer egress stair - concrete sealant	8	Riser	90.00	720
				10,720
C30 Interior Finishes				
C3010 Wall Finishes				
Allowance	5,400	SF	4.50	24,300
C3020 Floor Finishes				
Allowance	5,400	SF	9.50	51,300

Arlington Science Focus Elementary School
 School Expansion Feasibility Options



Option 2A

	Quantity	Unit	Rate	Total
C3030 Ceiling Finishes				
Allowance	5,400	SF	7.50	40,500
Allowance for premium ceilings	540	SF	15.00	8,100
				124,200
D10 Conveying Systems				
D1010 Elevators & Lifts				
ADA lift	1	EA	25,000.00	25,000
				25,000
D20 Plumbing Systems				
<u>Plumbing Fixtures</u>				
Allowance	5,400	SF	\$2.00	10,800
<u>Domestic Water Distribution</u>				
Allowance	5,400	SF	\$3.00	16,200
<u>Sanitary Waste and Vent Distribution</u>				
Allowance	5,400	SF	\$2.75	14,850
<u>Storm Distribution</u>				
Allowance	5,400	SF	\$1.50	8,100
<u>Other Plumbing Systems</u>				
Allowance	5,400	SF	\$1.75	9,450
				59,400
D30 Heating, Ventilation & Air Conditioning				
Allowance	5,400	SF	\$52.00	280,800
				280,800
D40 Fire Protection				
Allowance	5,400	SF	\$3.00	16,200
				16,200
D50 Electrical Lighting, Power & Communications				
Allowance	5,400	SF	\$42.00	226,800
				226,800

Arlington Science Focus Elementary School
School Expansion Feasibility Options



Option 2A

	Quantity	Unit	Rate	Total
E10 Equipment				
E1020 Institutional Equipment				
Allowance	5,400	SF	\$3.50	18,900
				18,900
E20 Furnishings				
E2010 Fixed Furnishings				
Window Treatments	1,241	SF	\$7.00	8,686
Allowance	5,400	SF	\$2.50	13,500
				22,186
F10 Special Construction				
F1010 Special Structures				
Relocatable classrooms - disconnect, move & re-connect	6	EA	\$15,000.00	90,000
				90,000
F20 Selective Demolition				
F2010 Building Elements Demolition				
Allowance - tie in to existing school	1	LS	10,000.00	10,000
F2020 Hazardous Components Abatement				
<i>Excluded</i>				Excluded
				10,000
G10 Site Preparation				
G1010 Site Clearing				
Allowance	8,100	SF	4.00	32,400
G1020 Site Demolition and Relocations				
Allow for miscellaneous selective removal	1	LS	5,000.00	5,000
Allow for relocating underground utilities	1	LS	15,000.00	15,000
G1030 Site Earthwork				
Allow for stripping topsoil and fine grading (12" deep)	300	CY	7.00	2,100
Allow for erosion control	1	LS	5,000.00	5,000
G1040 Hazardous Waste Remediation				
<i>Excluded</i>				Excluded
				59,500
G20 Site Improvements				
G2010 Roadways				
Connect to existing road	1	LS	5,000.00	5,000
G2020 Parking Lots				

Arlington Science Focus Elementary School
School Expansion Feasibility Options



Option 2A

	Quantity	Unit	Rate	Total
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 relocatables	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

286,250

G30 Site Mechanical Utilities

Water - allowance, incl. to temporary classrooms	250	LF	\$90.00	22,500
Storm drainage - allowance	1	LS	\$50,000.00	50,000
Sewer - allowance, incl. to temporary classrooms	300	LF	\$100.00	30,000

102,500

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 - allow	200	LF	125.00	25,000

120,000

Option 2B Total—\$5,909,927

Arlington Science Focus Elementary School
School Expansion Feasibility Options



Option 2B Summary

		\$/SF	TOTAL	%	
	Gross Area:	7,200 SF			
A10	Foundations	21.36	153,778	4%	
A20	Basement Construction	9.57	68,927	2%	
A	Substructure	30.93	222,704	6%	
B10	Superstructure	35.19	253,400	6%	
B20	Exterior Enclosure	37.38	269,108	7%	
B30	Roofing	20.49	147,500	4%	
B	Shell	93.06	670,008	17%	
C10	Interior Construction	35.56	256,050	7%	
C20	Stairways	1.49	10,720	0%	
C30	Interior Finishes	22.36	161,000	4%	
C	Interiors	59.41	427,770	11%	
D10	Conveying Systems	3.47	25,000	1%	
D20	Plumbing Systems	10.69	77,000	2%	
D30	Heating, Ventilation & Air Conditioning	50.56	364,000	9%	
D40	Fire Protection	2.92	21,000	1%	
D50	Electrical Lighting, Power & Communications	40.83	294,000	8%	
D	Services	108.47	781,000	20%	
E10	Equipment	3.40	24,500	1%	
E20	Furnishings	3.64	26,186	1%	
E	Equipment & Furnishings	7.04	50,686	1%	
F10	Special Construction	12.50	90,000	2%	
F20	Selective Demolition	1.39	10,000	0%	
F	Special Construction & Demolition	13.89	100,000	3%	
G10	Site Preparation	9.68	69,722	2%	
G20	Site Improvements	39.76	286,250	7%	
G30	Site Mechanical Utilities	14.24	102,500	3%	
G40	Site Electrical Utilities	16.67	120,000	3%	
G90	Other Site Construction	0.00	0	0%	
G	Building Sitework	80.34	578,472	15%	
Z1	Design Contingency	10.00%	39.31	283,064	7%
BUILDING & SITEWORK DIRECT COST BEFORE GC MARK-UPS		432.46	3,113,704	80%	
Z10	General Conditions	8.00%	34.60	249,096	6%
Z11	Phasing/Interface	1.00%	4.67	33,628	1%
Z12	Bonds & insurances	1.75%	8.26	59,438	2%
Z13	Contractors Overhead & Profit	5.00%	24.00	172,793	4%
TOTAL CONSTRUCTION COST BEFORE ESCALATION		503.98	3,628,659	93%	
Z30	Escalation	7.68%	38.71	278,730	7%
ESTIMATED CONSTRUCTION COST AT AWARD		542.69	3,907,389	100%	
	Construction Contingency	10.00%	390,739		
	Project Soft Costs	25.00%	1,074,532		
	Owner's Contingency	10.00%	537,266		
ESTIMATED TOTAL COST		820.82	5,909,926		

Arlington Science Focus Elementary School
School Expansion Feasibility Options



Option 2B

	Quantity	Unit	Rate	Total
A10 Foundations				
Assume pile foundations		SF	18.00	
Spread footings	6	Ea	1,500.00	9,000
Perimeter wall footing	97	CY	525.00	51,178
6" thick slab on grade, incl. 6" gravel	7,200	SF	10.00	72,000
Underslab drainage system	7,200	SF	3.00	21,600
Elevator pit		EA	6,500.00	
				153,778
A20 Basement Construction				
A2010 Basement Excavation				
Excavate for lower level	267	CY	30.00	8,000
Dispose off-site	227	CY	25.00	5,667
Backfill with excavated material	40	CY	30.00	1,200
Allow for rock excavation		CY	250.00	
A2020 Basement Walls				
CMU foundation walls, 12" thick	1,790	SF	20.00	35,800
Waterproofing to walls	3,580	SF	3.00	10,740
Perimeter foundation drain	376	LF	20.00	7,520
				68,927
B10 Superstructure				
B1010 Floor Construction				
<i>No work</i>				
B1020 Roof Construction				
Steel Frame	43	Tons	4,500.00	194,400
Roof decking & insulation	7,000	SF	7.00	49,000
Steel Roof dunnage	1	LS	10,000.00	10,000
				253,400
B20 Exterior Enclosure				
B2010 Exterior Walls				
Brick veneer insulated cavity wall on stud back up	3,722	SF	40.00	148,896
Coping	376	LF	35.00	13,160
B2020 Exterior Windows				
Windows (25%)	1,241	SF	65.00	80,652
B2030 Exterior Doors				
Glass door, complete; double	2	PR	10,500.00	21,000
Solid exterior doors, complete; single	3	EA	1,800.00	5,400
				269,108

Arlington Science Focus Elementary School
School Expansion Feasibility Options



Option 2B

	Quantity	Unit	Rate	Total
B30 Roofing				
B3010 Roof Coverings				
Roof coverings & insulation	7,000	SF	15.00	105,000
Misc roof specialties	7,000	SF	5.50	38,500
B3020 Roof Openings				
Allowance for penetrations	4	EA	1,000.00	4,000
				147,500
C10 Interior Construction				
C1010 Partitions				
Interior partitions allowance	7,000	SF	13.50	94,500
Interior glazing/storefront allowance	7,000	SF	2.75	19,250
Allow for misc. metals and blocking	7,000	SF	2.50	17,500
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	7,000	SF	14.00	98,000
				256,050
C20 Stairways				
C2010 Stair Construction				
Interior stairs, incl. railings	8	Riser	1,250.00	10,000
C2020 Stair Finishes				
Paint and sealer egress stair - concrete sealant	8	Riser	90.00	720
				10,720
C30 Interior Finishes				
C3010 Wall Finishes				
Allowance	7,000	SF	4.50	31,500
C3020 Floor Finishes				
Allowance	7,000	SF	9.50	66,500

Arlington Science Focus Elementary School
 School Expansion Feasibility Options



Option 2B

	Quantity	Unit	Rate	Total
C3030 Ceiling Finishes				
Allowance	7,000	SF	7.50	52,500
Allowance for premium ceilings	700	SF	15.00	10,500
				161,000
D10 Conveying Systems				
D1010 Elevators & Lifts				
ADA lift	1	EA	25,000.00	25,000
				25,000
D20 Plumbing Systems				
<u>Plumbing Fixtures</u>				
Allowance	7,000	SF	\$2.00	14,000
<u>Domestic Water Distribution</u>				
Allowance	7,000	SF	\$3.00	21,000
<u>Sanitary Waste and Vent Distribution</u>				
Allowance	7,000	SF	\$2.75	19,250
<u>Storm Distribution</u>				
Allowance	7,000	SF	\$1.50	10,500
<u>Other Plumbing Systems</u>				
Allowance	7,000	SF	\$1.75	12,250
				77,000
D30 Heating, Ventilation & Air Conditioning				
Allowance	7,000	SF	\$52.00	364,000
				364,000
D40 Fire Protection				
Allowance	7,000	SF	\$3.00	21,000
				21,000
D50 Electrical Lighting, Power & Communications				
Allowance	7,000	SF	\$42.00	294,000
				294,000

Arlington Science Focus Elementary School
School Expansion Feasibility Options



Option 2B

	Quantity	Unit	Rate	Total
E10 Equipment				
E1020 Institutional Equipment				
Allowance	7,000	SF	\$3.50	24,500
				24,500
E20 Furnishings				
E2010 Fixed Furnishings				
Window Treatments	1,241	SF	\$7.00	8,686
Allowance	7,000	SF	\$2.50	17,500
				26,186
F10 Special Construction				
F1010 Special Structures				
Relocatable classrooms - disconnect, move & re-connect	6	EA	\$15,000.00	90,000
				90,000
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	10,500	SF	4.00	42,000
G1020 Site Demolition and Relocations				
Allow for miscellaneous selective removal	1	LS	5,000.00	5,000
Allow for relocating underground utilities	1	LS	15,000.00	15,000
G1030 Site Earthwork				
Allow for stripping topsoil and fine grading (12" deep)	389	CY	7.00	2,722
Allow for erosion control	1	LS	5,000.00	5,000
G1040 Hazardous Waste Remediation				
Excluded				Excluded
				69,722
G20 Site Improvements				
G2010 Roadways				
Connect to existing road	1	LS	5,000.00	5,000
G2020 Parking Lots				

Arlington Science Focus Elementary School
School Expansion Feasibility Options



Option 2B

	Quantity	Unit	Rate	Total
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 relocatables	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
				286,250

G30 Site Mechanical Utilities

Water - allowance, incl. to temporary classrooms	250	LF	\$90.00	22,500
Storm drainage - allowance	1	LS	\$50,000.00	50,000
Sewer - allowance, incl. to temporary classrooms	300	LF	\$100.00	30,000
				102,500

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 - allow	200	LF	125.00	25,000
				120,000

Option 2C Total—\$9,517,669

Arlington Science Focus Elementary School
School Expansion Feasibility Options



Option 2C Summary					
		\$/SF	TOTAL	%	
	Gross Area:	14,000 SF			
A10	Foundations	12.39	173,433	3%	
A20	Basement Construction	4.92	68,927	1%	
A	Substructure	17.31	242,360	4%	
B10	Superstructure	36.71	514,000	8%	
B20	Exterior Enclosure	32.39	453,440	7%	
B30	Roofing	10.54	147,500	2%	
B	Shell	79.64	1,114,940	18%	
C10	Interior Construction	37.29	522,100	8%	
C20	Stairways	3.12	43,680	1%	
C30	Interior Finishes	23.00	322,000	5%	
C	Interiors	63.41	887,780	14%	
D10	Conveying Systems	8.21	115,000	2%	
D20	Plumbing Systems	9.25	129,500	2%	
D30	Heating, Ventilation & Air Conditioning	49.00	686,000	11%	
D40	Fire Protection	3.00	42,000	1%	
D50	Electrical Lighting, Power & Communications	42.00	588,000	9%	
D	Services	111.46	1,560,500	25%	
E10	Equipment	3.50	49,000	1%	
E20	Furnishings	3.62	50,708	1%	
E	Equipment & Furnishings	7.12	99,708	2%	
F10	Special Construction	6.43	90,000	1%	
F20	Selective Demolition	0.71	10,000	0%	
F	Special Construction & Demolition	7.14	100,000	2%	
G10	Site Preparation	4.36	61,080	1%	
G20	Site Improvements	20.45	286,250	5%	
G30	Site Mechanical Utilities	6.14	86,000	1%	
G40	Site Electrical Utilities	8.57	120,000	2%	
G90	Other Site Construction	0.00	0	0%	
G	Building Sitework	39.52	553,330	9%	
Z1	Design Contingency	10.00%	32.56	455,862	7%
BUILDING & SITEWORK DIRECT COST BEFORE GC MARK-UPS		358.18	5,014,480	80%	
Z10	General Conditions	8.00%	28.65	401,158	6%
Z11	Phasing/Interface	1.00%	3.87	54,156	1%
Z12	Bonds & insurances	1.75%	6.84	95,721	2%
Z13	Contractors Overhead & Profit	5.00%	19.88	278,276	4%
TOTAL CONSTRUCTION COST BEFORE ESCALATION		417.41	5,843,792	93%	
Z30	Escalation	7.68%	32.06	448,882	7%
ESTIMATED CONSTRUCTION COST AT AWARD		449.48	6,292,674	100%	
	Construction Contingency	10.00%		629,267	
	Project Soft Costs	25.00%		1,730,485	
	Owner's Contingency	10.00%		865,243	
ESTIMATED TOTAL COST		679.83	9,517,669		

Arlington Science Focus Elementary School
School Expansion Feasibility Options



Option 2C

	Quantity	Unit	Rate	Total
A10 Foundations				
Spread footings	7,200	Ea	7.00	50,400
Perimeter wall footing	42	CY	525.00	21,933
6" thick slab on grade, incl. 6" gravel	7,200	SF	10.00	72,000
Underslab drainage system	7,200	SF	3.00	21,600
Elevator pit	1	EA	7,500.00	7,500
				173,433
A20 Basement Construction				
A2010 Basement Excavation				
Excavate for lower level	267	CY	30.00	8,000
Dispose off-site	227	CY	25.00	5,667
Backfill with excavated material	40	CY	30.00	1,200
Allow for rock excavation		CY	250.00	
A2020 Basement Walls				
CMU foundation walls, 12" thick	1,790	SF	20.00	35,800
Waterproofing to walls	3,580	SF	3.00	10,740
Perimeter foundation drain	376	LF	20.00	7,520
				68,927
B10 Superstructure				
B1010 Floor Construction				
Steel Frame	42	Tons	4,500.00	189,000
First elevated floor decking	7,000	SF	3.50	24,500
First elevated slab on deck	7,000	SF	7.50	52,500
B1020 Roof Construction				
Steel Frame	42	Tons	4,500.00	189,000
Roof decking & insulation	7,000	SF	7.00	49,000
Steel Roof dunnage	1	LS	10,000.00	10,000
				514,000
B20 Exterior Enclosure				
B2010 Exterior Walls				
Brick veneer insulated cavity wall on stud back up	6,732	SF	40.00	269,280
Coping	340	LF	35.00	11,900
B2020 Exterior Windows				
Windows (25%)	2,244	SF	65.00	145,860
B2030 Exterior Doors				
Glass door, complete; double	2	PR	10,500.00	21,000
Solid exterior doors, complete; single	3	EA	1,800.00	5,400
				453,440

Arlington Science Focus Elementary School
School Expansion Feasibility Options



Option 2C

	Quantity	Unit	Rate	Total
B30 Roofing				
B3010 Roof Coverings				
Roof coverings & insulation	7,000	SF	15.00	105,000
Misc roof specialties	7,000	SF	5.50	38,500
B3020 Roof Openings				
Allowance for penetrations	4	EA	1,000.00	4,000
				147,500
C10 Interior Construction				
C1010 Partitions				
Interior partitions allowance	14,000	SF	13.50	189,000
Interior glazing/storefront allowance	14,000	SF	2.75	38,500
Allow for misc. metals and blocking	14,000	SF	2.50	35,000
C1020 Interior Doors				
Interior doors including door, frame & hardware complete, allow				
- Single leaf	36	EA	1,400.00	50,400
- double leaf	6	EA	2,200.00	13,200
C1030 Fittings				
Allowance	14,000	SF	14.00	196,000
				522,100
C20 Stairways				
C2010 Stair Construction				
Interior stairs, incl. railings	48	Riser	850.00	40,800
C2020 Stair Finishes				
Paint and sealer egress stair - concrete sealant	48	Riser	60.00	2,880
				43,680
C30 Interior Finishes				
C3010 Wall Finishes				
Allowance	14,000	SF	4.50	63,000
C3020 Floor Finishes				
Allowance	14,000	SF	9.50	133,000

Arlington Science Focus Elementary School
School Expansion Feasibility Options



Option 2C

	Quantity	Unit	Rate	Total
C3030 Ceiling Finishes				
Allowance	14,000	SF	7.50	105,000
Allowance for premium ceilings	1,400	SF	15.00	21,000
				322,000
D10 Conveying Systems				
D1010 Elevators & Lifts				
Elevator 2 -Stop	1	EA	90,000.00	90,000
ADA lift	1	EA	25,000.00	25,000
				115,000
D20 Plumbing Systems				
<u>Plumbing Fixtures</u>				
Allowance	14,000	SF	\$1.85	25,900
<u>Domestic Water Distribution</u>				
Allowance	14,000	SF	\$2.60	36,400
<u>Sanitary Waste and Vent Distribution</u>				
Allowance	14,000	SF	\$2.20	30,800
<u>Storm Distribution</u>				
Allowance	14,000	SF	\$1.40	19,600
<u>Other Plumbing Systems</u>				
Allowance	14,000	SF	\$1.20	16,800
				129,500
D30 Heating, Ventilation & Air Conditioning				
Allowance	14,000	SF	\$49.00	686,000
				686,000
D40 Fire Protection				
Allowance	14,000	SF	\$3.00	42,000
				42,000
D50 Electrical Lighting, Power & Communications				
Allowance	14,000	SF	\$42.00	588,000
				588,000

Arlington Science Focus Elementary School
School Expansion Feasibility Options



Option 2C

	Quantity	Unit	Rate	Total
E10 Equipment				
E1020 Institutional Equipment				
Allowance	14,000	SF	\$3.50	49,000
				49,000
E20 Furnishings				
E2010 Fixed Furnishings				
Window Treatments	2,244	SF	\$7.00	15,708
Allowance	14,000	SF	\$2.50	35,000
				50,708
F10 Special Construction				
F1010 Special Structures				
Relocatable classrooms - disconnect, move & re-connect	6	EA	\$15,000.00	90,000
				90,000
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	9,598	SF	3.50	33,592
G1020 Site Demolition and Relocations				
Allow for miscellaneous selective removal	1	LS	5,000.00	5,000
Allow for relocating underground utilities	1	LS	15,000.00	15,000
G1030 Site Earthwork				
Allow for stripping topsoil and fine grading (12" deep)	355	CY	7.00	2,488
Allow for erosion control	1	LS	5,000.00	5,000
G1040 Hazardous Waste Remediation				
Excluded				Excluded
				61,080
G20 Site Improvements				
G2010 Roadways				
Connect to existing road	1	LS	5,000.00	5,000
G2020 Parking Lots				

Arlington Science Focus Elementary School
School Expansion Feasibility Options



Option 2C

	Quantity	Unit	Rate	Total
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 relocatables	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
				286,250

G30 Site Mechanical Utilities

Water - allowance, incl. to temporary classrooms	150	LF	\$90.00	13,500
Storm drainage - allowance	1	LS	\$50,000.00	50,000
Sewer - allowance, incl. to temporary classrooms	225	LF	\$100.00	22,500
				86,000

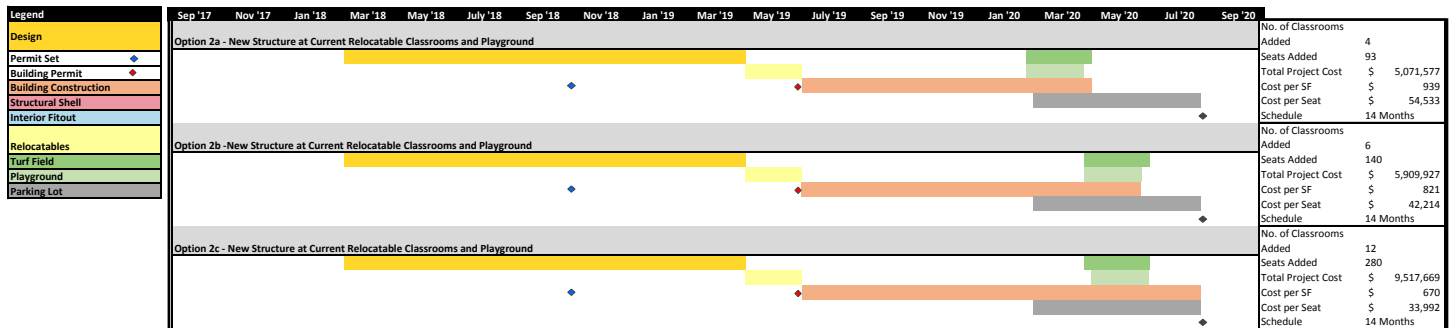
G40 Site Electrical Utilities

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 - allow	200	LF	125.00	25,000
				120,000

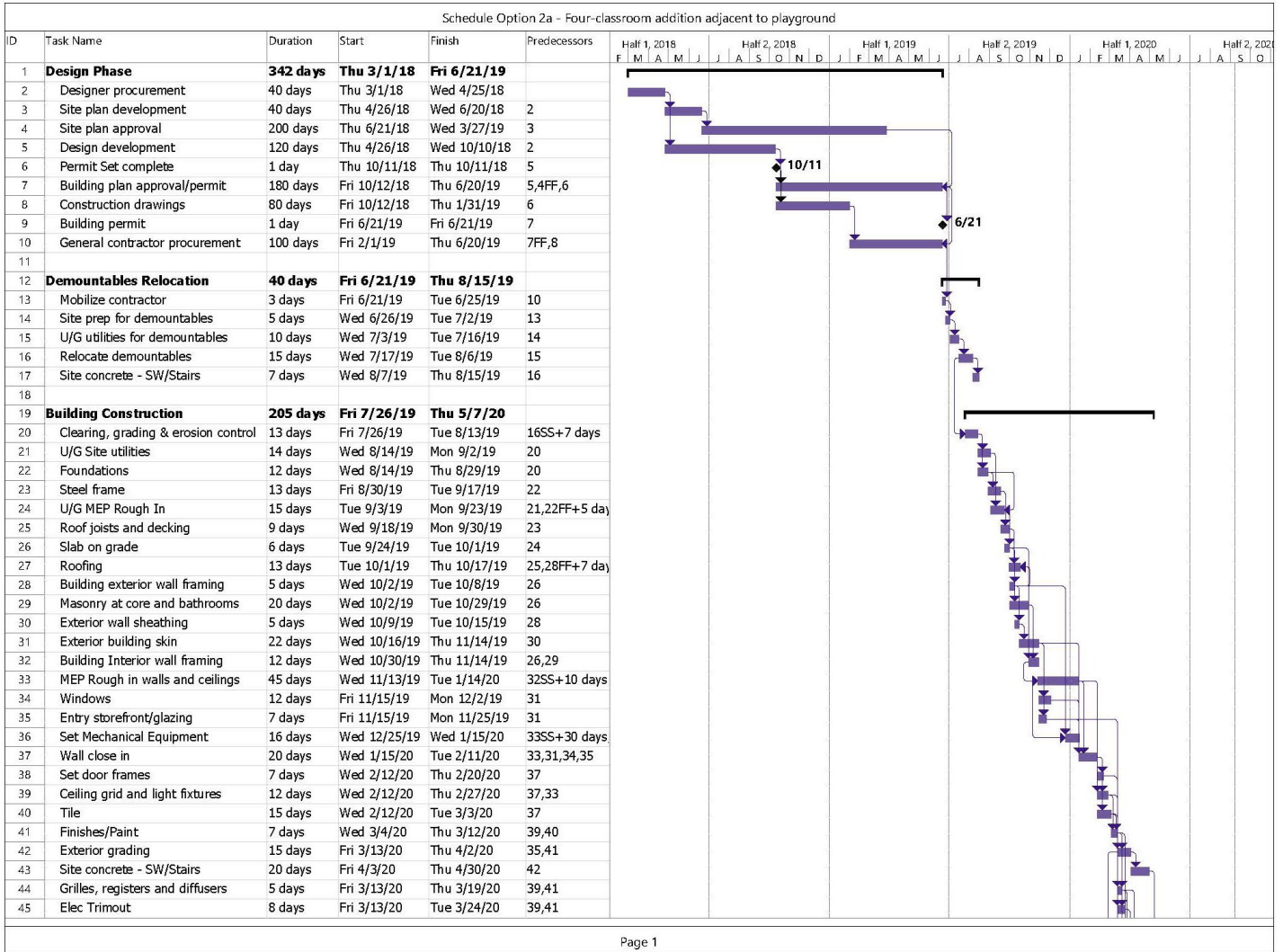
6. Schedule

The proposed construction schedules for these options would span over a summer and the next consecutive school year for a total proposed construction duration of fourteen (14) months each. Due to the length of the schedule, the six (6) relocatable classrooms impacted by the addition would have to be relocated for one school year but could still be used.

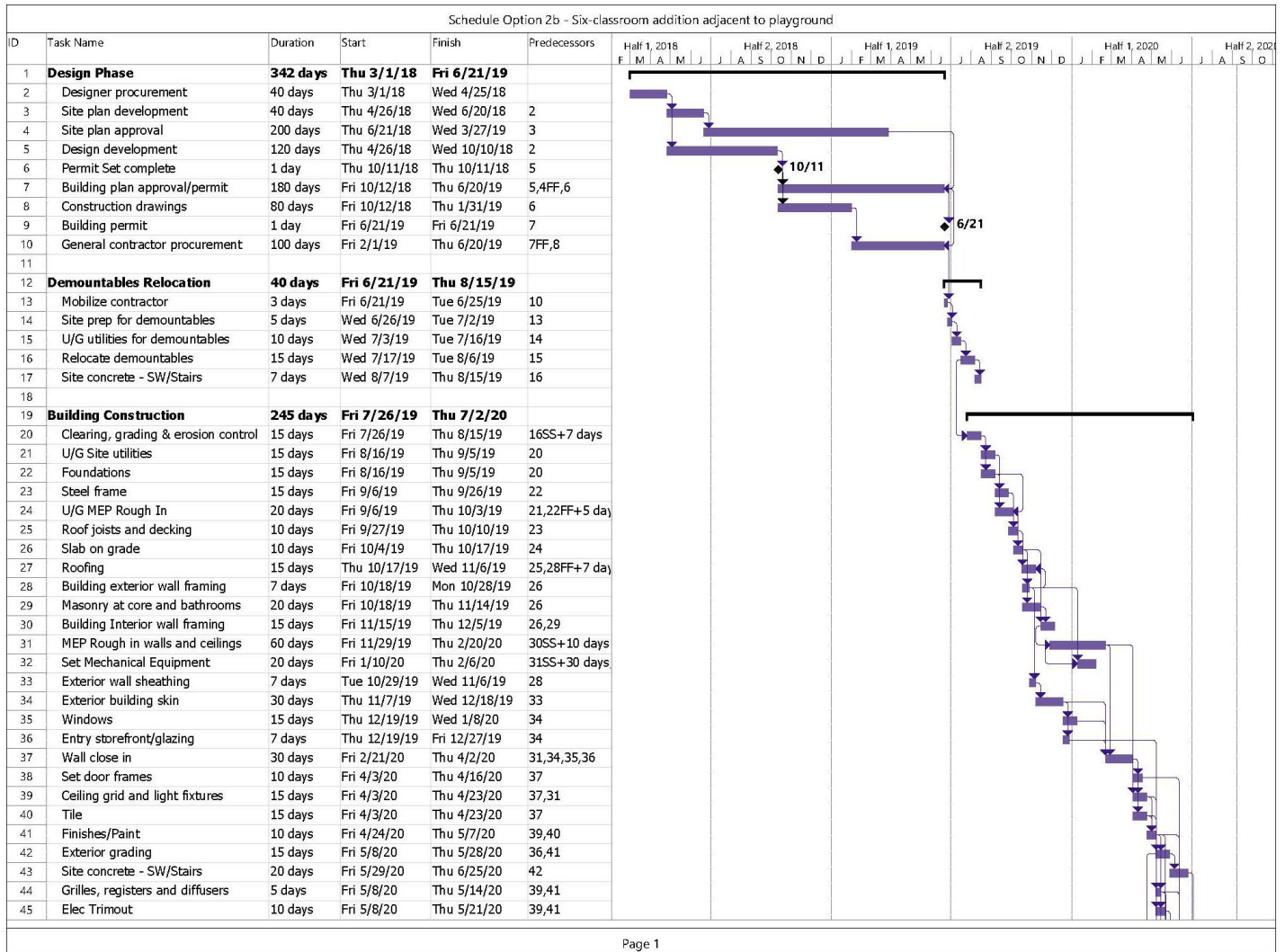
Below you can find a timeline of the Option 2 schedules, including the design phase. Full project schedules are included on the next two pages.



Option 2A

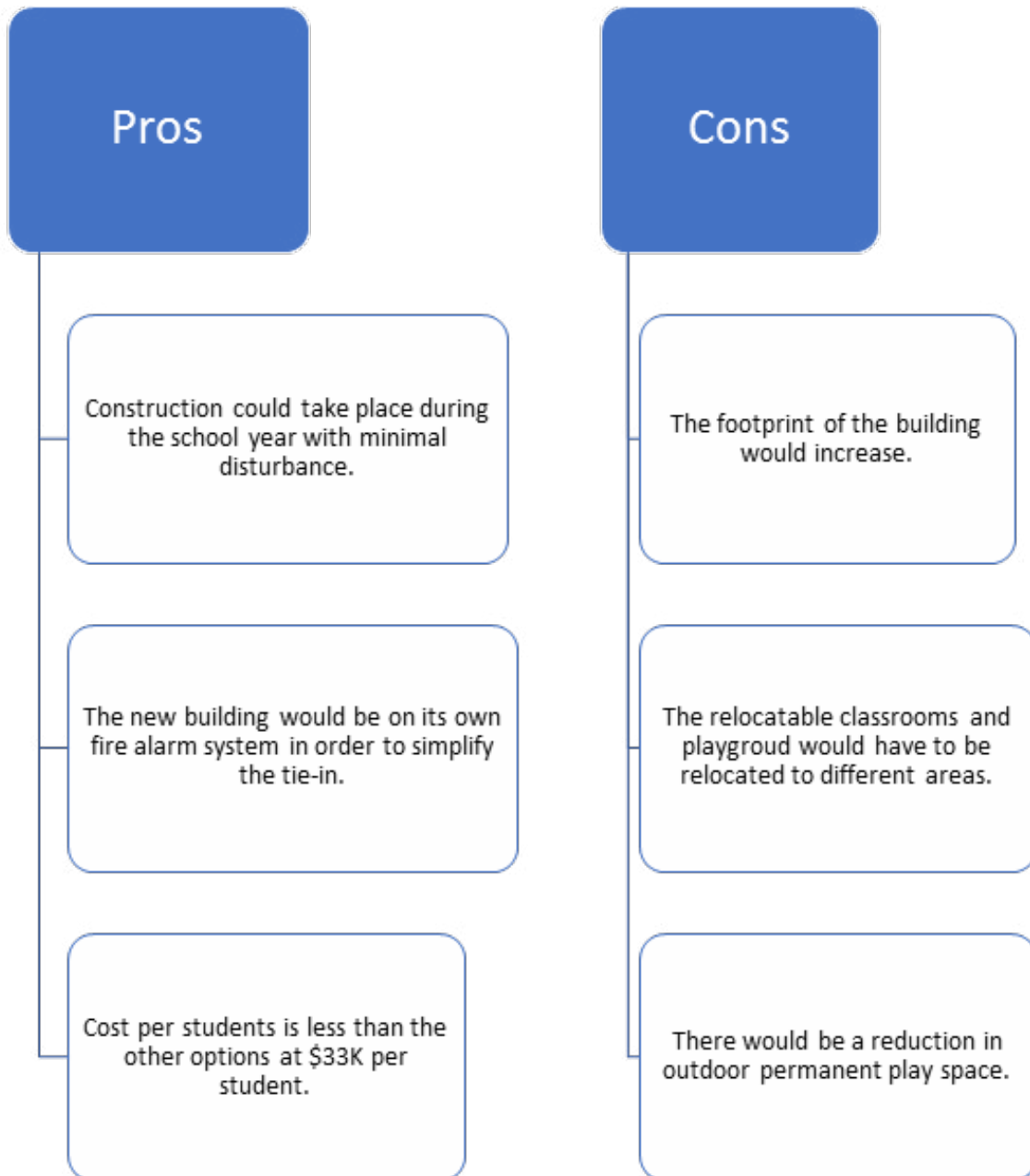


Option 2B



7. Pros & Cons

The team offers the following pros and cons for consideration.



8. Summary

Option 2a, 2b, and 2c would yield four (4), six (6), or twelve (12) new classrooms, respectively. The cost estimated to complete this work is less expensive than other options due to the decreased risk of the building within the existing

structure or on the steeply sloped terrain. The proposed construction schedule is fourteen (14) months. The schedule would last over a summer and the consecutive school year. In comparison to the other options, option 2C yields the most classrooms for the least amount of money at \$33,992 per seat.

C. Option 3—New Structure on Sloped Forest

1. Description of Option & Scope of Work

Option 3 proposes a new freestanding structure built to the north of the school in the current sloped forest area. This option would add up to ten (10) additional classrooms or support program spaces in approximately 11,280 square feet of space. Constructing the building in this location could make use of land that may not have other uses—such as a play ground—due to the slope.

This option would entail heavy site and civil work to construct the building foundation. In addition, over 5,000 square feet of trees would have to be cut down and replacement trees would have to be planted per county requirements. These two factors will increase the cost of this option in comparison to the other options. The new classrooms would be designed to be under 900 square feet each making them ideal for grades 1–5.

The schedule for this scope of work would have a proposed construction duration of fourteen (14) months and would include the following:

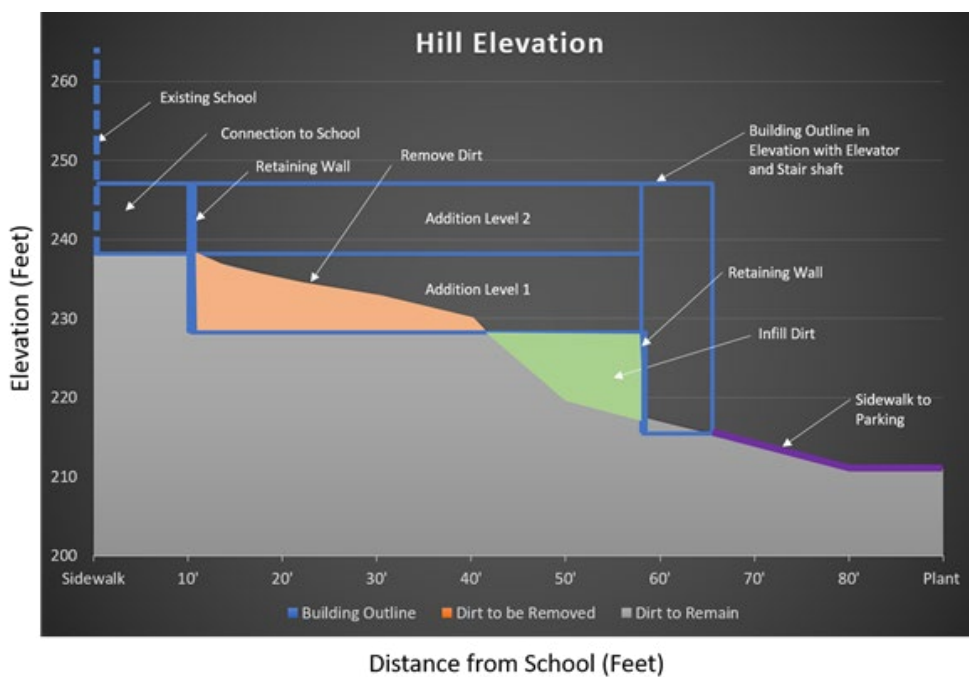
- Establish the construction site limitations and install fencing and sediment and erosion control. *(Please refer to the site access plan included in this section)*
- Heavy to extreme site work and grading to install the foundation for the new building on the sloped area of the hill.
- Install a new structure including a mid-level floor, steel framing for walls, and a new roof over the addition. *(More information on the structure can be found in the structural review to follow)*
- Rough in all necessary mechanical, electrical, and plumbing and install any new heating and cooling units as required.
- Install the exterior building skin, glazing, and roofing to match the existing skin in place.
- Fit out the interior of the space with ten (10) new classrooms to include millwork, doors frames and hardware, paint, and flooring.
- Add a new interior ramp, handicap lift, and staircase to

adjust between floor elevations.

- Add boys' and girls' bathrooms for the lower level.
- Add a new elevator and staircase to service three (3) levels.
- Test and balance the mechanical system to the existing structure, 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.
- Provide 50 additional parking spaces in the lower field area with a sidewalk connecting the parking lot to the addition.

The additional permanent capacity of this option is 233 students based on 23.33 students per classroom. This would increase the total permanent capacity of the school from 553 students to 786 students.

2. Plan View



3. Structural & Soil Review

Option 3 is a two-level addition to the existing building in the north side of the property adjacent to the steep terrain. It is anticipated that the structural systems would be as follows:

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 load-bearing masonry walls. Conventional-grade slabs and shallow spread footings are anticipated.

Interior and exterior walls for the building are expected to consist of masonry. Cold-formed metal stud framing would be used where prudent, and high durability wall finishes are less important. Below grade foundation, walls needed to retain earth on the high side of the addition would consist of the cast-in-place concrete wall. It is expected that some periodically placed concrete walls parallel to the slope—used to provide improved global stability for the structure on the steep hill—would be required.

The flat grade along the existing building would be maintained to allow for daylight to reach both new and existing classrooms. Consequently, it is anticipated the need for a shoring and bracing system with drilled tie-backs to retain the earth of this flat area while excavation for the addition is underway. It is anticipated that a system of steel soldier piles spaced at about 8 feet, on center, with wood lagging spanning between piles would be required.

It is anticipated that an enclosed breezeway would be constructed to attach the addition to the existing building at the existing stair in the northeast corner. It is expected that the breezeway would be a one-level, at grade, load bearing masonry structure with a light steel frame roof. It is likely that this building would be founded on grade beams that minimize the risk of differential settlement between the earth retained by the shoring and bracing system and the foundation wall of the addition.

The addition would be on a separate fire alarm system from the original building, as needed by area calculations, but also to phase the fire alarm and sprinkler construction relative to the existing systems. It is anticipated a small fire wall between the newly enclosed breezeway, and the existing construction would be required. Some minor renovation to the existing building would be needed to interface the addition to the existing.

Lateral stability for the addition would be best provided using the 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 and foundations, it is reasonable to consider 3,000 PSF for soil bearing. However, geotechnical testing would have to be performed at the time of new construction to provide the foundation design parameters for a complex foundations design on the steep slope and to provide a document for permit submission.



Photo 3.1 Sidewalk access on the West side of the school.



Photo 3.2



Photo 3.3 View toward the future parking area. The new addition would be built on the sloped terrain.



Photo 3.4 View toward the future parking area. The new addition would be built on the sloped forest terrain.

5. Estimated Budget

The total estimated project cost for this addition is \$8,341,596. The breakdown of the estimate can be found on the following pages.

Arlington Science Focus Elementary School School Expansion Feasibility Options



			\$/SF	TOTAL	%
		Gross Area:	10,340 SF		
A10	Foundations		14.00	144,785	3%
A20	Basement Construction		31.64	327,140	6%
A	Substructure		45.64	471,925	9%
B10	Superstructure		36.97	382,240	7%
B20	Exterior Enclosure		40.32	416,920	8%
B30	Roofing		12.58	130,080	2%
B	Shell		89.87	929,240	17%
C10	Interior Construction		38.56	398,702	7%
C20	Stairways		6.34	65,520	1%
C30	Interior Finishes		23.75	245,575	4%
C	Interiors		68.65	709,797	13%
D10	Conveying Systems		11.61	120,000	2%
D20	Plumbing Systems		9.25	95,645	2%
D30	Heating, Ventilation & Air Conditioning		52.00	537,680	10%
D40	Fire Protection		3.00	31,020	1%
D50	Electrical Lighting, Power & Communications		42.00	434,280	8%
D	Services		117.86	1,218,625	22%
E10	Equipment		4.00	41,360	1%
E20	Furnishings		4.06	42,020	1%
E	Equipment & Furnishings		8.06	83,380	2%
F10	Special Construction		0.00	0	0%
F20	Selective Demolition		0.00	0	0%
F	Special Construction & Demolition		0.00	0	0%
G10	Site Preparation		3.92	40,570	1%
G20	Site Improvements		28.46	294,285	5%
G30	Site Mechanical Utilities		12.33	127,500	2%
G40	Site Electrical Utilities		11.61	120,000	2%
G90	Other Site Construction		0.00	0	0%
G	Building Sitework		56.32	582,355	11%
Z1	Design Contingency	10.00%	38.64	399,532	7%
BUILDING & SITEWORK DIRECT COST BEFORE GC MARK-UPS			425.03	4,394,854	80%
Z10	General Conditions	8.00%	34.00	351,588	6%
Z11	Phasing/Interface	1.00%	4.59	47,464	1%
Z12	Bonds & insurances	1.75%	8.11	83,893	2%
Z13	Contractors Overhead & Profit	5.00%	23.59	243,890	4%
TOTAL CONSTRUCTION COST BEFORE ESCALATION			495.33	5,121,690	93%
Z30	Escalation	7.68%	38.05	393,415	7%
ESTIMATED CONSTRUCTION COST AT AWARD			533.38	5,515,105	100%
	Construction Contingency	10.00%		551,511	
	Project Soft Costs	25.00%		1,516,654	
	Owner's Contingency	10.00%		758,327	
ESTIMATED TOTAL COST			806.73	8,341,596	

Option 3 Summary

Arlington Science Focus Elementary School School Expansion Feasibility Options



Option 3

	Quantity	Unit	Rate	Total
A10 Foundations				
Spread footings	5,170	SF	7.00	36,190
Perimeter wall footing	35	CY	525.00	18,375
6" thick slab on grade, incl. 6" gravel	5,170	SF	12.00	62,040
Underslab drainage system	5,170	SF	4.00	20,680
Elevator pit	1	EA	7,500.00	7,500
				144,785
A20 Basement Construction				
A2010 Basement Excavation				
Excavate for cut/fill	1,340	CY	35.00	46,913
Dispose off-site	1,139	CY	25.00	28,483
Backfill with excavated material & imported	1,206	CY	45.00	54,285
Allow for rock excavation	134	CY	250.00	33,509
A2020 Basement Walls				
Sheeting & shoring	1,100	SF	55.00	60,500
Basement walls, 12" thick, complete	81	CY	575.00	46,426
Elevator shaft wall, 8" thick, complete	42	CY	575.00	23,864
Waterproofing to walls	2,180	SF	12.00	26,160
Perimeter foundation drain	350	LF	20.00	7,000
				327,140
B10 Superstructure				
B1010 Floor Construction				
Steel frame	31	Tons	4,500.00	139,590
Metal deck & concrete	5,170	SF	11.00	56,870
B1020 Roof Construction				
Steel frame	31	Tons	4,500.00	139,590
Roof decking & insulation	5,170	SF	7.00	36,190
Steel Roof dunnage	1	LS	10,000.00	10,000
				382,240
B20 Exterior Enclosure				
B2010 Exterior Walls				
Brick & stud back-up cavity wall, incl. insulation etc	3,465	SF	40.00	138,600
EIFS to upper floor	3,465	SF	28.00	97,020
Coping	350	LF	35.00	12,250
B2020 Exterior Windows				
Fixed windows (25%)	2,310	SF	65.00	150,150

Arlington Science Focus Elementary School School Expansion Feasibility Options



Option 3

	Quantity	Unit	Rate	Total
B2030 Exterior Doors				
Glass door, complete; single	1	EA	4,800.00	4,800
Glass door, complete; double	1	PR	10,500.00	10,500
Solid exterior doors, complete; single	2	EA	1,800.00	3,600
				416,920
B30 Roofing				
B3010 Roof Coverings				
Roof coverings & insulation	5,170	SF	24.00	124,080
B3020 Roof Openings				
Allowance for penetrations	6	EA	1,000.00	6,000
				130,080
C10 Interior Construction				
C1010 Partitions				
Interior partitions allowance	10,340	SF	13.50	139,590
Interior glazing/storefront allowance	10,340	SF	2.75	28,435
Allow for misc. metals and blocking	10,340	SF	2.50	25,850
C1020 Interior Doors				
Interior doors including door, frame & hardware complete, allow				
- Single leaf	34	EA	1,400.00	47,600
- double leaf	6	EA	2,200.00	12,467
C1030 Fittings				
Allowance	10,340	SF	14.00	144,760
				398,702
C20 Stairways				
C2010 Stair Construction				
Interior stairs, incl. railings	72	Riser	850.00	61,200
C2020 Stair Finishes				
Paint and sealer egress stair - concrete sealant	72	Riser	60.00	4,320
				65,520

Arlington Science Focus Elementary School School Expansion Feasibility Options



Option 3

	Quantity	Unit	Rate	Total
C30 Interior Finishes				
C3010 Wall Finishes				
Allowance	10,340	SF	4.50	46,530
C3020 Floor Finishes				
Allowance	10,340	SF	9.50	98,230
C3030 Ceiling Finishes				
Allowance	10,340	SF	7.50	77,550
Allowance for premium ceilings	1,551	SF	15.00	23,265
				245,575
D10 Conveying Systems				
D1010 Elevators & Lifts				
3-stop elevators	1	EA	120,000.00	120,000
				120,000
D20 Plumbing Systems				
<u>Plumbing Fixtures</u>				
Allowance	10,340	SF	\$1.85	19,129
<u>Domestic Water Distribution</u>				
Allowance	10,340	SF	\$2.60	26,884
<u>Sanitary Waste and Vent Distribution</u>				
Allowance	10,340	SF	\$2.20	22,748
<u>Storm Distribution</u>				
Allowance	10,340	SF	\$1.40	14,476
<u>Other Plumbing Systems</u>				
Allowance	10,340	SF	\$1.20	12,408
				95,645
D30 Heating, Ventilation & Air Conditioning				
Allowance	10,340	SF	\$52.00	537,680
				537,680

Arlington Science Focus Elementary School School Expansion Feasibility Options



Option 3

	Quantity	Unit	Rate	Total
D40 Fire Protection				
Allowance	10,340	SF	\$3.00	31,020
				31,020
D50 Electrical Lighting, Power & Communications				
Allowance	10,340	SF	\$42.00	434,280
				434,280
E10 Equipment				
E1020 Institutional Equipment				
Allowance	10,340	SF	\$4.00	41,360
				41,360
E20 Furnishings				
E2010 Fixed Furnishings				
Window Treatments	2,310	SF	7.00	16,170
General allowance	10,340	SF	2.50	25,850
				42,020
F10 Special Construction				
F1010 Special Structures				
Relocatable classrooms - disconnect, move & re-connect		EA	\$15,000.00	
				-
F20 Selective Demolition				
F2010 Building Elements Demolition				
No work				
F2020 Hazardous Components Abatement				
<i>Excluded</i>				Excluded
				-
G10 Site Preparation				
G1010 Site Clearing				
Allowance for tree & stump removal	7,755	SF	3.75	29,081
G1020 Site Demolition and Relocations				
No work				

Arlington Science Focus Elementary School School Expansion Feasibility Options

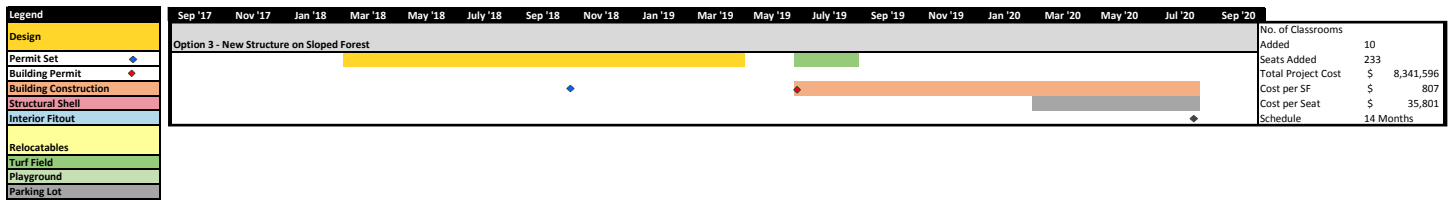


Option 3

	Quantity	Unit	Rate	Total
G1030 Site Earthwork Allow for stripping topsoil (12" deep)	287	CY	40.00	11,489
G1040 Hazardous Waste Remediation <i>Excluded</i>				Excluded
				40,570
G20 Site Improvements				
G2010 Roadways No work		SF	15.00	
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	35,000.00	35,000
Site preparation & paving for relocatables		SF	2.00	
New play area, including equipment relocation		SF	24.00	
Asphalt recreation area		SF	9.00	
G2050 Landscaping Allowance	1	LS	25,000.00	25,000
Allow for replacing removed trees	78	EA	700.00	54,285
				294,285
G30 Site Mechanical Utilities				
Water - allowance, incl. to temporary classrooms	250	LF	\$90.00	22,500
Storm drainage - allowance	1	LS	\$75,000.00	75,000
Sewer - allowance, incl. to temporary classrooms	300	LF	\$100.00	30,000
				127,500
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

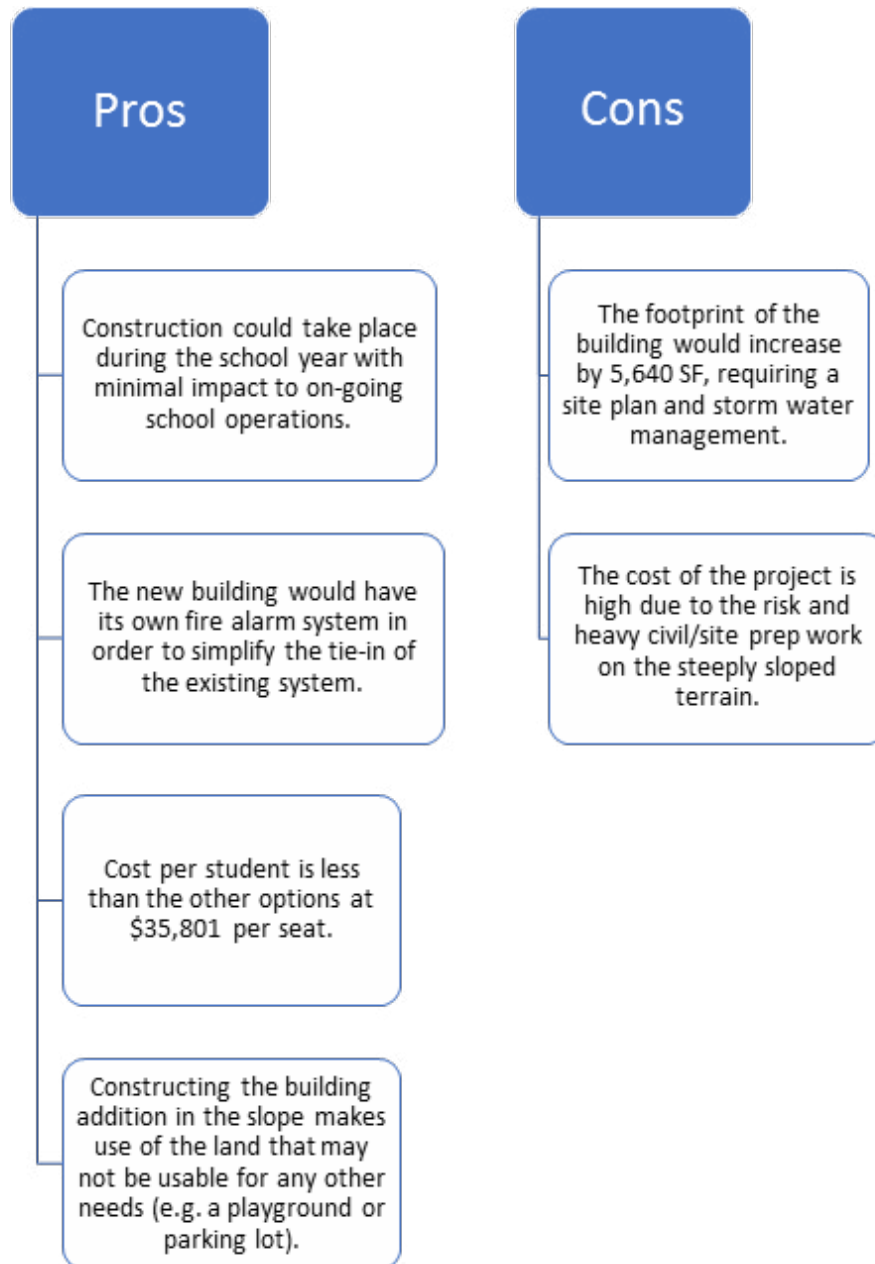
6. Schedule

The proposed construction schedules for this option would span over a summer and the next consecutive school year for a total length of roughly fourteen (14) months. A full project schedule is included on the next two pages.



7. Pros & Cons

The team offers the following pros and cons for consideration.



8. Summary

Option 3 yields ten (10) new classrooms. The projected cost to complete this option is \$8,341,596. The proposed construction duration for the project is fourteen (14)

months—over a summer and during a consecutive school year. In comparison to the other options, this option yields the most classrooms and would cost \$35,801 per seat. It is also one of the riskier options due to the intensity of the site work and the addition of a retaining wall.

D. Option 4—New Vertical Addition

1. Description of Option & Scope of Work

This option would be a vertical addition on the west end of the school. Two scenarios were explored that would yield a net addition of either five (5) or nine (9) additional classrooms, respectively. Part of each option is to rebuild three (3) existing classrooms and connect with the structure's existing first floor. The area of disturbance would include the three (3) classrooms below the future addition. The existing classrooms would be out of service for a full year during construction due to the amount of structural work required to construct the addition. Three (3) relocatable classrooms would have to be added for one school year to make this option feasible. These classrooms range from 850 square feet to 1,050 square feet making it possible to locate any grades within the addition.

The schedule for the scope of work would have a duration of fourteen (14) to fifteen (15) months and would include the following:

- Establish the construction site limitations. *(Please refer to the site access plan included in this section)*
- Install three (3) additional relocatable classrooms at the back of the school.
- Install temporary protections in the existing school to minimize unnecessary damage and impact areas outside of the construction zone.
- Demolish the existing three (3) classrooms.
- Potentially enlarge or underpin the existing foundation to hold the weight of the addition.
- Install a new structure including a mid-level floor, steel framing for walls, and a new roof over the addition.
- Rough in all necessary mechanical, electrical, and plumbing and install any new heating and cooling units as required.
- Install the exterior building skin, glazing, and roofing to match the existing skin in place.
- Fit out the interior of the space with new classrooms to include millwork, doors frames and hardware, paint, and flooring.
- Test and balance the mechanical system to the existing structure, 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.

Option 4A

By selecting this option, the school would be able to add five (5) additional classrooms or support program spaces adding roughly 9,752 square feet of new space to the school. The permanent capacity of the school would increase by 116 students, growing from 553 to 669.

Option 4B

By selecting this option, the school would be able to add nine (9) additional classrooms or support program spaces adding roughly 10,307,477 square feet of space to the school. The permanent capacity of the school would increase by 210 students, growing from 553 to 763.

2. Plan View

Option 4A



Option 4B



3. Structural & Soil Review

Option 4A

In a typical bay at the location of the proposed vertical expansion, the existing roof consists of 1½ - 22 GA, Type B metal roof deck over 20K4 joists spaced at 5 feet, on center, and spanning 28 feet. The joists are shown sloping and span between the exterior masonry wall and the interior corridor wall. The slope is shown as a 4-inch drop in 28 feet of span. The load-bearing masonry walls are shown to be supported on standard 12" X 24" concrete wall footings. Some of the masonry walls appear to be vertically reinforced with steel bars. However, many of these walls are unreinforced.

No geotechnical testing was performed for consideration in this study. However, based on the two sets of existing drawings, foundations were designed for 3,000 PSF soil bearing. Consequently, it is reasonable to consider 3,000 PSF for soil bearing. To maintain this allowable bearing pressure with the added structural load, the existing foundations may need to be enlarged or underpinned. However, geotechnical testing would have to be performed at the time of new construction to confirm foundation design parameters and to 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. The adjacent corridor would have to support 80 PSF. To construct a level floor, 2½ inches of concrete over the deck at one end and a minimum of 6½ inches at the other end would have to be placed over the existing metal roof deck.

Considering the addition of this varied thickness of lightweight concrete at 110 PCF and a 40 PSF live load, we find the following:

- The 1½ - 22 GA metal roof deck is adequate to support the wet weight of concrete and to perform as a floor.
- The 20K4 joists would be 43% overstressed due to the added dead and live loads.

Also, considering the addition of the roof structure above the proposed second floor, the existing load-bearing masonry wall 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, we find the following:

- The wall footings would be stressed to design capacity, or slightly above design capacity at 3,000 PSF soil-bearing pressure.
- Unreinforced load-bearing masonry walls would most likely require the addition of vertical reinforcing bars to provide capacity for a two-level building.

Based on this analysis and findings, the existing structure is not able to support the vertical addition without strengthening the steel framing, columns, and foundations. While it is possible that the steel joists can be reinforced by welding parallel smooth round rods to the existing chords, top, and bottom in order to achieve a 43% increase in capacity, this would have to be done in conjunction with the augmentation of footings and addition of vertical steel reinforcing bars to the load-bearing masonry walls.

For the construction of the future roof, it is anticipated that a 1½-inch metal deck supported on new open-web steel bar joists would be required. The joists would bear on masonry wall in the same alignment as the floor below and be supported on new masonry walls that would align with the existing masonry walls, below. The exterior wall construction at the east side and the courtyard could consist of the same masonry construction with a veneer. Additional east-west masonry walls between classrooms with footings would have to be added to provide shear walls for laterals stability of the two-level portion of the building.

Alternatively, the existing roof structure and masonry walls may be replaced with a steel frame structure consisting of 1½ metal roof deck over open web steel bar joists spaced at 5'-0" as 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

load-bearing masonry walls. Conventional grade slabs and spread footings bearing at a shallow depth below the ground would be reconstructed to provide adequate foundations and adequate superstructures with the capacity to resist greater overturning loads due to the wind and seismic.

The complexity of foundations design is likely to be exacerbated by the steep slope of the site along the eastern perimeter of the existing building.

Option 4B

For the construction of two (2) additional levels of classrooms above the existing building, the consideration for converting the existing roof to a floor will be the same as for Option 4a. However, the weight and floor live load for two (2) additional levels will be imposed on the supporting masonry walls and foundations.

It is anticipated that the existing roof structure and masonry walls may be replaced with a three-level steel frame structure. It is anticipated that the roof system would include a roof structure consisting of 1½ metal roof

deck over open web steel bar joists spaced at 5'-0" as 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 load-bearing masonry walls.

Conventional grade slabs and spread footings bearing at shallow depths below the ground surface would be reconstructed to provide adequate foundations and adequate superstructures with the capacity to resist greater overturning loads due to wind and seismic. The complexity of foundations design is likely to be exacerbated by the steep slope of the site along the eastern perimeter of the existing building.

Lateral stability would be provided by concentric steel bracing as part of the steel frame, in conjunction with the shear action of the masonry walls.

4. Site Access (Similar for Options 4A and 4B)

Access to this area of the building could be achieved from the west side-walk, not to interfere with school functions.

There would be construction outside the windows of the classrooms and student traffic at the sidewalk would be restricted. The picture below depicts the proposed construction route access to the stairwell.





Photo 4.1 Approximate outline of addition



Photo 4.2 Location of proposed addition



Photo 4.3 Approximate outline of addition



Photo 4.4 West side access

5. Estimated Budget

The breakdown of both estimates can be found on the following pages.

Option 4A Total—\$7,687,333

Arlington Science Focus Elementary School School Expansion Feasibility Options



Option 4A Summary

			\$/SF	TOTAL	%
	Gross Area:		9,752 SF		
A10	Foundations		17.27	168,391	3%
A20	Basement Construction		9.11	88,826	2%
A	Substructure		26.37	257,216	5%
B10	Superstructure		37.03	361,086	7%
B20	Exterior Enclosure		44.29	431,888	8%
B30	Roofing		12.62	123,029	2%
B	Shell		93.93	916,003	18%
C10	Interior Construction		38.35	373,991	7%
C20	Stairways		3.86	37,600	1%
C30	Interior Finishes		23.00	224,305	4%
C	Interiors		65.20	635,896	13%
D10	Conveying Systems		9.23	90,000	2%
D20	Plumbing Systems		9.25	90,210	2%
D30	Heating, Ventilation & Air Conditioning		52.00	507,125	10%
D40	Fire Protection		3.00	29,257	1%
D50	Electrical Lighting, Power & Communications		42.00	409,601	8%
D	Services		115.48	1,126,193	22%
E10	Equipment		4.00	39,010	1%
E20	Furnishings		4.29	41,881	1%
E	Equipment & Furnishings		8.29	80,891	2%
F10	Special Construction		7.69	75,000	1%
F20	Selective Demolition		3.26	31,824	1%
F	Special Construction & Demolition		10.95	106,824	2%
G10	Site Preparation		4.68	45,680	1%
G20	Site Improvements		28.84	281,250	6%
G30	Site Mechanical Utilities		11.48	112,000	2%
G40	Site Electrical Utilities		12.30	120,000	2%
G90	Other Site Construction		0.00	0	0%
G	Building Sitework		57.31	558,930	11%
Z1	Design Contingency	10.00%	37.75	368,195	7%
BUILDING & SITEWORK DIRECT COST BEFORE GC MARK-UPS			415.30	4,050,149	80%
Z10	General Conditions	8.00%	33.22	324,012	6%
Z11	Phasing/Interface	1.00%	4.49	43,742	1%
Z12	Bonds & insurances	1.75%	7.93	77,313	2%
Z13	Contractors Overhead & Profit	5.00%	23.05	224,761	4%
TOTAL CONSTRUCTION COST BEFORE ESCALATION			483.98	4,719,977	93%
Z30	Escalation	7.68%	37.18	362,558	7%
ESTIMATED CONSTRUCTION COST AT AWARD			521.16	5,082,534	100%
	Construction Contingency	10.00%		508,253	
	Project Soft Costs	25.00%		1,397,697	
	Owner's Contingency	10.00%		698,848	
ESTIMATED TOTAL COST			788.25	7,687,333	

Arlington Science Focus Elementary School
 School Expansion Feasibility Options



Option 4A

	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	32	CY	550.00	17,391
Waterproofing to walls	3,498	SF	3.00	10,495
Perimeter foundation drain	350	LF	20.00	6,993
				88,826
B10 Superstructure				
B1010 Floor Construction				
Steel frame	29	Tons	4,500.00	131,657
Metal deck & concrete	4,876	SF	11.00	53,638
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
				361,086
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	4,039	SF	28.00	113,080
Coping	350	LF	35.00	12,238
B2020 Exterior Windows				
Fixed windows (25%)	2,500	SF	65.00	162,504
B2030 Exterior Doors				
Solid exterior doors, complete; double	2	PR	2,800.00	5,600
				431,888

Arlington Science Focus Elementary School
School Expansion Feasibility Options



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



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				
<u>Plumbing Fixtures</u>				
Allowance	9,752	SF	\$1.85	18,042
<u>Domestic Water Distribution</u>				
Allowance	9,752	SF	\$2.60	25,356
<u>Sanitary Waste and Vent Distribution</u>				
Allowance	9,752	SF	\$2.20	21,455
<u>Storm Distribution</u>				
Allowance	9,752	SF	\$1.40	13,653
<u>Other Plumbing Systems</u>				
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



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



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



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



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



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

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				
<u>Plumbing Fixtures</u>				
Allowance	14,629	SF	\$1.70	24,869
<u>Domestic Water Distribution</u>				
Allowance	14,629	SF	\$2.40	35,109
<u>Sanitary Waste and Vent Distribution</u>				
Allowance	14,629	SF	\$2.00	29,257
<u>Storm Distribution</u>				
Allowance	14,629	SF	\$1.30	19,017
<u>Other Plumbing Systems</u>				
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



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				
<i>Excluded</i>				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				
<i>Excluded</i>				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



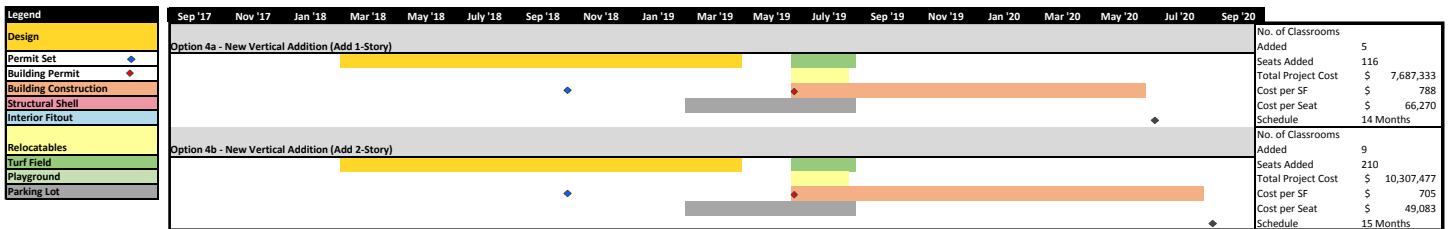
Option 4B

	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

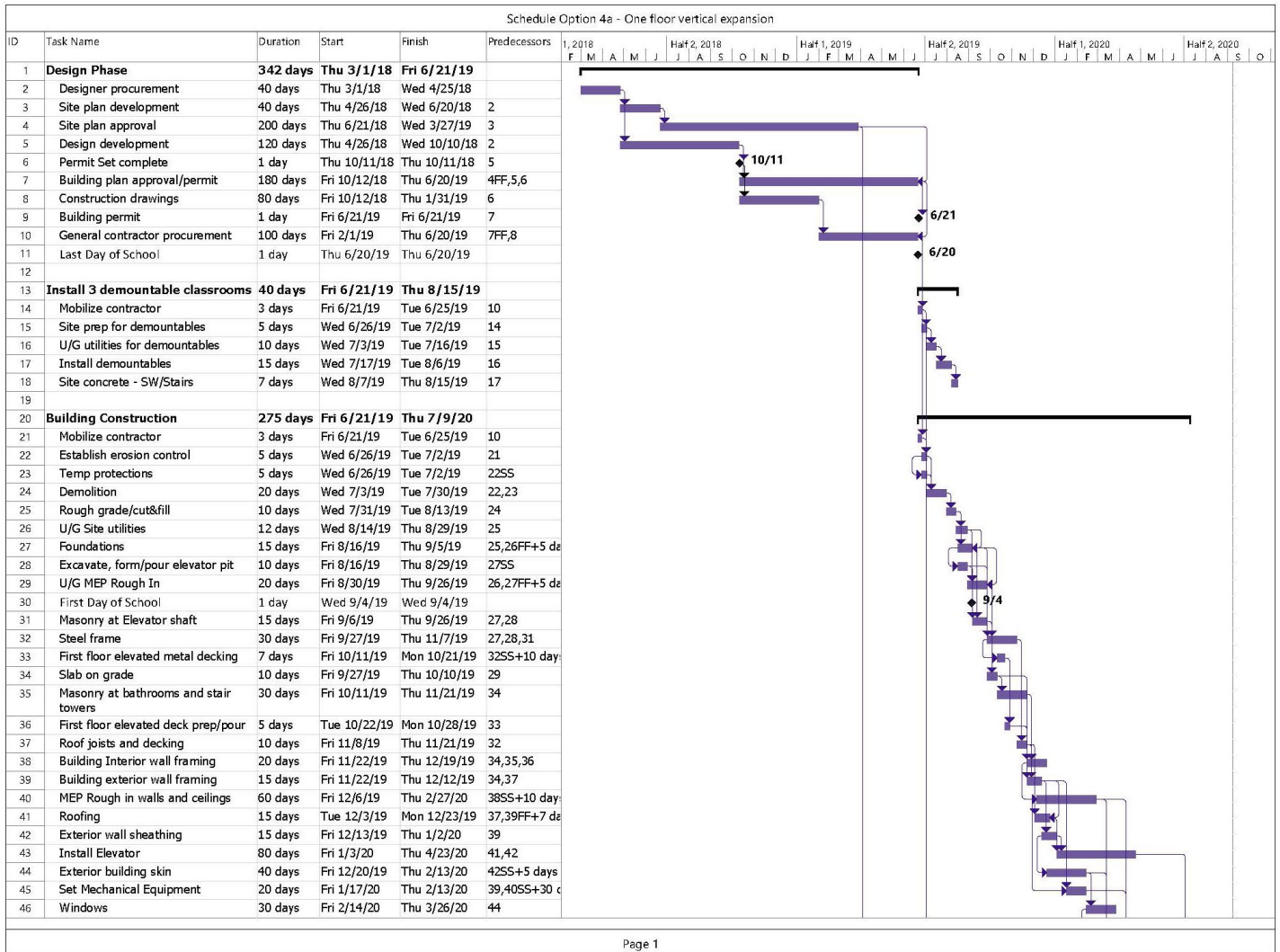
6. Schedule

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.

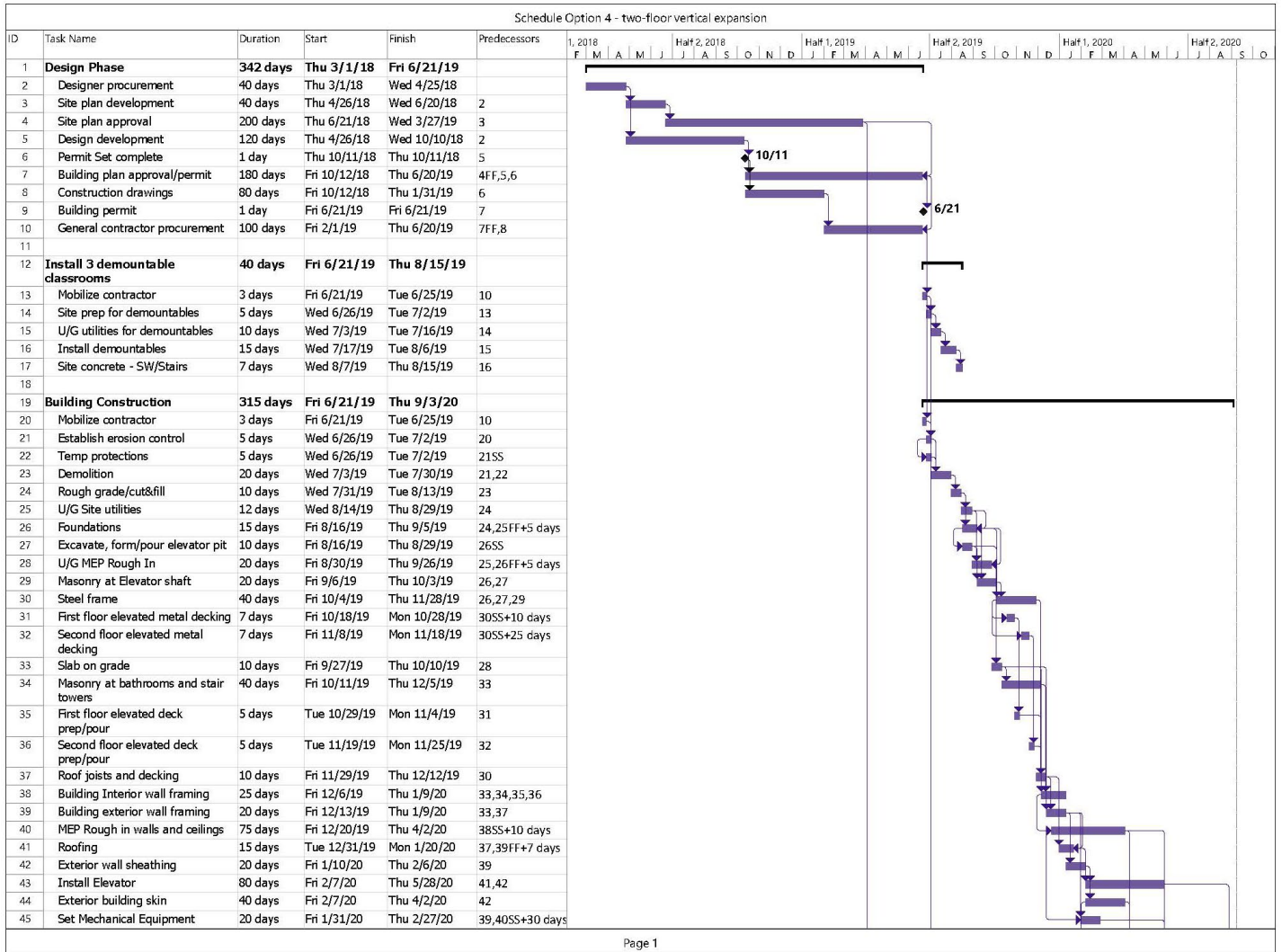
Below you can find a timeline of the Option 4A and Option 4B schedules, including the design phase. A full project schedule can be found on the next few pages.



Option 4A

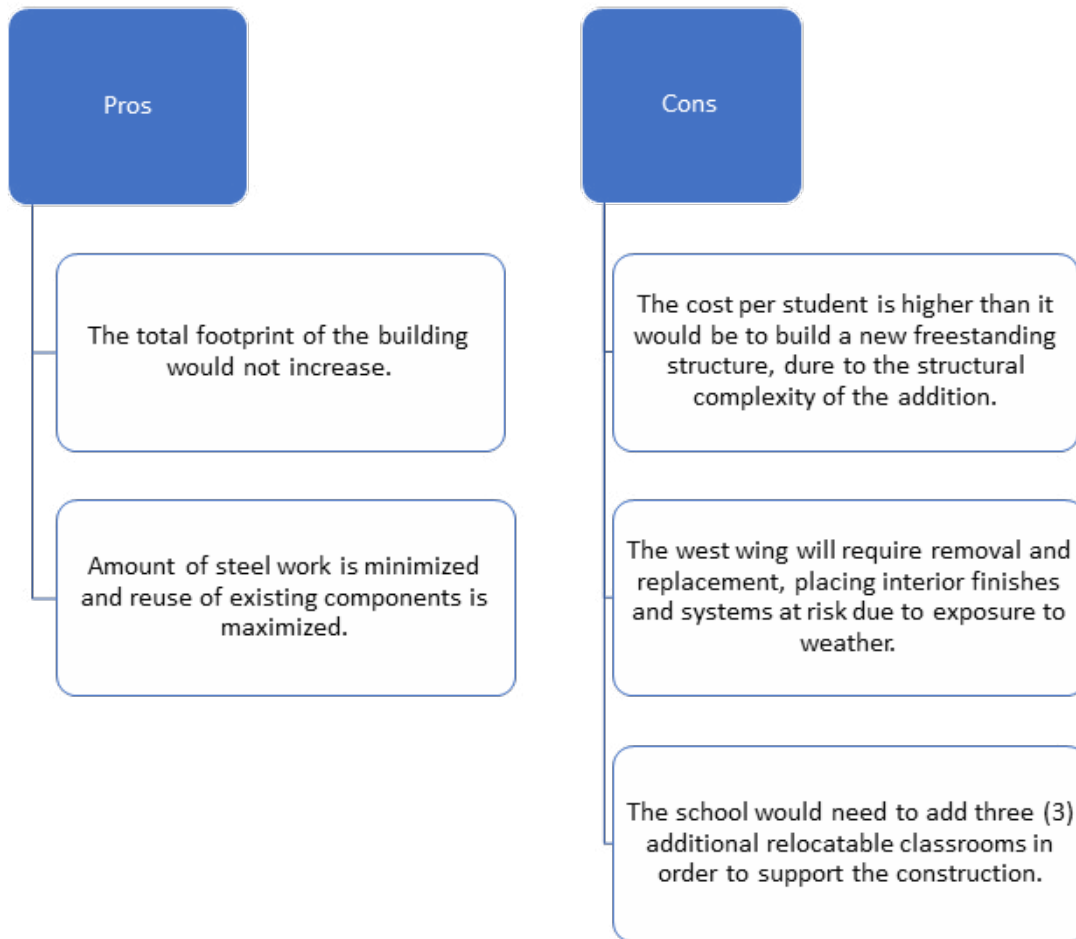


Option 4B



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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Arlington
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