Technical Site Study Assessment

Draft Progress Report
March 10, 2021

Cora Kelly Elementary School
3600 Commonwealth Ave.

George Mason Elementary School
2601 Cameron Mills Rd.

Alexandria City School Board Alexandria City Public Schools (ACPS)
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ACPS
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In the Spring of 2019, **Alexandria City Public Schools** (ACPS) decided to hire Studio Twenty Seven Architecture as the lead of a multidisciplinary professional team to assist in preparing Technical Site Study Assessments for two of the City's elementary schools. Those two schools are George Mason Elementary School, located at 2601 Cameron Mills Road, and Cora Kelly School for Math, Science, and Technology, located at 3600 Commonwealth Avenue. The goal of the Technical Site Study Assessments was to gather detailed information on the viability of school renovations versus school replacements to be used in the next stage of ACPS's capacity modernization program.

The document presented here is a result of the application of professional technical expertise and the collaboration of invested and knowledgeable stakeholders. The document is outlined in the following Table of Contents.

The research, findings, and scenarios presented here constitute the professional opinions of the multidisciplinary professional team based on the assumptions and conditions detailed throughout the book. This Technical Site Survey Assessment effort was in conjunction with City staff and faculty participation. The findings will give ACPS information on making future decisions for the CIP.

The **Multidisciplinary Professional Team** was comprised of the following individuals //

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The Planning Team wishes to acknowledge the support, cooperation, and effort of all of the ACPS and staff who contributed to the planning effort, in particular //

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All of the faculty, staff, and committee members who joined the effort throughout.

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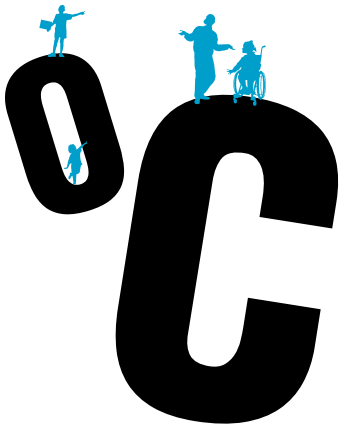

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I. EXECUTIVE SUMMARY

Introduction

Background

George Mason Elementary School was built in 1939 on a generous 9 acre lot, and since then has undergone 5 previous phases of work, which has resulted in a fragmented construction of additions used to address immediate challenges. George Mason is situated in a residential context with a historic fabric that requires careful attention to site access without disrupting the character of the neighborhood.

Cora Kelly Elementary School was built in 1955 on an undersized 4.5-acre lot and has not built any addition addressing changes in student population or curriculum guidelines. It is located west of Commonwealth Avenue, south of Four Mile Run Stream, surrounded by a variety of housing densities and commercial sites. The school is dedicated to preparing its students for the 21st century through science, technology, engineering, and math (STEM).

Alexandria City Public Schools is a school system of approximately 15,900 students and has experienced between 2 percent and 3 percent growth annually since 2012. This growth trend combined with observed increases in kindergarten capture and cohort survival rates has led to an increasing school population. Based upon these trends and recent work with the City's planning department, ACPS believes that enrollment growth over the next five years will continue to outpace the citywide growth rate at more than a 3:1 ratio. As the school population grows, the modernization of schools to meet capacity and educational needs is required.

Explanation of the Technical Site Study Assessment Scope of Work

The purpose of the Technical Site Study Assessment (TSSA) is to identify and assess current infrastructural and programmatic challenges that a particular school experiences, and how these challenges can be addressed to meet current codes, specifications, life cycle costs, and projected schedules.

The Limits and Benefits of a Technical Site Assessment Study

Although a Technical Site Assessment Study (TSSA) provides a plethora of information with respect to cost, time, and quantity, the TSSA does not offer, nor does it try to offer, a level of specificity that can be interpreted as a design solution. The TSSA, or Feasibility Study, is an objective assessment of the current conditions of facilities, identifies the challenges and opportunities for future development projects, and applies possible approaches and solutions to those scenarios.

Confirming the Priority

This Feasibility Study confirms the Capital Improvement Plan timeline for the modernization of these schools, that George Mason's modernization should be addressed prior to Cora Kelly. George Mason's overall building condition, fragmented nature of the educational adjacencies, and issues with over-capacity refelct the need to prioritize it's moderniztion.

Capacity and Program

Educational Specifications ("Ed Specs") are developed to serve as the guiding recipe and benchmark for future school renovations and new construction projects.

Per the National School Boards Association:

"The purpose of educational specifications ("Ed Specs") is to define the programmatic, functional, spatial, and environmental requirements of the educational facility, whether new or remodeled, in written and graphic form for review, clarification, and agreement as to the scope of work and requirements by the architect, engineer, and other professionals working on the building."

The ACPS Ed Spec and student population were used as the guiding criteria for programmatic quantities, sizes, and adjacencies.

Due to George Mason's fragmented nature and Cora Kelly's stagnant development, the TSSA and Masterplan scenarios provide a feasible framework addressing these challenges and their relationship to neighborhood context, site access and outdoor play space, academic program, and adjacencies, building and energy systems, life cycle costs, and scheduling. These scenarios are made to assist decision makers in deciding the path forward for the future of the school. They are not site plans or final scenarios, but illustrations of the opportunities and constraints of the site.

George Mason is currently 60,875 gross square feet. Per the Ed Specs, the school is 39,940 square feet deficient in gross building area and 49,600 square feet deficient in the outdoor play space area. George Mason's enrollment is 420 students based on Sept 30, 2019 enrollment data. Its current capacity is 368 students, making the school over capacity.

Cora Kelly is currently 76,840 gross square feet. Per the Ed Specs, the school is 28,102 square feet deficient in gross building area without a new gymnasium and 37,624 square feet deficient in gross building area with a new gymnasium. The school is 54,670 square feet deficient in the outdoor play space area. Cora Kelly's enrollment is 379 students with a capacity of 429 students.

I. EXECUTIVE SUMMARY

Building Systems

Per the building assessment, it was observed that both Cora Kelly and George Mason will eventually require either a full system upgrade or complete replacement of MEP systems due to its antiquated nature or a lack of system usage or availability, like a sprinkler and fire alarm system, which are crucially linked to the life safety of building occupants.

In addition to the code requirements of the state of Virginia, the City of Alexandria has implemented a new 2019 Green Building Policy. This newly approved policy requires that major or new public projects be required to meet minimum level certifications of LEED and/or other Green building certifications as well as they shall perform as a Net Zero Energy building. In order for a facility to meet the aforementioned requirements, it would be expected that the building's annual energy consumption be in the 18-22 EUI (Energy Use Intensity) range where EUI is defined as kBtu/Sf/YEAR. This requirement further justifies the complete upgrade or replacement of building systems.

Program Tables for each school are found in their respective sections of this booklet.

Adjacencies

The "ideal" adjacency diagram (**Figure 1)** illustrates relevant adjacencies for the typical elementary school model. The rooms and spaces illustrated in this educational specification compose a number of program "clusters". The school as a whole is a collection of these "clusters" organized according to adjacencies required to best support the educational mission of ACPS.

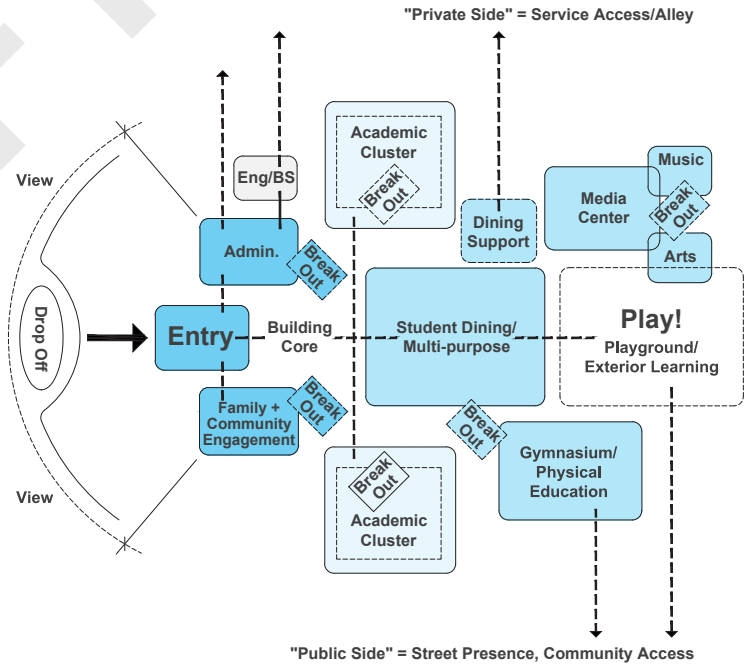
Academic clusters are located in the quiet areas of the building that can be isolated during off-hours. Noisier and shared programmatic clusters are grouped toward parking, public, and play areas allowing for after-hours access. A single main entry is a specific determination of ACPS's security plan and that entrance is supported by administration and family welcome center functions.

In addition to the ideal adjacency of the school, the site must establish clear site access and circulation that separates vehicular, bus, loading, and pedestrian traffic. Additionally, the siting of the building should maximize site open space that provides views and daylight to the school program:

- Provide different sizes and types of exterior play spaces for all age groups.
- Establish a dialogue with the neighborhood context.
- Accommodate the educational specification within an efficient and expandable footprint.
- Implement sustainable building systems.
- Coordinate phasing of work to limit swing space and co-location.

Informal "break- out" or Extended Learning Areas happen throughout the building along with opportunities for distributed dining areas. Studio 27 Architecture compared simplified adjacency diagrams of Cora Kelly and George Mason elementary to the "ideal" organization in the following pages.

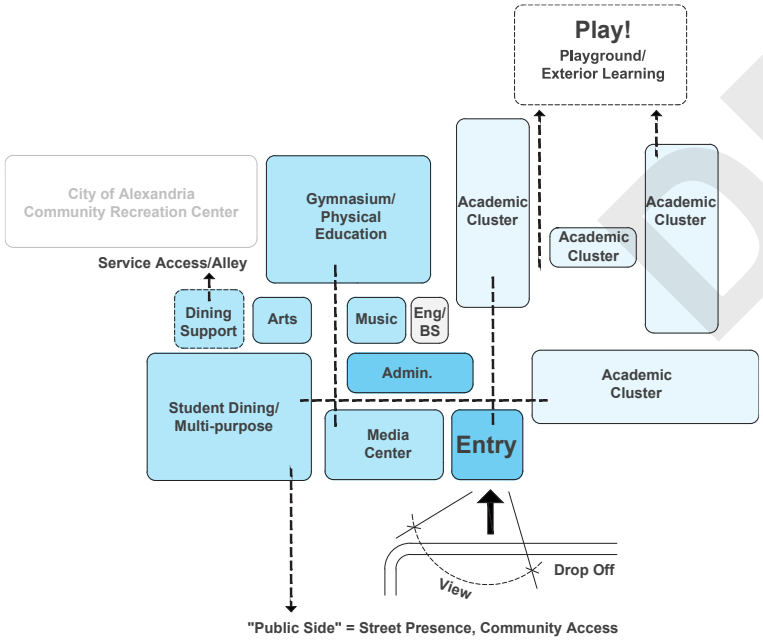
Figure 1
Ideal Adjacency



I. EXECUTIVE SUMMARY

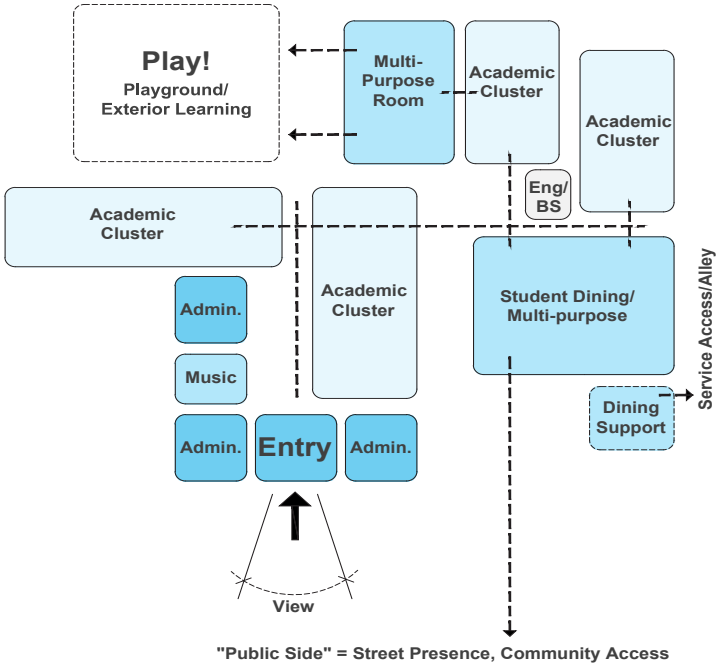
The Cora Kelly (**Figure 1a**) academic wings are very remote from the shared spaces like the cafeteria, gym, and library. To get between these two sides of the school many students must take a long, circuitous route. These larger gathering spaces should be in a more central location to facilitate class transitions. The administration program is adjacent to noisy, high traffic areas when it would be better served distributed throughout more quiet wings of the school. Another item of concern is the lack of a private service/delivery access point. The service/delivery circulation crosses paths with the recreation center traffic and is visible from the rec center main entry.

Figure 1a
Existing Cora Kelly Adjacency



George Mason Elementary **(Figure 1b)** has a more central cafeteria however the multi-purpose room is located such that students have to travel through quieter academic wings to get there. Students must also travel through the multi-purpose room to reach the outdoor play areas which are not ideal if the multi-purpose room is already in use. George Mason also lacks a separate service/delivery access point. Service traffic currently crosses paths with staff parking and is visible from adjacent homes.

Figure 1b
Existing George Mason Adjacency



I. EXECUTIVE SUMMARY

Renovation & Addition versus Replacement

A major element of the Feasibility Study is to explore options for capacity addition of schools through renovation and addition or through replacement of the school.

This book presents two key components to generate feasibility studies for each school. The Technical Site Study Assessment includes assessments of current building systems, site infrastructure, academic requirements referencing educational specifications, and life cycle costs. Project Scenarios present master plan scenario approaches to challenges currently experienced by Cora Kelly and George Mason, phasing and scheduling, and associated feasibility costs. The scenarios also allow comparison between replacement, renovation, swing space on or offsite, and future considerations.

In Scenario 1 for George Mason, the Renovation and Addition Scenario shows that any renovtion and addition will encroach onto the existing outdoor area and George Mason Park, which is located on the school parcel. Additionally, any renovation or addition would not address the fragmented educational adjacencies. Lastly, swing space would be needed as the building would need to be shelled to update MEP systems.

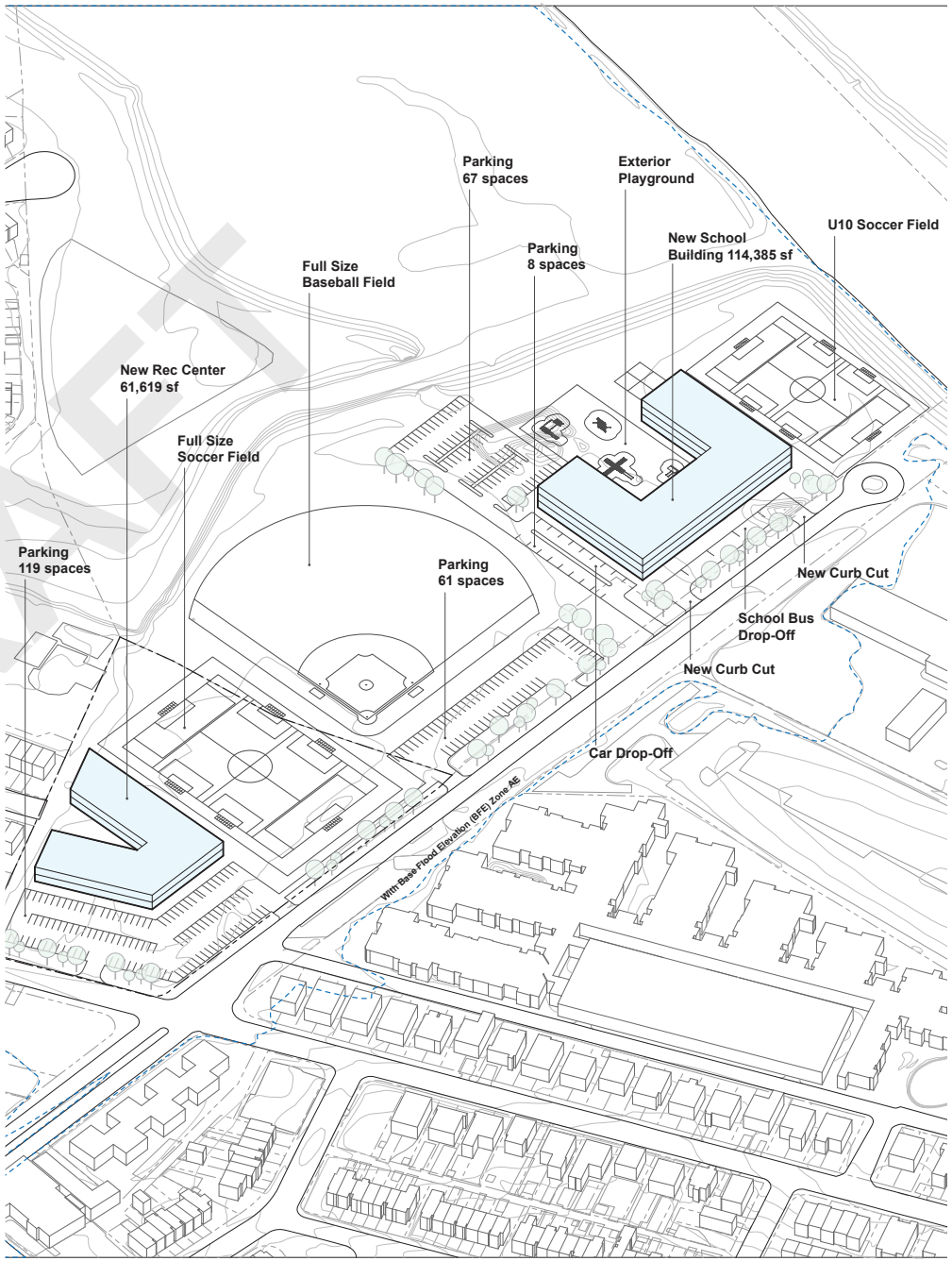
In Scenario 1 for Cora Kelly, the Renovation and Addition Scenario shows that an addition would encroach into the POS area and near the existing RPA line. Swing space would be needed as the building would need to be shelled to update MEP systems.

Onsite versus Offsite Swing Space

To the right, is a preview of one of the feasibility studies that accompany the Technical Site Assessment Study for each school. This masterplan scenario illustrates the opportunity to reconfigure the major components of the Cora Kelly site in order to provide a new school and recreation center without requiring swing space. In other words, the new school and recreation center could be constructed while the existing facilities remain in place and operational. A situation such as this would allow ACPS to avoid the costs of relocating the student body during an eighteen-to-twenty-four-month construction period.

Swing space may still be preferable to maintain existing open space uses and provide more flexibility in the design.

This is the type of question that the feasibility studies are meant to explore. What scenarios are available on the site? Can we avoid swing space? Can we increase open space and or surface parking? Each of the feasibility studies, intended to do no more than serving the purpose of answering a specific question. None of the feasibility studies is a masterplan upon which new building scenarios or additions would be based. The studies are intended only to assist the ACPS in formulating budgets for future capital improvement costs.



I. EXECUTIVE SUMMARY

Future Considerations

Colocation of Community Services

ACPS had been asked by the City to explore colocation options for City/School facilities on all school sites undergoing modernization. There are many options for colocation. Colocation can include:

- Park and recreation services
- Workforce, senior and affordable housing
- Public library services
- Public health clinics and services

An example of existing colocated services include Cora Kelly Elementary School which is colocated with the Leonard “Chick” Armstrong Recreation Center.

In general, the master plan scenarios illustrate that at both the George Mason and Cora Kelly sites there is an opportunity to increase the utilization of space. Doing so would allow for additional uses to be located on the site. Those uses would be determined by ACPS and the City and discussed with the community.

In January of 2020, feasibility studies were presented to the public. At the time, future co-located use options, inluding affordable housing, were shown on the school parcels. During the period of public input the community generally was opposed to the colocation of afforadble housing on school sites. Other co-located uses such as park and recreation services were well received. In February 2021, the ACPS School Board voted against colocating affordable housing with the new Minnie Howard school. The School Board determined that the co-location of uses on school sites should directly complement the educational programming and should not take up space which could later be used for school needs.

This Feasibility Study does not contemplate affordable housing as a future co-located use, but does include uses such as park and recreation services to be determined in future project phases.

Other Future Considerations

The process of this Feasibility study began in summer of 2019. In early 2020, the frist findings of the study were presented to the public and ACPS began recieving feedback on the priorities and outcomes of the study. Shortly thereafter, efforts on the Feasibility Study were paused during the on-going COVID-19 pendemic. ACPS re-started this project in January 2021. Some of the assumptions for schools will need to be confirmed based on ACPS division priorties and other site considerations.

In addition to the opportunities for expanding the capacity and modernizing the educational adjacencies of the schools, there are some site challenges that will need to be addressed in the future. Cora Kelly is located next to the Four Mile Run AlexRenew Pump Station and future development will need to accommodate the existing facilities. New floodplain maps are expected to be adopted for the City of Alexandria in 2022. Redevelopment of Cora Kelly will be subject to additional floodplain regulations. Additionally, each site will need to meet stormwater regulations for development.

Grade-level confirguration for each school will be validated in the future. This includes evaluation of a K-8 grade level configuration.

George Mason Master Plan Scenarios

Scenario 1: Renovation and Addition

George Mason	Confirming the Priority	Addition and Renovation		Swing Space	
		Addition	Renovation	On-Site	Off-Site
Educational Program/Adequacy	Responds to immediate challenges. Critically limits expandability & flexibility	39,940 sf	Full renovation	No	Yes
Budget (Conceptual Cost)*	$48M			-	TBD
Schedule	18 - 24 months			-	TBD
Community Impact	Addition of one or two stories would encroach heavily into the existing George Mason Park, which belongs to the school parcel, per the field survey	Emphasizes the fragmented nature of George Mason & may further complicate the coordination of building systems if further additions are constructed	Entire existing school building would need to be entirely shelled to meet MEP system and energy code (LEED and Net Zero)	-	Swing space would need to be allocated in the city

Scenario 2: Replacement School with Historic Component

George Mason	Confirming the Priority	Replacement	Swing Space	
			On-Site	Off-Site
Educational Program/Adequacy	Responds to a long-term goal & supports expandability & flexibility for future capacity changes	Replaced & relocated	Yes	No
Budget (Conceptual Cost)*	$61M		Crucial cost savings	-
Schedule	18 - 24 months		Crucial time savings	-
Community Impact	Historic frontage is maintained as a community space or an indoor recreational space for activities	Dedicated parking & drop-off zones will avoid any kind of congestion on the local & arterial streets & will provide cleaner street frontage throughout the day	-	Relocating the school would eliminate the need	-

Scenario 3: Replacement School (in-place) with Historic Component

George Mason	Confirming the Priority	Replacement		Swing Space	
				On-Site	Off-Site
Educational Program/Adequacy	Responds to a long-term goal & supports expandability & flexibility for future capacity changes	Replaced in-place		No	Yes
Budget (Conceptual Cost)*	$61M			-	TBD
Schedule	18 - 24 months			-	TBD
Community Impact	Historic frontage is maintained as the main entry & administration wing of the school	Dedicated parking & drop-off zones will avoid any kind of congestion on the local & arterial streets & will provide cleaner street frontage throughout the day	Courtyard configuration creates a private outdoor play area for the students, increases natural daylight into all occupiable room	-	Swing space would need to be allocated in the city

*Note: Budget and Conceptual Cost does not include costs of on-site or off-site swing space.

Cora Kelly Master Plan Scenarios

Scenario 1: Renovation and Addition

Cora Kelly	Confirming the Priority	Renovation and Addition		Swing Space	
		Addition	Renovation	On-Site	Off-Site
Educational Program/Adequacy	Responds to immediate challenges. Critically limits expandability & flexibility	28,000 sf	Full renovation	No	Yes
Budget (Conceptual Cost)*	$48M			-	TBD
Schedule	18 - 24 months			-	TBD
Community Impact	Gymnasium & its associated program in the recreation center will also increase & may succumb to over-utilization	Encroach heavily into the POS, & nears the RPA boundary	Entire existing school building would need to be entirely shelled to meet MEP system and energy code (LEED and Net Zero)	-	Swing space would need to be allocated in the city

Scenario 2: Replacement School and Recreation Center (no swing space required)

Cora Kelly	Confirming the Priority	Replacement		Swing Space	
		Addition	Renovation	On-Site	Off-Site
Educational Program/Adequacy	This is an approach that responds to long-term goals & supports expandability & flexibility for future capacity changes	Replaced & relocated		Yes	No
Budget (Conceptual Cost)*	New School $68M New Rec Center $33M			Crucial cost savings	-
Schedule	18 - 24 months			Crucial time savings	-
Community Impact	Locating the school north & closer to the water, reinforces the STEM identity by celebrating the natural context & allowing students to explore the flora & fauna discovered along the creek & park, but within the immediate school boundaries	Encroach heavily into the POS & nears the RPA boundary	The recreation center and fields receive their dedicated parking	Relocating the school would eliminate the need	-

Scenario 3: Replacement School (in-place) and Existing Recreation Center

Cora Kelly	Confirming the Priority	Replacement		Swing Space	
				On-Site	Off-Site
Educational Program/Adequacy	Approach that responds to long-term goals & supports expandability & flexibility for future capacity changes	Replaced in-place		No	Yes
Budget (Conceptual Cost)*	$68M			-	TBD
Schedule	18 - 24 months			-	TBD
Community Impact	The recreation center would not be shared since this scenario considers a separate gymnasium within the school	Establishes a dialogue with the Four Mile Run Park and creek	Courtyard configuration creates a private outdoor play area for the students, increases natural daylight into all occupiable rooms	-	Swing space would need to be allocated in the city

Scenario 4: Replacement School (in-place) and Existing Recreation Center

Cora Kelly	Confirming the Priority	Replacement (Shared Gym)		Swing Space	
				On-Site	Off-Site
Educational Program/Adequacy	This is an approach that responds to long-term goals & supports expandability & flexibility for future capacity changes	Replaced in-place		No	Yes
Budget (Conceptual Cost)*	$68M			-	TBD
Schedule	18 - 24 months			-	TBD
Community Impact	Recreation center is shared. New school orientation on-site allow for future expansion for dedicated gymnasium	Establishes a dialogue with the Four Mile Run Park and creek	Courtyard configuration creates a private outdoor play area for the students, increases natural daylight into all occupiable rooms	-	Swing space would need to be allocated in the city

*Note: Budget and Conceptual Cost does not include costs of on-site or off-site swing space.

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II. Cora Kelly Master Plan and Technical Data

II. Cora Kelly Master Plan and Technical Data

Introduction

Cora Kelly School for Math, Science, and Technology

Cora Kelly Elementary School was built in 1955 on an undersized 4.5-acre lot and has not built any addition addressing changes in student population or curriculum guidelines. It is located west of Commonwealth Avenue, south of Four Mile Run Stream, surrounded by a variety of housing densities and commercial sites. The school is dedicated to preparing its students for the 21st century through science, technology, engineering, and math (STEM). The site is bound by an RPA (resource protection area) line along the west and northwest of the site which limits both scale and location for future growth.

Critical Findings

Given the projected student capacity, the current site would exhibit a strain on on-site access for parking and drop-off, the shared recreation center gym would be over-utilized due to an increase in student population, and less open green space would be available. The master plan study provides possible scenarios in either relocating the school and site access which creates a stronger dialogue with the creek and Four Mile Run Park, which reinforces the academic nature of Cora Kelly (a STEM school), and establishing a clearer adjacency of recreational programs for the public. Other master plan studies explore the possible scenarios of replacing the school in place and sharing resources with the existing recreation center and public open space.

The Limits and Benefits of a Feasibility Study

Although a TSSA and a Masterplan Study provides a plethora of information with respect to cost, time, and quantity, the TSSA and Masterplan do not offer, nor does it try to offer, a level of specificity that can be used as a solution or design. The benefits of a TSSA and Feasibility Study can be found both in its objective assessment of current conditions, and conceptual rigor of conveying the possible approaches to current challenges.

Issues that Require Future Study

The RPA boundary is critical in understanding the limits and possibilities of future growth, whether it is an addition or replacement and reorientation of the school. Currently, zoning does not allow any new construction other than passive recreation on the RPA boundary. If Cora Kelly experiences a substantial growth of student capacity, the current site configuration will experience severe limitations with accommodating new addition while maintaining public open space.

Educational Specification Assessment

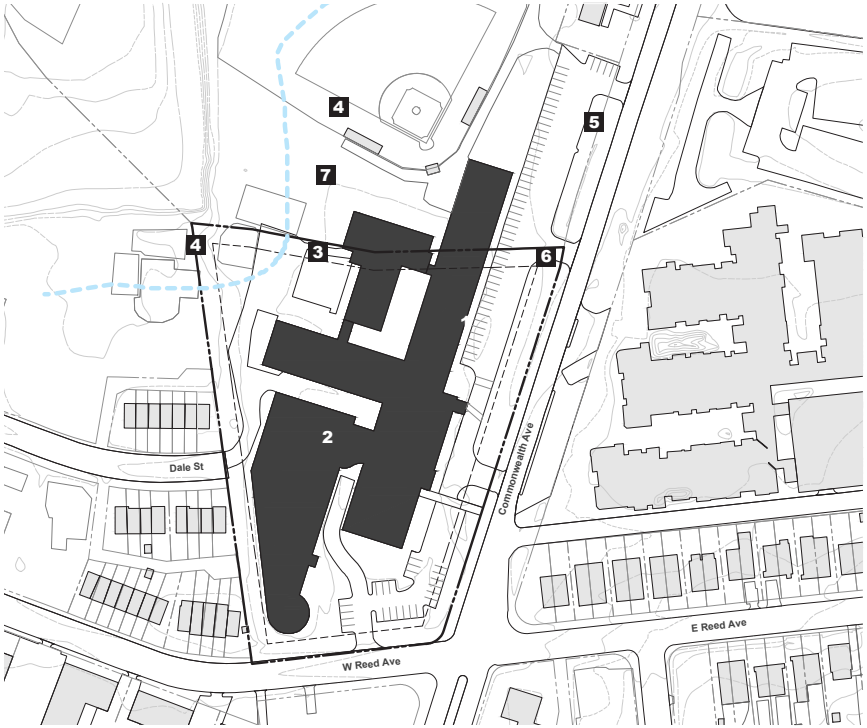
Capacity and Program

Cora Kelly is currently 76,840 gross square feet. Per the Ed Specs, the school is **28,102 square feet deficient** in gross building area without a new gymnasium and **37,624 square feet deficient** in gross building area with a new gymnasium. The school is **54,670 square feet deficient** in the outdoor play space area. Cora Kelly's projected enrollment capacity is **720 students**, with an enrollment of 379 students.

Cora Kelly contains a STEM Program, Head Start Program, and Citywide ED Program which was also included in the assessment.

Site Plan

1. Existing renovated school
2. Existing rec center limits siting of new construction or renovation.
3. Limited exterior play space.
4. Encroachment into POS.
5. Existing car drop-off
6. 72 Existing parking space.
7. RPA Line



II. Cora Kelly Master Plan and Technical Data

Site Assessments

Zoning and Site Utilization

Cora Kelly School for Math, Science, and Technology is located on 3600 Commonwealth Ave in an RB (Townhouse) zoning district. The current lot is 197,673 square feet and the school currently shares the lot with the Leonard Armstrong Recreation Center. Cora Kelly encroaches over the property line into the public open space (POS).

Map and Zoning Information

Address	3600 Commonwealth Ave	
Tax Map	15.02	7.04
Zoning	RB	POS
Lot Size	197,673	1,953,958
Current SF	69,516	
FAR	0.75	
Allowed SF	148,255	
Setbacks	Front- 20'	
	Side- 25', 1:1 ratio	
	Rear- 25', 1:1 ratio	
Max Height	45'	
Parking	~36 reqd, ~72 exst	

Notes:

Existing school and modular classrooms encroach on POS parcel.
Far is maxed out for RB parcel only, School used POS lot to build modular classroom addition in 2010

Site Access and Circulation

Table 9 provides a summary of the existing and future demands for Cora Kelly. The planned increase in student population will increase the number of buses serving the site, parking demand, and the maximum dismissal queue length. This assumes that each category of demand will increase linearly by approximately 91% to 106%, due to the 91% to 106% increase in student population.

Table 9
Cora Kelly

	Population/Demand	
	Existing	Future
Students	379 students	650-700 students
Buses Serving Demand	3 buses	5-6 buses
Parking Demand	59 spaces	114-123 spaces
Maximum Dismissal Queue	16 vehicles	31-33 vehicles

Play and Open Space

In addition to the state requirements, Alexandria's new Green Building Policy requires that the existing and future stormwater demands for Cora Kelly and George Mason are 100% treated by green infrastructure practices.

To achieve 100% treatment of stormwater and meet BMP requirements, it is recommended to divide the site into multiple drainage areas. A combination of rain gardens, stone base, and under basins below permeable turf fields, over 50% green roof, and permeable parking spaces would achieve a phosphorous removal over the required 2.81 lb/yr.

All play areas should be protected from vehicular and pedestrian traffic, so students can be assured of a safe and secure environment on the entire school site. The Virginia Department of Education Facilities Guidelines recommends that each school "site have areas that can be developed to provide the minimum number of play areas require for physical education;" as indicated by the chart on **Table 11**.

Alexandria school sites are urban in nature and most current and future sites cannot accommodate the recommendations outlined in the Guidelines for School Facilities in Virginia's Public Schools. However, every elementary school site should accommodate non-structured or natural play-areas as well as at least one playground. It is recommended that architects work with ACPS and RPCA to prioritize types of outdoor space development on a site-specific basis.

The Ed. Specs recommend approximately 73,400 - 83,640 square feet (sf) of play area for a 600-student population. Cora Kelly is heavily deficient due to its site constraints of being bound to the recreation center and the baseball fields in the public open space. Cora Kelly currently has 28,970 sf of play space, which is **54,670 sf deficient** of the recommend play space area.

II. Cora Kelly Master Plan and Technical Data

Table 11
Playspace Size and Quantity

SPACE	QUANTITY
Multiuse (Hard Surface)*	(2) 100' x 120'
Fitness Development Fenced Equipment Area (PK-1)	(1) 100' x 120'
Fitness Development Fenced Equipment Area (2-5)	(1) 100' x 120'
Multiuse Field Play Area	(2) 180' x 140'

*A gymnasium may substitute for one multiuse (hard surface) play area
**Ed Specs are for a school population of 600+

Building Assessment

Safety and Security

ACPS maintains an inviting and de-institutionalized environment, while simultaneously providing a safe environment for students, staff, and community who use the facility and adjacent support services. Studio 27 Architecture evaluated the safety and security of each school in 6 categories: Building Layout, Building Materials, Uses of Technology, Visitor Management, Vehicular and Pedestrian Traffic, and Other Site Concerns.

The categories of largest concern for Cora Kelly Elementary are Building Layout, Building Materials, and Visitor Management. Interior circulation paths are long and illogical, with poor sightlines along corridors and from staff spaces for passive surveillance. Interior finishes were adequate when installed but are now in poor condition. There is a lack of a secured entry vestibule and security desk with clear sightlines of the approach to the school.

Envelope

Cora Kelly and George Mason Elementary schools are housed in aging facilities and will require a substantial renovation or upgrade to meet LEED and Net Zero standards. Studio 27 Architecture interviewed school leaders and visited both schools to assess the current conditions of the building envelopes and evaluate the impact of the observed envelope issues.

The largest concern for Cora Kelly is the continued maintenance of the masonry, EIFS system, entrances, and envelope penetrations. There is visible masonry cracking at multiple locations and damage to the EIFS system. Exterior grilles are in poor condition and stains on the brick below window sills. Water appears to pool where the play surface meets the exterior brick. Most entrance doors are in poor condition with visible rust and large undercuts allowing unwanted thermal transfer between the interior and exterior.

Due to the sprawling nature of Cora Kelly's plan, the envelope is much larger in surface area than it needs to be for a new school with the same interior square footage. This larger form factor has a big impact on energy use and consequently higher operations costs.

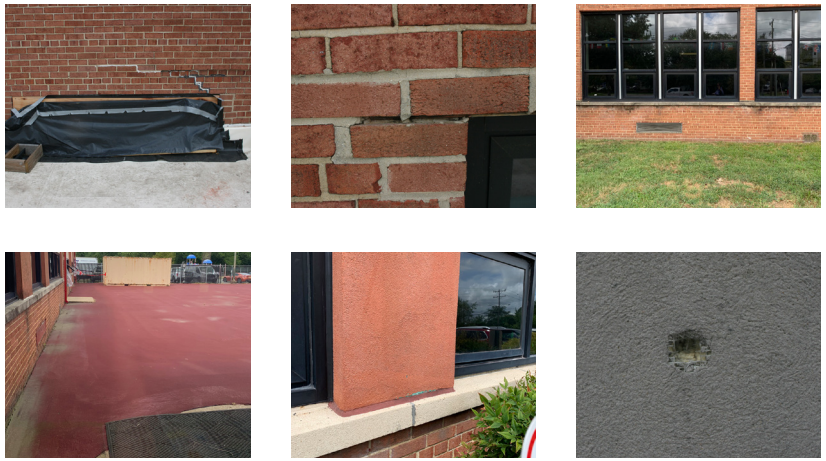
Accessibility

ACPS has made it a strong priority to make its facilities accessible to all students and staff. Universal Design is one of ACPS's 10 driving design principles, established in the 2015 Educational Specifications. Universal Design is the design of buildings and environments to make them accessible to all people, regardless of age, disability, or other factors.

Since 2012, accessibility in schools has been the law. Title II of the Americans with Disabilities Act prohibits disability discrimination by all public entities, including schools, at the local and state level.

The highest priority item of concern for Cora Kelly Elementary School is that the school does not have an elevator. The second story of the building contains areas of primary function to the school curriculum that students in wheelchairs can not access. Many plumbing fixtures and facilities at Cora Kelly are not ADA accessible. This includes water fountains in the corridors, sinks in classrooms, and bathrooms in classrooms. The majority of the library is not accessible because of the sunken 'pit' design of the central area.

Existing Envelope Condition



II. Cora Kelly Master Plan and Technical Data

Technical Information

Traffic Study

This memorandum presents the findings of an operational review of the existing Cora Kelly School for Math, Science, and Technology located at 3600 Commonwealth Avenue in Alexandria, Virginia. The purpose of this memorandum is to review site circulation, student arrival and dismissal, and parking at this location to help plan for future improvements.

At the time when Gorove/Slade, our certified traffic engineering firm observed conditions at the existing location, the Cora Kelly School served a total of 340 students. The site includes a 70-space surface parking lot with an additional 30 spaces across from the school on the east side of Commonwealth Avenue. The school is planned to increase its student population to include approximately 650 to 700 students in the future. Potential changes to arrival/dismissal operations and parking on the site are currently being evaluated. Figure 1 provides a map showing an overview of the Cora Kelly School site.

This memorandum reaches the following conclusions:

- Based on observations, the existing Cora Kelly school does not have any significant parking or queuing issues during arrival and dismissal. This is mainly because most of these activities take place in the on-site parking lot and the north end of Commonwealth Avenue is a dead end and does not have high non-school traffic volumes. Currently, parent/guardian pick-up/drop-off is assisted by school staff/teachers.
- Parent/guardian pick-up/drop-off activity does occur external to the on-site lot, along both sides of Dale Street and Reed Avenue, the cul-de-sac on the north end of Commonwealth Avenue, and the Four Mile Run Trail. No significant queuing issues were observed on the adjacent streets due to this.

Site Operations

Regular school hours for the Cora Kelly School are from 8:00 AM to 2:35 PM. Gorove/Slade performed arrival/dismissal site observations on Tuesday, November 19, 2019, from 7:15 AM to 8:15 AM and on Thursday, November 21, 2019, from 2:15 PM to 3:15 PM. Based on these observations, the arrival and dismissal operations are summarized in Figure 2 and Figure 3.

Arrival Operations

Bus

There are three (3) buses that serve the school and the existing bus area can accommodate the demand with no queuing issues during arrival. Bus arrivals begin at approximately 7:30 AM. Buses enter from the designated bus entrance on Commonwealth Avenue and drop off students in the unloading area in front of the lobby entrance. The second and third buses arrive in 5 to 10-minute intervals after the first, dropping off students in the same location. Parents/guardians that arrive after all buses have departed use the bus area to drop off their student(s) closest to the front door of the school.

Parent/Guardian Drop-off

Parent/guardian drop-off operations occur between 7:30 AM and 8:15 AM. The designated area for parent/guardian drop-off is located in the on-site parking lot. Vehicles enter the drop-off area using the signed entrance on Commonwealth Avenue. As vehicles arrive, school staff/teachers are present to supervise and assist with the drop-off. The maximum peak vehicle queue was observed at approximately 7:40 AM and consisted of five (5) vehicles. This queue was contained within the on-site parking lot and did not extend onto Commonwealth Avenue. Once students exit each vehicle, the vehicle departs the area allowing the following vehicles to drop-off. Vehicles exit the parking lot using a driveway shared by buses entering the site, as shown in Figure 2. Additional drop-off activity occurs along Dale Street, Reed Avenue, and the adjacent recreation center parking lot. At these locations, parents/guardians opt to park and walk in their student(s). Overall, arrival operations are effective with no significant queuing issues.

Student Bike/Walk

In addition to bus and parent/guardian drop-off, there are several students that bike and walk to the Cora Kelly School. Starting from 7:25 AM, a crossing guard is stationed at the intersection of Reed Avenue and Commonwealth Avenue to assist with students that are crossing. Students begin arriving at approximately 7:30 AM. Most students arrive via Reed Avenue, from the east and west, and the Four Mile Run Trail, from the north, and enter the school through the cafeteria entrance on the south end of the school.

Dismissal Operations

Bus

Three (3) buses queue in the bus loading area by approximately 2:20 PM to wait for student dismissal at 2:35 PM. Once dismissed, students exit the school from the front entrance and load onto their respective buses. Parents/guardians that arrive after all buses have departed use the bus area to pick-up their student(s) closest to the front door of the school.

Parent/Guardian Pick-up:

Paarent/guardian drop-off operations occur between 2:20 PM and 3:10 PM. The

II. Cora Kelly Master Plan and Technical Data

designated area for parent/guardian pick-up is also located in the on-site parking lot. Vehicles enter the drop-off area using the signed entrance on Commonwealth Avenue. Because vehicles arrive before students are dismissed at 2:35 PM, the maximum peak queue length occurs at approximately 2:30 PM and was observed to consist of 16 vehicles. This queue did extend onto Commonwealth Avenue. However, since the north end of Commonwealth Avenue is effectively a dead end, the queue minimally impedes non-school traffic. Once students are dismissed, school staff/teachers are present to supervise pick-up and match students to the vehicles. Once students enter their vehicle, the vehicle departs the area allowing the following vehicles to enter the pick-up area. Vehicles exit the parking lot using a driveway shared by buses entering the site, as shown in Figure 3. Overall, dismissal operations are effective with no significant queuing issues.

Because the maximum queue for the designated pick-up area extends onto Commonwealth Avenue, pick-up activity was observed to occur in several other locations. Heavy pick-up activity occurs along Dale Street, Reed Avenue, and the south side of Commonwealth Avenue. Some activity was observed to occur along the Four Mile Run Trail but was minimal. To prevent parents/guardians from parking in the recreation center parking lot adjacent to the school, this area is closed to all traffic during dismissal.

Student Bike/Walk

Similar to arrival, there are several students that bike and walk from the Cora Kelly School. A crossing guard is stationed at the intersection of Reed Avenue and Commonwealth Avenue to assist with students that are crossing. Students exit the school through the cafeteria entrance that they enter through in the morning. Most students exit toward Reed Avenue, to the east and west, and the Four Mile Run Trail, to the north.

Parking

The Cora Kelly School provides a total of 100 parking spaces. There is a 70-space surface parking lot located on the site. Additional off-street staff-only parking is provided across from the school on the east side of Commonwealth Avenue. Parking activities in these locations are primarily designated for staff-only throughout the day.

The 30 staff-only parking spaces on tthe east side of Commonwealth Avenue are typically occupied first, most likely due to their proximity to the school's front entrance. These spaces are mostly full by approximately 7:15 AM before students arrive. Because these spaces are nearly or full before students arrive, the parent/guardian drop-off and vehicle queue in the parking lot may block empty parking spaces in the parking lot adjacent to the school. Both staff parking locations remain mostly full throughout the day and during the dismissal period. Similar to the student arrival period, some occupied parking spaces are blocked by the parent/guardian pick-up vehicle queue.

Expected Future Demand

The planned increase in student population will increase the number of buses serving the site, parking demand, and the maximum dismissal queue length. This memorandum assumes that each category of demand will increase linearly by approximately 91% to 106%, due to the 91% to 106% increase in student population. Table 1 provides a summary of the existing and future demands for the Cora Kelly School. The future parking demand projection is based on linear growth and maybe lower, either through having fewer than the planned number of students or through additional Transportation Demand Management (TDM) programs and policies. Thus, they represent the worst-case projections of demand.

- Buses Serving Demand

  There is capacity within the existing bus area on the site to accommodate the increased bus demand.

- Parking Supply and Demand

  The increased parking demand; cannot be accommodated within the existing 100-space parking supply on-site and on Commonwealth Avenue. If additional parking cannot be added on-site, there is an opportunity for additional parking along Commonwealth Avenue.

- Maximum Dismissal Queue

  The increased dismissal queuing demand; can be accommodated within the existing pick-up/drop-off area. While the existing queue extends outside of the designated area onto Commonwealth Avenue, the projected increase in the queue will not extend past Reed Avenue or impede non-school traffic.

Table 1
Summary of Demand

	Population/Demand	
	Existing	Future
Students	379 students	650-700 students
Buses Serving Demand	3 buses	5-6 buses
Parking Demand	59 spaces	114-123 spaces
Maximum Dismissal Queue	16 vehicles	31-33 vehicles

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Conclusions

The goal of arrival/dismissal operations is to minimize impacts the site may have on the surrounding areas. This memorandum concludes that the arrival and dismissal operations observed and outlined above are adequate for the needs on the site and can be conducted efficiently and effectively with minimal impacts on nearby streets. The planned increase in student population and potential site improvements present opportunities to better meet the demands of the site. Based on the projections outlined above, this memorandum recommends providing a bus loading/unloading area that can accommodate up to six (6) buses, up to 123 parking spaces, and up to 33 queued pick-up vehicles during dismissal to meet the anticipated demand. Several changes can be made to better accommodate these projected demands, specifically adjustments to; (1) the size and location of the bus area, (2) the amount of available parking, and (3) the size and location of the designated pick-up/drop-off area.

As previously outlined, staff parking is located on-site and across the street on Commonwealth Avenue. If the parking on Commonwealth Avenue is removed in the future, there would most likely be overflow onto the nearby streets, which are generally occupied by the residents without driveways, unless those parking spaces are added elsewhere on the site. If spaces cannot be added, there is potential to increase the parking supply on Commonwealth Avenue to meet the demand. If the long dismissal queue length on Commonwealth Avenue is a concern, the designated pick-up/drop-off area can be expanded, and/or the queue could instead extend north on Commonwealth Avenue rather than south toward Reed Avenue.

Figure 2
Existing Site Overview

December 12, 2019

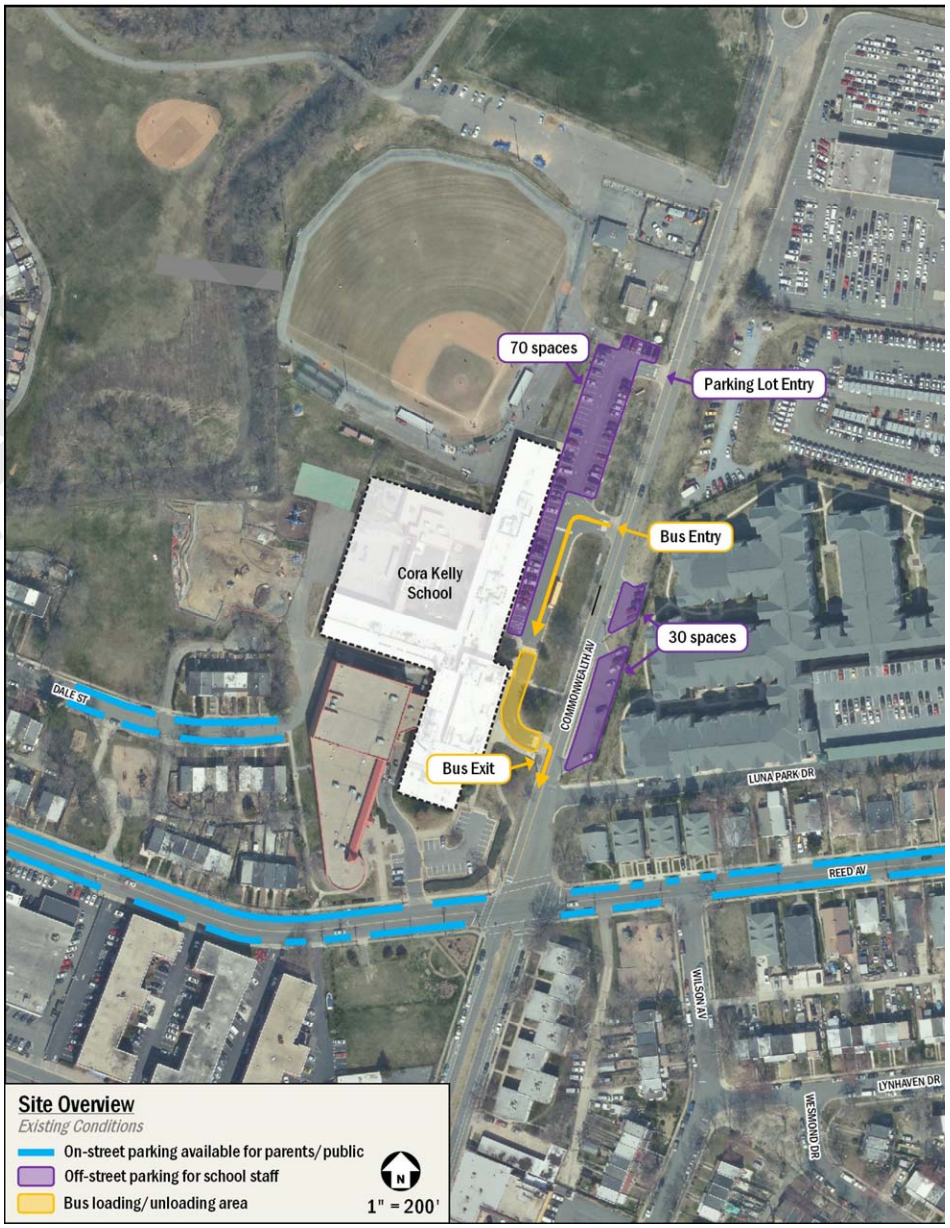
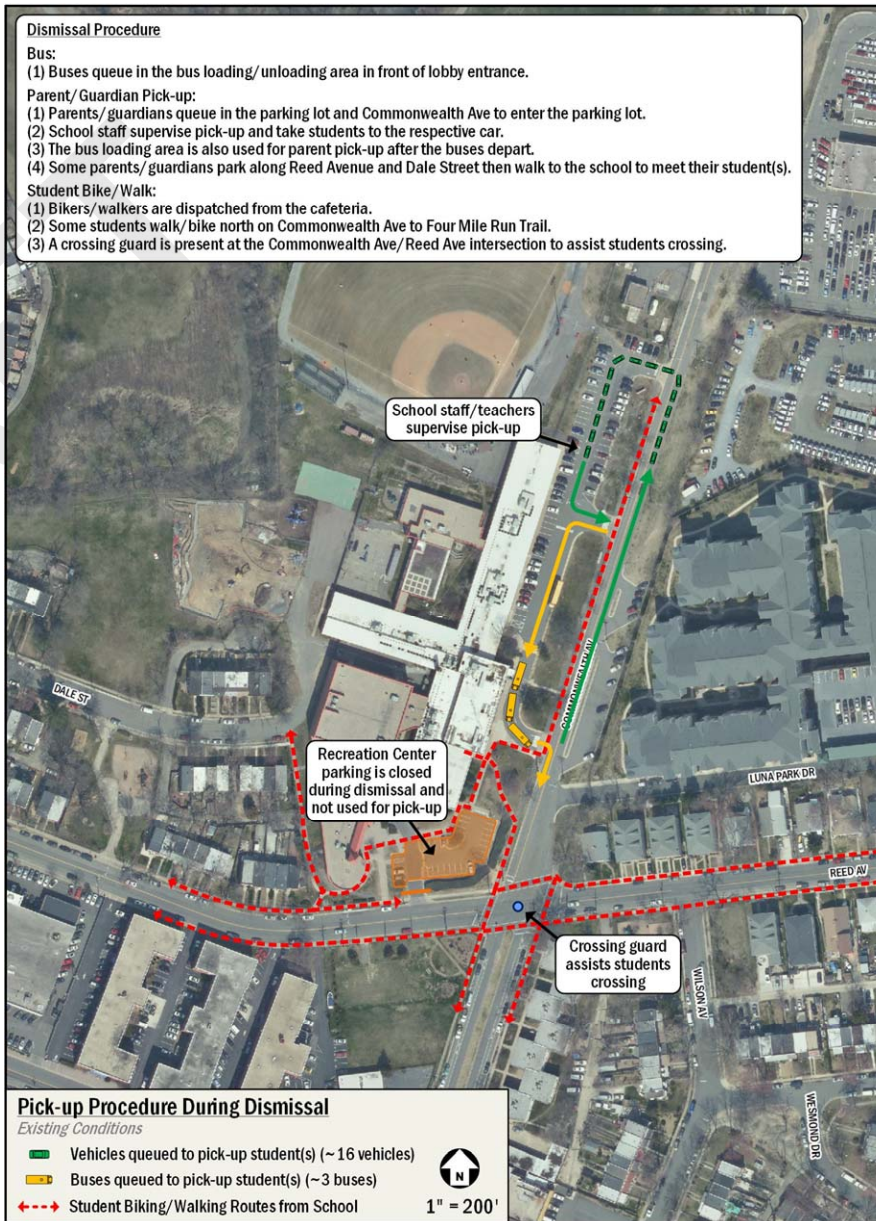


Figure 3
Existing Drop-off Procedure Driving Arrival

December 12, 2019

Figure 4
Existing Pick-up Procedure During Dismissal

December 12, 2019



II. Cora Kelly Master Plan and Technical Data

Technical Information

Building Assessment Data

Structural Assessment

Structural Introduction

The purpose of this technical site assessment is to review the existing building structures and to provide structural input on possible renovation or replacement solutions to meet the growing capacity needs of the Alexandria City Public School system. Our evaluation included visits to each site to observe the existing building. Existing structural drawings were not available for our use at either school. Visual observation was performed to determine the type of construction and basic building components. The surveys included the entire roof and perimeter of the buildings. For the interiors, ceiling tiles were removed in select locations to allow for structural observation. No other finishes were removed and in many areas hard ceilings, equipment and furnishing limited our review to structural elements that were exposed to view.

Cora Kelly Elementary School

The existing school was constructed in 1955 and two additions have been built in the years since. In 1991, a community center and gymnasium were added on the south-west corner of the site. The gymnasium is shared between the community center and the school and may not be included in future renovations. The gymnasium is connected to the school building through a hallway and the music room. In 1996 a classroom addition was constructed on the north-west portion of the site between the original classroom wings enclosing an interior courtyard. The original building is mainly a one-story structure, with a second floor over the main entrances, offices, and library. The gymnasium and classroom additions are one-story structures.

Existing Structural Systems

The original building roof system typically uses open web steel joists with bulb tee purlins supporting gypsum sheathing. Often with this type of construction, a shallow layer of gypsum topping is poured on the sheathing, but this could not be verified as it was hidden by the roofing. The additions typically use open web steel joists with metal decking for the roof structure. A portion of the classroom addition has an extensive green roof system with a growing medium depth of approximately six inches. The structure supporting the green roof was hidden from view but would need to be more robust compared to the typical roof system we observed. The roof structure is typically flat, or shallowly sloped for drainage. Mechanical units are supported on the roof with steel dunnage or curbs above the roof structure. There is a recessed mechanical well above the hallway of the west classroom wing. A steel-framed roof-mounted screen wall shields the mechanical equipment zone on the classroom addition. There is a steel-framed canopy structure over the main entrance to the building that is not original to the building. It was likely added concurrently with one of the building additions. The second-floor construction was not verified due to a lack of access. Typically, the ground floors are concrete grade slabs. The vertical support for the floors and roof is a combination of structural steel beams, columns, and load-bearing masonry walls. The building is likely supported on shallow spread footings which are commonly used for buildings of this type. The original 1955 building has multi-wythe masonry perimeter bearing walls with punched window openings. The perimeter walls of the classroom addition have a masonry base, and exterior insulation and finish system (EIFS) above. The classroom wings of the original building appear to have been modified to match the classrooms of the 1996 addition. The original brick was removed from the roof down to the same height as the masonry base on the addition walls. The upper portion of the walls was infilled with an EIFS system with windows incorporated into it.

Existing Conditions Assessment

A site visit was performed on August 26th, 2019 by Lee Ressler, PE. Generally, the existing building complex is in good structural condition with no significant structural deterioration or deficiencies observed. The existing roofing was being replaced on portions of the building while we were on-site, and the remaining areas of the roofing had been recently replaced.

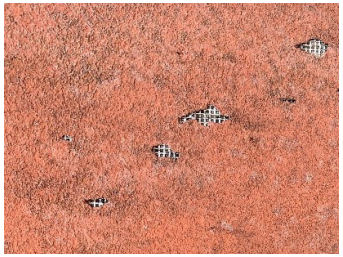


Photo #1
Typical EIFS Deterioration

Photo #2
Typical EIFS Deterioration Bearing

Photo #3
Typical Brick Crack & Repairs

Photo #4
Typical Brick Crack Repairs

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The EIFS exterior wall system has deteriorated and generally is in poor condition. In many locations, the exterior stucco finish has cracked and spalled, exposing the reinforcing mesh (see photos #1 and #2).

Around the exterior perimeter of the original building, there were a few cracks observed in the brick masonry. Many of these cracks were around openings and appeared to be related to thermal movement, restraint cracking, and rust jacking of the lintels (see photos #3 thru #5). In select locations, repairs have been made previously to damaged areas of brick. These repairs included repointing of the mortar joints and replacement of damaged brick (see photos #3 and #5).

At the front entrance of the building, the steel-framed canopy is bearing on a multi-wythe masonry brick wall with decorative punched openings. The canopy beam is bearing directly above one of these openings and brick is beginning to deteriorate (see photo #6).

Summary

Generally, the structure of the building is in good working condition with only minor deficiencies observed. The building envelope and exterior wall system have age-related deterioration and these issues will continue to progress and require periodic maintenance. The gypsum roof system used in the original building construction is susceptible to degradation if exposed to water. Water damage to the roof was not observed in the survey, but it is possible that this type of damage has occurred and is hidden from view. To identify and locate damage of this type the roofing would need to be removed and the gypsum deck inspected.

MEP Assessment

Current Code and Standard Compliance:

2015 Virginia Statewide Building Code (VUSBC)

2015 International Building Code (IBC) with Virginia Amendments

2015 International Mechanical Code (IMC) with Virginia Amendments

2015 International Plumbing Code (IPC) with Virginia Amendments

2015 Virginia Statewide Fire Prevention Code NFPA 90A

2014 National Electric Code / NFPA 70

2015 International Fuel Gas Code (IFGC) with Virginia Amendments

2015 International Energy Conservation Code (IECC) (or ASHRAE equivalent)

ASHRAE 90.1-2010

ASHRAE 55-2013

2005 SMACNA HVAC Duct Construction Standards - Metal and Flexible

Existing Facility Mechanical

Overview

The majority of the existing building is served by rooftop-mounted VAV air handling units that were manufactured in 2000. Some rooftop units were indicated to have been manufactured in 2012. RTUs are gas-fired and DX cooled. In a replacement scenario, it is not recommended to repurpose any of these units.

Building air is exhausted with roof-mounted exhaust ventilators. The ventilators are in fair to poor condition. It is recommended to plan on replacement of roof exhaust ventilators.

All existing units, associated ductwork, controls, and air devices in areas to be renovated shall be removed. Existing terminal equipment, such as unit heaters, VAVs, etc. shall be removed. It is not anticipated that any existing mechanical infrastructure in renovated areas will be utilized for future use.

Demolition of existing equipment shall be performed in a phased manner as required by overall project phasing.

Photo #5
Typical Brick Deterioration & Repair

Photo #6
Brick Deterioration at Canopy Bearing

II. Cora Kelly Master Plan and Technical Data

Scope of Work

New Facility Mechanical

If it is determined that the existing building will be demolished or be required to have a major renovation, see the following recommendations for new system design.

Replacement Design Conditions

The design criteria listed below shall be used for conceptual HVAC design, payback evaluation, and heating/cooling load calculations.

Site Data:

Building Location: Alexandria, VA
Physical Address: 3600 Commonwealth Ave
Square Footage of Renovated Area: See Architectural sq. ft.
Main Building Total Area: See Architectural sq. ft.
Latitude: 38.84 / Longitude: -77.055, Elevation: 20 feet
Building Orientation: Main entrance faces East/Southeast
ASHRAE 90.1 Climate Zone: 4A

Outdoor Design Conditions

Based on ASHRAE 2017 Handbook - Fundamentals for Ronald Reagan Washington Natl, VA, USA

Heating - ASHRAE 99.6% Peak Design Condition: 17.9 deg F DB
Cooling - ASHRAE 0.4% Peak Design Condition: 94.7 deg F DB / 75.5 deg F MCWB

Indoor Design Conditions

Equipment shall be sized and designed to maintain the following setpoints within a 2-degree deadband. The maximum class size is assumed to be 24 students and one teacher.

Existing Facility Mechanical

The facility is anticipated to be occupied Monday through Friday, 7 am-5 pm and Saturday/Sunday based on a special event scheduling only. The building will not be utilized year-round. The administration area (out of scope) is the only area that was stated to have year-round occupancy. Detailed occupancy and loading schedules shall be provided as part of future space by space analysis.

Classrooms / Support Spaces:

Heating Season:	Occupied Mode:	70 deg F DB / no humidity control
	Vacant Mode:	68 deg F DB
	Unoccupied Mode:	60 deg F DB
Cooling Season:	Occupied Mode:	75 deg F DB / 40-60% RH
	Vacant Mode:	78 deg F DB
	Unoccupied Mode:	85 deg F DB

Toilet Rooms / Group Restrooms: Ventilated/Exhausted

Cafeteria:

Heating Season:	Occupied Mode:	70 deg F DB / no humidity control
	Vacant Mode:	68 deg F DB
	Unoccupied Mode:	60 deg F DB
Cooling Season:	Occupied Mode:	78 deg F DB / 40-60% RH
	Vacant Mode:	82 deg F DB
	Unoccupied Mode:	85 deg F DB

System Options

System modeling and selection will be determined during the design phase. For budgeting purposes, two probable system options are as follows:

Option 1 - Geothermal Heat Pumps with DOAS

This option has been explored by CMTA due to energy performance and overall system simplicity as it relates to controls and operation.

The HVAC system for this option consists of unitary geothermal heat pumps for zone thermal comfort control and dedicated outdoor air handling units (DOAS) with fixed-plate energy recovery for delivery of code required outside air. The ventilation (outside) air is de-coupled from the HVAC heating and cooling with each space (or zone) receiving outside air separately utilizing demand control ventilation.

Each heat pump will be a high efficiency, variable speed compressor heat pump unit (below 5 tons) with an ECM fan motor. Units can be horizontally hung and installed in the plenum space above the ceiling or floor mounted in closets outside of the classroom. Each heat pump unit will utilize refrigerant R-410A and will have an

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ozone-depleting potential (ODP) of 0.05 or less.

Each classroom zone is anticipated to have its heat pump and space temperature sensor, one per room or shared (1 per two adjacent classrooms – TBD). The unit will operate by maintaining the temperature of the space based on the adjustable space temperature setpoint. Each space temperature sensor shall have a push-button override for a 2-hour (adjustable) override to the occupied mode of operation.

Each office and corridor zone is anticipated to have a shared heat pump with VAV diffusers to allow thermal comfort control in each office. The unit will operate with a static pressure reset controlling the ECM fan motor. Each space temperature sensor shall have a push-button override for a 2-hour (adjustable) override to the occupied mode of operation.

The Cafeteria will each have a new single-zone VAV geothermal water-cooled packaged RTU installed. The unit will operate by maintaining the temperature of the space, based on averaging multiple space temperature sensors. Each space temperature sensor shall have a push-button override for a 2-hour (adjustable) override to the occupied mode of operation.

Where demand control ventilation is applied, spaces will include a CO2 sampling/ measuring port and occupancy sensors. The thermostat (and associated sensors), CO2, and occupancy sensors are to interface to the building automation system. The CO2 measuring port and occupancy sensor inputs will be utilized to control the space ventilation terminal unit and space temperature setpoints.

All heat pump units shall have a fully ducted supply and return with sheet metal ductwork. Each heat pump unit will include a duct-mounted pre-filter rack. The pre-filters shall be 24”x24” Flanders/FFI PrePleat 40. Each heat pump shall include an integral disconnect switch. Condensate for each unit will be disposed of through a floor drain or open receptacle into the sanitary system.

Approximate sizes are as follows:

- Classrooms - The heat pump unit zones serving classrooms will utilize units sized between 2-6 tons, depending on classroom size and location within the building.
- Corridors - The heat pump unit zones serving corridors will utilize units sized at approximately 2 tons.
- Offices - The heat pump unit zones serving offices will utilize units sized at
- Approximately 2 -3 tons, depending on office zone size and location within the building.
- Cafeteria – The water-cooled packaged RTU will be sized for approximately 25-tons The DOAS unit shall provide ventilation air as described in Option 2. However, it shall be configured as a water-cooled unit with listed manufacturers as Trane, Valent, or Carrier or other approved equal.

Geothermal Well Field and Piping System

The well field geothermal system pumping system shall consist of two variable flow pumps (one operational – one 100% standby) for pumping the water to all heat pumps and geo AHU’s/RTU’s throughout the building. The pumps shall be located in the Mechanical Room and circulate water throughout the well field.

Option 2 - 4-Pipe Fan Coil Units and Dedicated Outdoor Air System (DOAS)

The HVAC system for this option shall utilize 4-pipe fan coil units for zone thermal comfort control and outside air handling units with fixed-plate energy recovery for delivery of code required outside air. A central air-cooled chiller, pumping system, and chilled water piping network will be utilized to circulate chilled water to each unit. Chiller shall be equal to Trane Stealth, tonnage to be determined. Chiller contains two refrigerant circuits. The boilers shall be gas-fired, high-efficiency condensing style boilers to reduce energy consumption. Boilers shall be equal to Viessmann Vitocrossal 300, 3,000 MBH, 2 each.

The ventilation (outside) air is de-coupled from the HVAC heating and cooling with each space (or zone) receiving outside air separately utilizing demand control ventilation.

Each fan coil unit will be equipped with an ECM fan motor, 1” disposable MERV 8 filter, hydronic heating and cooling coil, piping package with two-way modulating control valve, strainer, balance valve, and isolation valves. Units can be configured horizontally (hung and installed in the plenum space above the ceiling) or vertically (floor-mounted in the space). The unit controller shall either be provided by Temperature Controls Contractor and field installed or provided by Unit Manufacturer and factory-installed.

Hydronic (chilled water and heating hot water) piping and insulation shall be as follows:

- 2” and smaller: Type L drawn-copper tubing with brazed or pressure-seal (Propress) joints and wrought, cast copper fittings, brazed or pressure-seal. Mineral fiber preformed pipe insulation with all service jacket for indoor, concealed piping.
- 2 ½” and larger: Carbon steel, Schedule 40, with wrought-steel fittings and wrought-cast or forged-steel flanges and flange fittings, welded and flanged joints. Mechanical grooved couplings may be considered as a bid alternate. Mineral fiber preformed pipe insulation with all service jacket for indoor, concealed piping. Outdoor exposed piping shall have astucco embossed aluminum jacket.

Each classroom zone is anticipated to have it’s unit and space temperature sensor, one per room. The unit will operate by maintaining the temperature of the space based on the adjustable space temperature setpoint. Each space temperature sensor shall have a push-button override for a 2-hour (adjustable) override to the occupied mode of operation.

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Each office zone is anticipated to have a shared unit with VAV diffusers to allow thermal comfort control in each office or a dedicated unit. The unit will operate with a static pressure reset controlling the ECM fan motor for variable flow with shared units. Each space temperature sensor shall have a push-button override for a 2-hour (adjustable) override to the occupied mode of operation.

The Cafeteria will be served by a single-zone VAV Air Handling Unit, 4-pipe. The unit will operate by maintaining the temperature of the space-based on averaging multiple space temperature sensors. Each space temperature sensor shall have a push-button override for a 2-hour (adjustable) override to the occupied mode of operation.

IT Rooms shall be served by air-cooled DX split systems, approximately 1 to 1.5 tons each.
Where demand control ventilation is applied, spaces will include a CO2 sampling/ measuring port and occupancy sensors. The thermostat (and associated temperature sensors), CO2, and occupancy sensors are to interface to the building automation system. The CO2 measuring port and occupancy sensor inputs will be utilized to control the space ventilation terminal unit and space temperature setpoints.

All fan coil units mounted above the ceiling shall have a fully ducted supply and return with sheet metal ductwork. Each unit shall include an integral disconnect switch. Condensate for each unit will be gravity drained where possible.

Approximate sizes are as follows:

- Classrooms - The zones serving classrooms will utilize units sized between 2-6 tons, depending on classroom size and location within the building.
- Corridors - The zones serving corridors will utilize units sized at approximately 2 tons.
- Offices - The zones serving offices will utilize units sized at approximately 2 -3 tons, depending on office zone size and location within the building.
- Cafeteria – The RTU will be sized for approximately 25-tons.

Ventilation Systems (DOAS)

The DOAS unit shall provide ventilation air as described in Option 2. However, it shall be configured as a water-cooled unit with listed manufacturers like Trane, Valent, Carrier, or other approved equal.
The outside air systems for the building shall be de-coupled from the conditioning systems. In general, outside air shall be provided directly to the occupied zone. The dedicated outside air handling unit will be outdoor, roof-mounted, double-wall construction, and include dual supply/exhaust plenum fans. The units shall be variable volume energy recovery type units utilizing building exhaust and general exhaust air to precondition the outside air through a total energy recovery enthalpic plate. All conditioned outside air ductwork and building exhaust air ductwork will not be insulated – this applies to positive pressure outside air ductwork and negative pressure exhaust air ductwork. All un-conditioned air ducts shall be insulated with 3" thick, ¾ pcf duct wrap with vapor barrier – this applies to negative pressure outside air ductwork and positive pressure exhaust air ductwork.

The DOAS unit shall be a packaged air-cooled, DX cooling, natural gas heat, unit with listed manufacturers like Trane, Valent, Carrier, or other approved equal. The outside air units will consist of the following sections/components: stacked and in the direction of airflow will be an inlet filter, enthalpic plate, plenum type, dual exhaust air fans (each sized at 50% airflow), on the bottom will be an inlet filter, enthalpic plate, access, gas-fired heating section, access, plenum type, dual supply air fans (each sized for 50% airflow), and final filter bank. Each fan bank will be controlled by a VFD for varying airflow conditions. During low ventilation conditions, only one of the fans would be needed to meet the ventilation requirements. The exhaust fan is sized at 20% reduction in capacity (thus maintaining building pressurization). The supply air distribution system will supply outside air to terminal units for distribution of outside air to each zone. The outside air conditioning system will be provided with an air-cooled DX circuit. The resulting winter supply temperature is approximately 70 degrees F and summer supply air temperature shall be approximately 68 degrees F DB/63 degrees F WB.

To control outside air, a central CO2 monitoring system (Aircuity) will be provided to take advantage of building diversity. Each variable occupied area/room will contain a CO2 measuring port with a high quality central CO2 sensor. The VAV terminal will modulate in accordance with the space CO2 measurements. The VAV terminal will also be interlocked with a room occupancy sensor. The ventilation rate will be modulated based on occupied and vacant spaces conditions. The total space by space occupancy count is expected to exceed actual building occupancy. Designing a variable ventilation system based on actual building occupancy reduces the central ventilation system by approximately 30 percent, thus reducing the overall HVAC load.

Building Automation System (BAS) / HVAC Controls

All new packed equipment shall be provided with DDC controllers for integration to BAS. All existing equipment shall be integrated into the new BAS.

The following shall be included as part of the controls scope of work:

- Control or integration of new terminal equipment (fan coil units). Control devices (valves, sensors, etc.) and controller by TCC or equipment manufacturer have not yet been determined.
- IIntegration of new Air Handling Units and DOAS Units. It is anticipated that unit-level controls and the controller will be provided by the unit manufacturer.
- Integration of rooftop HVAC units (gym, etc).
- Integration of HVAC central plant (boilers/chillers)
- Control of hydronic pumps

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- Exhaust fan control for toilet rooms, restrooms, etc.
- Supplemental heater control (unit heaters, cabinet heaters, etc.)
- IT Server / MDF rooms – space temperature monitoring and alarming
- Plumbing –domestic hot water heater temperature monitoring and alarming
- Plumbing –domestic water circulation pump control and monitoring
- Kitchen –makeup air unit monitoring and cooler/freezer temperature monitoring and alarming
- Energy Meters – monitoring and BTU/energy tabulation for primary natural gas and electric consumption

Existing Facility Plumbing

Overview

The existing building plumbing systems, including domestic hot and cold water, sanitary, and vent piping. The existing piping systems in the original building appear to be original to the building.

Natural Gas Service

A metered natural gas service is currently supplied to the building by Washington Gas. The service serves the RTUs and domestic hot water heaters. No documentation was found to indicate the age of the existing piping system. The exterior piping has flaking paint and is beginning to rust on surface and at flanges. Recommend refinish/paint exposed piping if the building is to remain and be renovated.

Plumbing Waste and Vent Piping

Waste and Vent piping that was observed appeared to be original which is 60+ years old and past its rated useful life. Recommend replace all building original piping with new.

Roof Drains and Piping

Roof Drains appear to have been recently replaced and are in fair to good condition. Storm piping that was observed throughout the building appears to be original which is 60+ years old and is past its rated useful life. Recommend replace all building original piping with new

Domestic Water Piping

Domestic water enters the building into a classroom's casework on Commonwealth Ave side of the building. The service size is approximated as 2 1/2". Domestic water piping that was observed appeared to be original which is 60+ years old and past its rated useful life. Recommend replace all building original piping with new. In addition, it is recommended to relocate the service entrance to an area where it can be serviced. A check valve was not observed.

Plumbing Fixtures

Plumbing fixtures appear to be original to the building.

Water closets – White vitreous china; with battery or manual operated flush valve
Urinals – White vitreous china; with battery-operated flush valve
Sinks – Wall-mounted are white vitreous china
Sinks – Wall-mounted gang are solid surface (3) gang; sensor operated
Sinks – Counter mounted are stainless steel.
Electric water fountains in facility are found to wall-mounted and free-standing.

New Facility Plumbing

If it is determined that the existing building will be demolished or be required to have a major renovation, see the following recommendations for new system design.

Plumbing Waste and Vent Piping

- Extra Heavy Hubless Cast Iron pipe and fittings shall be manufactured from gray cast iron and shall conform to ASTM A 888 and CISPI Standard 301. All pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute ® and listed by NSF® International. Hubless Couplings

Figure 1
Fan Coil Units

II. Cora Kelly Master Plan and Technical Data

shall conform to CISPI Standard 310 and be certified by NSF® International. Heavy Duty couplings shall conform to ASTM C 1540 and shall be used. Gaskets shall conform to ASTM C 564. All pipe and fittings to be produced by a single manufacturer and are to be installed in accordance with the manufacturer's recommendations and applicable code requirements. Couplings shall be installed in accordance with the manufacturer's band tightening sequence and torque recommendations. Tighten bands with a properly calibrated torque limiting device. The system shall be hydrostatically tested after installation to 10 ft. of head (4.3 psi maximum).

- Type DWV copper drainage piping with cast bronze drainage pattern fittings with solder joints.
- The sanitary piping will require cleanouts at every pipe direction change and on 75-foot centers. All sanitary and roof drainage piping shall service weight cast iron hub and spigot piping with compression gasket joints. All plumbing vents shall terminate a minimum of 50 feet from any outdoor air intake.

Roof Drains and Piping

The primary roof drainage system shall consist of standard round dome-type drains with cast iron body, flashing clamp, sump receiver, and 15" cast iron locking strainers. The secondary roof drainage system shall consist of overflow scuppers provided on flat roof areas with parapets or roof drains adjacent to the primary drains with standard round dome-type drains, cast iron body, flashing clamp, sump receiver, 15" cast iron locking strainers, and 4" pipe overflow extension.

Domestic Water Piping

The domestic water system for the building shall be served by a NSF 61 compliant water supply with gate service valves and ASSE or CSA compliant reduced pressure zone backflow preventer located in the main mechanical room. A domestic water booster pump is not anticipated to be required.

Domestic water distribution within the building will serve the toilet rooms, janitor closets, classrooms, kitchen, health unit, pantries, drinking fountains, hose bibbs, and non-freeze wall hydrants. Piping shall be NSF 61 compliant type L Hard Copper with lead-free solder and 150 lb, flanged or screwed, gate or ball, bronze valves. Piping insulation shall be a minimum of 1 inch for all hot water and a minimum of 1/2 inch for cold water 4 inches and above.

Domestic Hot Water shall be provided by two (2) hydronic natural gas-fired condensing style boilers, an indirect storage tank, ASME rated thermal expansion tank, in-line circulating pumps, and ASSE 1017 compliant central thermostatic mixing valve. Domestic hot water shall be designed for 140 deg F supply distribution temperature and a 120 deg F return water temperature at peak demand.

Plumbing Fixtures

Plumbing fixtures shall be lead-free, low flow, Water Sense type, and ADA compliant. All water closets, lavatories, sinks, drinking fountains, emergency showers, floor drains, etc. shall be commercial grade.

- Student water closets shall be Water Sense and ADA compliant floor-mounted type with "Capacitive sensor" type handsfree top spud flush valves with a side-mounted operator and a maximum flow rate of 1.28gpf. The power source shall be (4) "C" size battery or self-generating with battery backup.
- Adult water closets shall be Water Sense and ADA compliant wall-mounted type with "Capacitive sensor" type handsfree, top spud flush valves with a side-mounted operator, and a maximum flow rate of 1.28gpf. The power source shall be (4) "C" size battery or self-generating with battery backup.
- Urinals shall be Water Sense and ADA compliant wall-mounted type with "Capacitive sensor" type handsfree, top spud flush valves with a side-mounted operator, and a maximum flow rate of 0.125gpf. The power source shall be (4) "C" size battery or self-generating with battery backup.
- Lavatory faucets shall be Water Sense and ADA compliant "Capacitive sensor" type handsfree

Figure 2
DOAS Unit with Heat Recovery

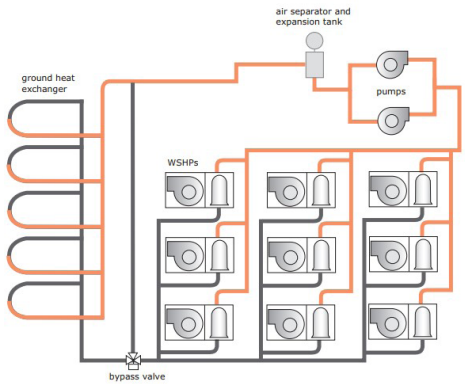

Figure 3
Ground Loop Heat Pumps

Figure 4
Water Source Heat Pump

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faucets with a maximum flow rate of 0.5gpm. The power source shall be battery or self-generating with battery backup. Lavatories shall have an ASSE 1070 compliant manual thermostatic mixing valve w/ lockable box centrally located to control a maximum of 4 lavatories.

- Sinks serving pantries, classrooms, and art areas shall be stainless steel type with a maximum flow rate of 2.5gpm and local sediment interceptors provided as required. Classroom sinks shall have a 5.25” radius gooseneck faucet, less bubbler, centered on the back ledge with lever handles.
- Electric water cooler and drinking fountains shall be bi-level ADA compliant with manually operated bubbler controls. Indoor electric water coolers shall have bottle fillers and filters while the exterior non-chilled drinking fountains shall be non-freeze type units.
- Floor drains shall be provided to serve mechanical equipment, drain discharges, bathrooms, kitchens, and washdown areas. Floor drains shall be of size and type suitable for the application.

Existing Facility Electrical

Electrical Distribution

The facility is served by a 480Y/277 volt, 3-phase,4 wire 1600A electric service. The main electric switchboard is manufactured by GE with a bus rated at 1600A with a 1600A switch. The switchboard is in fair condition. Recommend annual maintenance, infrared scanning as well as completion of a short circuit/coordination/ arc flash hazard study. Surge protection was not observed on the main switchgear or on any of the secondary panel boards. The addition of surge protection is recommended to minimize the effects of electrical transients that may be transmitted on the incoming power lines. Voltage surges and other electrical transients can cause damage to equipment resulting in untimely equipment replacement or repair.

The switchboard serves multiple 480:208/120V step down transformers that in turn feed branch panel boards throughout the space. The transformers are estimated to be approximately 20 years old. The transformers are surrounded by storage materials. It is recommended that the room be cleared out and all materials around the transformers are removed to allow the transformer to vent.

The normal power main switchboard and some distribution panel boards are located in the main Electric Room. Branch panel boards are located throughout the school in hallways, classrooms, etc. Most of the Panel boards appear to be antiquated and original to the building and it is recommended that they and their associated feeders be replaced. Infrared scanning is recommended for all electrical connections in the panel boards that are to remain to ensure proper operation and prevent future failures.

All new panel boards that are installed to replace old shall be hinged cover (door-in-door) construction. All feeders and exposed branch circuits shall be insulated copper conductors routed in EMT conduit.

Emergency Electrical Distribution

The building is not served by an emergency generator. The Emergency lighting is provided by emergency light sets as well as integral battery packs. These fixtures are past their useful life and should be replaced.

Interior Lighting

Most areas in the facility utilize linear fluorescent lighting. Linear fluorescent fixtures in the facility are typically 2’x4’ troffers with acrylic or parabolic lens with T-8 lamps. The fluorescent lighting is estimated to be near or past its rated useful life, in addition, is very inefficient as compared to current LED lighting solutions. Recommend replacement with new LED light fixtures. This will assist with energy efficiency and help lower electric utility costs. Other lighting such as specialty lighting in private restrooms and closets appears to be original to building. It is recommended that these fixtures be replaced with new LED lighting fixtures.

Exterior Lighting

Exterior lighting is provided by wall mounted high-intensity discharge wall packs. These are inefficient and should be replaced.

Wiring Devices

Switches and receptacles that were observed in the original sections of the school appeared to be original. Multiple layers of paint have been applied to the devices which can affect their operation. In addition, some of the light switches did not appear to be switching normally and were a little “spongy”. It is recommended that all wiring devices that are original to the facility be replaced with new.

Wiring

The wiring that is existing in the building is estimated to be approximately 63 years old. The useful life expectancy for wiring is 50 years. It is recommended that all wiring that is original to the facility be replaced with new.

Fire Alarm

The building is served by multiple FA systems.. (1) antiquated Simplex analog type and (1) Honeywell addressable system. Devices throughout the facility are past their useful life. Recommend complete replacement of FA devices and antiquated system components.

New Facility Electrical

If it is determined that the existing building will be demolished or be required to have a major renovation, see the following recommendations for new system design.

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Electrical Distribution

Underground primary electric service shall be routed to a new pad mounted utility transformer located near the new building. A new secondary service will be extended from the utility transformer to feed the new 2000A/277/480V/3PH/4W (est) switchgear located in the main electric room. Each floor of the building shall have dedicated electrical spaces with 277/480V/3PH/4W and 120/208V/3PH/4W branch circuit panel boards separated for specific loads such as mechanical equipment, lighting, receptacles, etc.

A multi-circuit sub-metering device connected to the building automation system shall monitor all building load categories including renewable energy and report to the energy dashboard system.

All wiring shall be copper, minimum #12AWG installed in conduit, minimum size ¾". MC cable is not acceptable. Power connections and code required disconnecting means will be provided for all HVAC and plumbing equipment. Combination starter/ fusible disconnects will be provided for selected equipment as required.

Integral surge protective devices will be provided for the main service switchgear and all branch circuit panels. Main Circuit breaker on the switchgear will be equipped with Phase loss monitors and undervoltage/overvoltage trip settings.

Receptacles will be located at each teacher's workstation location, equipment locations, and on each wall for convenience. All collaboration spaces in the corridors will be provided with additional power per classroom standards.

Emergency Electrical Distribution

A new 150kW diesel generator (BOD: Cummins) with 48-hour dual-wall sub-base fuel tank will be provided for life-safety and general emergency loads.

All Life safety emergency electrical distribution equipment will be housed in a separate room from the normal power equipment. The Emergency system shall consist of two automatic transfer switches - one each for life-safety and general branch, two distribution transformers - one each for life-safety and general branch, and a limited number of life-safety and general branch panel boards. All life-safety emergency loads shall be selectively coordinated to 0.1 seconds. A remote generator annunciator panel will be provided.

Interior Lighting

Interior artificial lighting will be accomplished with recessed high-performance LED direct/indirect fixtures throughout the building with more decorative LED lighting in selected spaces such as Media Center, Entry Lobby, Dining, etc. Alternate pricing shall be provided for Dynamic Lighting fixtures (tunable white) in all classrooms with the ability to independently raise/lower lighting intensity and CCT. Lighting in the Gymnasium will be LED high bays with semi -diffuse acrylic lens. Lighting throughout will meet the latest Illuminating Engineering Society of North America (IESNA)

Interior egress lighting shall be connected to the life-safety branch of emergency power.

100% occupancy/vacancy sensor coverage will be provided throughout except in electrical and mechanical rooms. Occupancy sensors will be automatic on/automatic off. Vacancy sensors will be manual on/automatic off. Automatic daylight dimming will be employed in all daylight zones.
Dimming controls/scene controls will be provided in all classrooms and offices. All interior lighting controls will be stand-alone systems (BOD: nLight).

Exterior Lighting

Dark sky compliant LED exterior lighting will be provided at all exit doors for egress lighting. Site pathway lighting will be post top LED fixtures (BOD: Lithonia #DSX) on a straight round aluminum poles and in accordance with the site guidelines. Color temperature shall be 4000K. Backlight shielded optics will be utilized to minimize glare to adjacent properties as necessary. Exterior lights will also feature integral motion sensing for reduced glare, energy usage, and extended LED lamp life. Exterior egress lighting shall be connected to the life-safety branch of emergency power.

Exterior lighting will be controlled through a photocell/timeclock combination. A lighting contractor will be provided with HOA option and tied into the BAS system. Exterior light fixtures will feature integral motion sensors for reduced glare, energy usage, and extended LED lamp life.

Fire Alarm

A new fully addressable voice evacuation type fire alarm system (BOD: Simplex) shall be provided with notification and initiation devices per NFPA requirements. All peripheral devices shall be installed per ADA requirements. Manual pull stations will be located within five (5) feet of each exterior egress door and within 150 feet of an egress door. Fire alarm strobe/audio devices will be provided to comply with ADA requirements. Smoke detectors will be photoelectric type. Connections will be provided to all fire suppression equipment, air handling units over 2,000CFM, door access controls, etc. A Graphic annunciator panel will be placed at the main entrance to the building and at each fire department entrance into the building.

Technology

Telephone/Data

The contractor will provide all rough-in's, faceplates, cabling paths, cabling, and patch panels for all telephone and data systems. The telephone system shall be IP based. The owner shall provide active components including wireless access points. The minimum stub-out conduit size will be 1'' and cabling paths will consist of 12''

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cable tray with J-hook assemblies on 48'' centers.

The horizontal data network will utilize CAT 6 infrastructure. Wireless coverage will be provided for the entire school utilizing CAT 6A cabling.

WAPs will be laid out to create a fence to fence coverage pattern both on the interior of the building and the exterior of the building.

The phone system will be as per owner's specification.

Fiber backbone will consist of 12 strand multimode OM3 fiber optic cable with LC connectors supporting full 10gig uplinks.
Public Address System

A building-wide Public Address System will be integrated into the Unified Communications system with visual devices in select rooms that will be determined as the design progresses.

Electronic Safety & Security

A new ESS system will include interior and exterior Video Management Systems (VMS) coordinated with Dedicated Micros and a Security Management Control System (SMS) (BOD: Software House).
The SMS includes door access and logic capabilities such as visitor management, time schedules, intrusion detection, and digital signage for emergency notification features. VMS will include security cameras that will be specified along with servers and analytics (motion detection) that run them. Both VMS and SMS systems will be integrated with a single web portal interface at a later time after this project is complete by the District.

Lightning Protection

See attached document for lighting protection risk analysis. The building shall feature a complete Lightning Protection System certified to NFPA 780 standards. The system shall comply with UL #96A. Building steel shall not be used as a down conductor. Down conductors shall be concealed within the building. Each down conductor shall be terminated to a dedicated ground rod. Surge protective devices shall be provided for all systems identified in NFPA 780.

Fire Protection

The existing 6" fire service currently serves the newer addition, leaving the remainder of the facility without sprinklers. The existing building is not fully sprinklered.

Recommend extension and/or expansion of the fire suppression system to cover the entire building.

Safety and Security

ACPS maintains an inviting and de-institutionalized environment, while simultaneously providing a safe environment for students, staff, and community who use the facility and adjacent support services. Studio27 Architecture evaluated the safety and security of each school in 6 categories: Building Layout, Building Materials, Uses of Technology, Visitor Management, Vehicular and Pedestrian Traffic, and Other Site Concerns.

The categories of largest concern for Cora Kelly Elementary are Building Layout, Building Materials, and Visitor Management. Interior circulation paths are long and illogical, with poor sightlines along corridors and from staff spaces for passive surveillance. Interior finishes were adequate when installed but are now in poor condition. There is a lack of a secured entry vestibule and security desk with clear sightlines of the approach to the school.

Envelope

The largest concern for Cora Kelly is the continued maintenance of the masonry, EIFS system, entrances, and envelope penetrations. There is visible masonry cracking at multiple locations and damage to the EIFS system. Exterior grilles are in poor condition and stains on the brick below window sills Water appears to pool where the play surface meets the exterior brick. Most entrance doors are in poor condition with visible rust and large undercuts allowing unwanted thermal transfer between the interior and exterior.

Due to the sprawling nature of Cora Kelly's plan, the envelope is much larger in surface area than it needs to be for a new school with the same interior square footage. This larger form factor has a big impact on energy use and consequently higher operations costs.

Accessibility

ACPS has made it a strong priority to make its facilities accessible to all students and staff. 'Universal Design' is one of ACPS's 10 driving design principles, established in the 2015 Educational Specifications. Universal design is the design of buildings and environments to make them accessible to all people, regardless of age, disability, or other factors.
Since 2012, accessibility in schools has been the law. Title II of the Americans with Disabilities Act prohibits disability discrimination by all public entities, including schools, at the local and state level.

The highest priority item of concern for Cora Kelly Elementary School is that the school does not have an elevator. The second story of the building contains areas of primary function to the school curriculum that students in wheelchairs can not currently access. Many plumbing fixtures and facilities at Cora Kelly are not ADA accessible. This includes water fountains in the corridors, sinks in classrooms, and bathrooms in classrooms. The majority of the Library is not accessible because of the sunken 'pit' design of the central area.

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Cora Kelly Safety and Security Evaluation

Category	Consideration	Rating	*Notes*
Building Layout	Maintain clear lines of sight along circulation paths and avoid blind spots, corners, and cubby holes	Poor	
	Locate administrative and teacher preparation with good visual contact of major circulation areas	Poor	
	Develop spatial relationships that naturally transition from one location to another	Inadequate	
	Locate toilets in close proximity to classrooms	Fair	
	Design Toilets to balance the need for privacy with the ability to supervise	Fair	
	Locate areas likely to have significant community use (after school) close to parking and where these areas can be closed off from the rest of the building	Fair	*Location is acceptable, however doors to close off these spaces from academic wings do not exist*
Building Materials	Use durable wall surfaces and maintainable flooring material that are easy to clean so graffiti and dirt can be removed	Fair	*Glazed block in corridors is very durable and graffiti resistant however it is in bad condition*
	Operational windows should high above ground to prevent access	Poor	
	Install non-slip floors and walk-off mats at points of entry	Inadequate	
	Use of interior glass to create a transparent environment within the school	Inadequate	
	Use of colors, natural day lighting, and interior furnishings to create an environment that is aesthetically pleasing in order to support student and faculty pride within the building	Poor	
Uses of Technology	Phones in every instructional and support area	Fair	*Phones located in most classrooms*
	Building wide all-call or intercom system to be heard throughout the school and in outdoor play spaces when needed	Fair	*Speakers are located in classrooms, exterior unknown*
	Exterior and interior video security cameras	Fair	*Exterior security cameras were observed, interior unknown*
	Motion or infra-red detectors	TBD	
	Smoke and heat detectors location throughout the building	Fair	
	Magnetic locking systems and carefully selected door hardware to facilitate lock downs if needed	TBD	
Visitor Management	The main lobby should be welcoming and inviting for students, staff, and visitors and a central visitor registration area should be prominent upon entry	Fair	
	Clear wayfinding signage should be included that directs visitors upon campus arrival to visitor registration as well as throughout the building to provide overall building guidance	Poor	
	A secured double vestibule system with either clear sight lines to a security desk or a video enabled front intercom buzzer system should be provided to manage visitor entry	Inadequate	
	Front lobby and security desk should have clear views to parking lot and building approach	Inadequate	
Vehicular and Pedestrian Traffic	Bus drop off area should be separated from other vehicular traffic	Poor	
	Clear wayfinding signage and pavement striping should direct vehicular traffic on where to go	Fair	
	Sperate staff and community parking areas	Poor	
	Sperate pedestrian traffic from vehicular traffic and if possible avoid having pedestrian traffic cross vehicular drive lanes	Good	
Other Site Concerns	Use native high trees and low bushes (less than 3'-0" high) to deter hiding	Fair	
	Use aesthetically pleasing fencing around perimeter of the building	Poor	*Perimeter fence around some play areas*
	Non-intrusive lighting should light all areas or site, according to the LEED light pollution credit guidelines with no lighting to leave the property line	Fair	
	Provide security lighting around building and parking lots with photocell timer, motion sensor, and on/off capacity	Poor	

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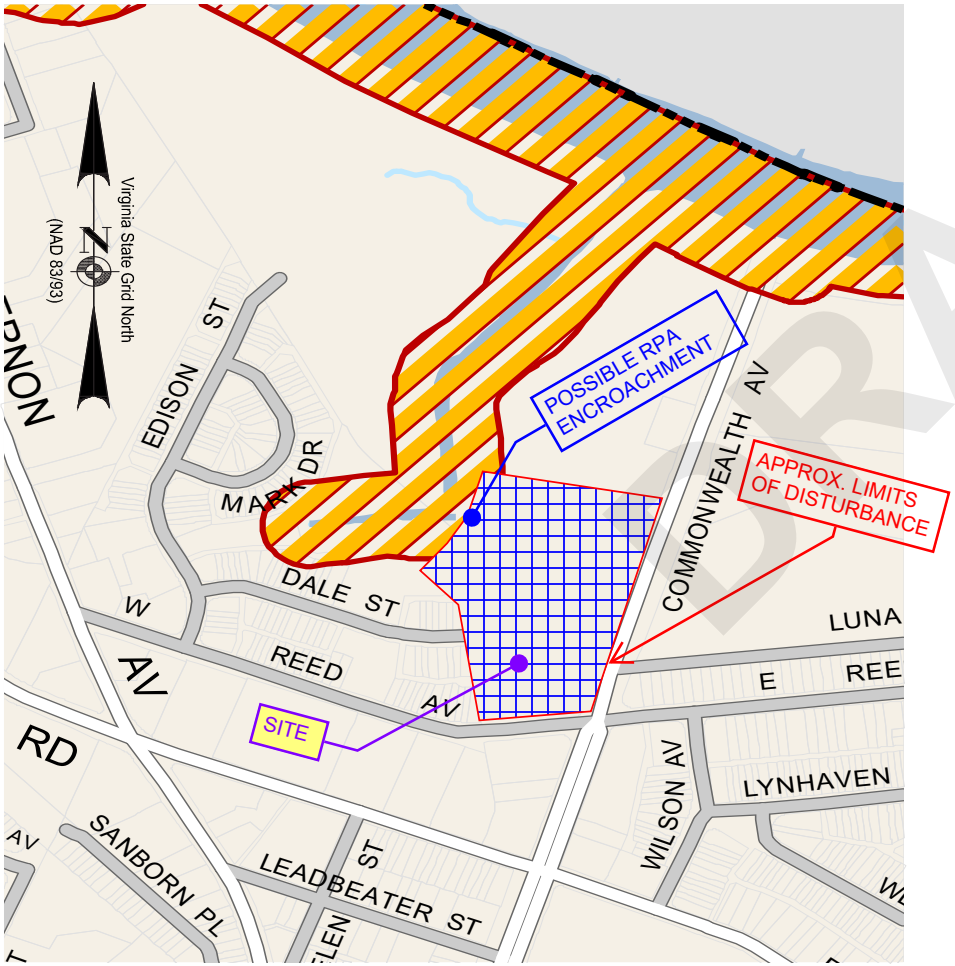
Concerns

The proposed playgrounds and fields encroached on the RPA. Refer to **Exhibit 6** of site location to RPA. A RPA Delineation would need to be performed to determine the exact extents of the RPA on the property.

Exhibit 6

(FROM THE CITY RPA MAP)

NOT TO SCALE

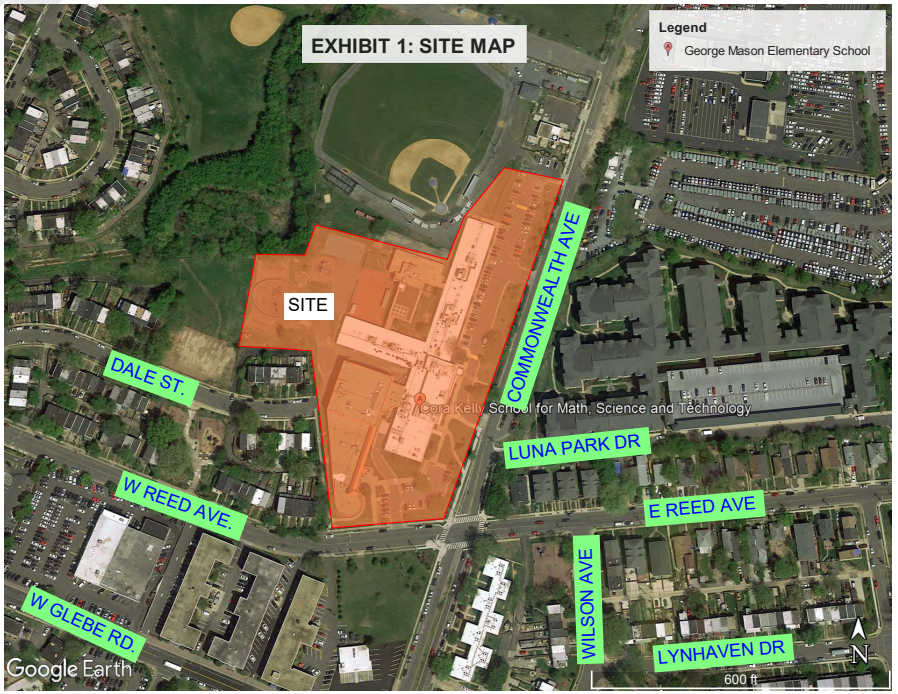


Site Assessment Data

The subject site for this study is Cora Kelly School for Math, Science, and Technology, and it's located in the City of Alexandria at 3600 Commonwealth Ave, Alexandria VA 22305. Refer to **Exhibit 1** for the Site Location Map. The scope of our site study includes the evaluation of Best Management Practices (BMP), Storm Water Management (SWM), Sanitary Sewer, and Waterline. For our analysis, we gathered information from:

- Available records of approved plans of surrounding relevant projects
- Existing utility locations of the project area
- Boundary survey of the project area
- Soil maps of the area
- RPA maps of the area
- City of Alexandria stormwater technical criteria.
- City of Alexandria GIS, and
- CAD provided by Studio 27

Exhibit 1



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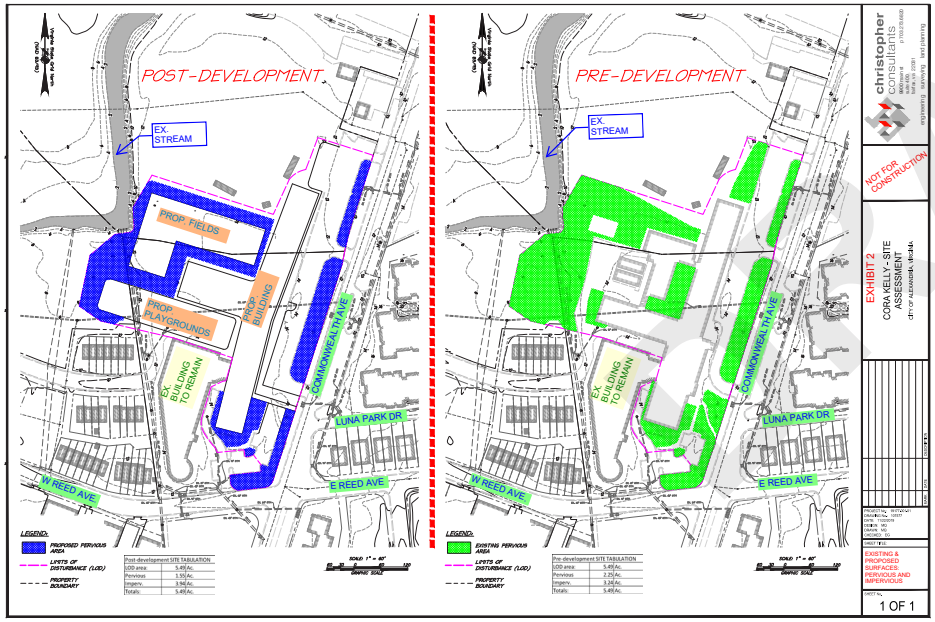
Findings

BMP Evaluation

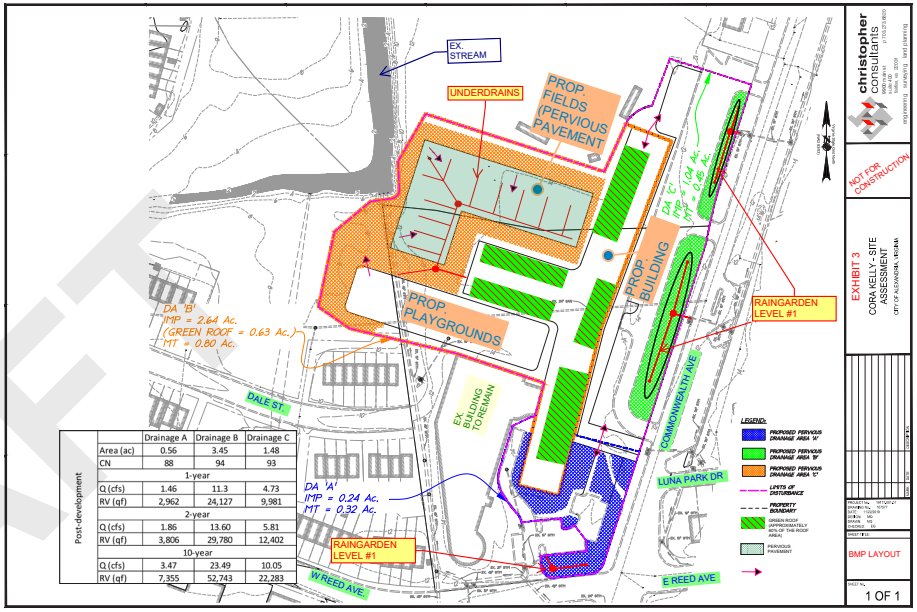
To determine BMP requirements, we used the Virginia Runoff Reduction Method (VRRM) spreadsheet and made some assumptions of the area disturbed and the pre-developed and post-developed pervious/impervious areas. We assumed a total disturbed area of 5.49 acres as the BMP area. We then calculated the amount of existing and proposed pervious/impervious areas and entered the VRRM spreadsheet to calculate the required Total Phosphorus removal of 2.81 lb/yr. Refer to **Exhibit 2** for existing and proposed pervious/impervious areas. In addition to the state requirements, City's new Green Building Policy requires treatment of 100% of the stormwater through green infrastructure.

Exhibit 2



To achieve 100% treatment of stormwater and meet BMP requirements, we divided the site into three drainage areas of A, B, and C. For drainage Area A, we proposed a rain garden. For drainage Area B, we proposed installing a stone base and underdrains below the turf field to count the field as permeable pavement. We also included 60% of proposed building roof as green roof. For drainage area C, we proposed a new rain garden and restoring an existing rain garden along Commonwealth Ave. Refer to **Exhibit 3** for the layout of these measures. By installing the BMP practices as proposed in the three drainage areas, a total of 2.96 lb/yr of phosphorous will be removed, exceeding the requirement of 2.81 lb/yr.

Exhibit 3



Assumptions Made:

- The overall site drains to the west to an existing stream therefore we assumed that proposed layout will maintain the same drainage.
- We assumed that proposed fields will be turf and its ground cover is considered impervious and outfalling to the west.
- Overall green roof area on the roof accounts for up to 60% of the roof surface area.
- The building's roof drains outfall to the west.
- For any impervious area that is untreated, a contribution will need to be paid into City's WQIF at $2 per SF.

SWM Evaluation

To meet SWM requirements in Section 13-109 of City of Alexandria, we analyzed Channel Protection and Flood Protection of the three drainage areas of the proposed development. The site is located within the Four Mile Run Watershed. Refer to below values of Pre and Post development of drainage areas, curve number, peak discharge (Q), and runoff volume (RN).

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Pre-development		Drainage A	Drainage B	Drainage C
	Area (ac)	0.51	3.49	1.39
	CN	88	94	92
	1-year			
	Q (cfs)	1.33	11.79	4.26
	RV (cf.)	2,697	25,179	8,889
	2-year			
	Q (cfs)	1.69	14.36	5.26
	RV (cf)	3,466	31,079	11,119
	10-year			
	Q (cfs)	3.16	24.52	9.24
	RV (cf)	6,698	55,043	20,268

Post-development		Drainage A	Drainage B	Drainage C
	Area (ac)	0.56	3.45	1.48
	CN	88	94	93
	1-year			
	Q (cfs)	1.46	11.30	4.73
	RV (cf)	2,962	24,127	9,981
	2-year			
	Q (cfs)	1.86	13.76	5.81
	RV cf)	3,806	29,780	12,402
	10-year			
	Q (cfs)	3.47	23.49	10.05
	RV (cf)	7,355	52,743	22,283

Channel Protection

The extent of the review to meet channel protection of drainage areas A and B of the proposed school ends in a pipe, not causing any erosion, therefore no detention is required. As for drainage Area C, this drainage area was not contributing 1% of the watershed area per the requirement of city code 13-109-F-c-i. Therefore, we used the Improvement Factor (IF) equation and determined that detention will be not required:

$$Q_{Developed} \leq I.F.*(Q_{Pre\text{-}developed}*RV_{Pre\text{-}developed}) / RV_{Developed}$$

Flood protection

To meet flood protection requirements per city code 13-109-F-2, the 10-year post-developed peak flow must be less than the pre-developed peak flow for the same storm. Based on our assumptions made on the site's drainage areas and ground covers, drainage area B meets the flood protection requirements without any detention. The 10-year peak flow for drainage areas A and C slightly increases the amount of peak flow and some detention will be required. The detention can be provided in the rain gardens for both of these drainage areas.

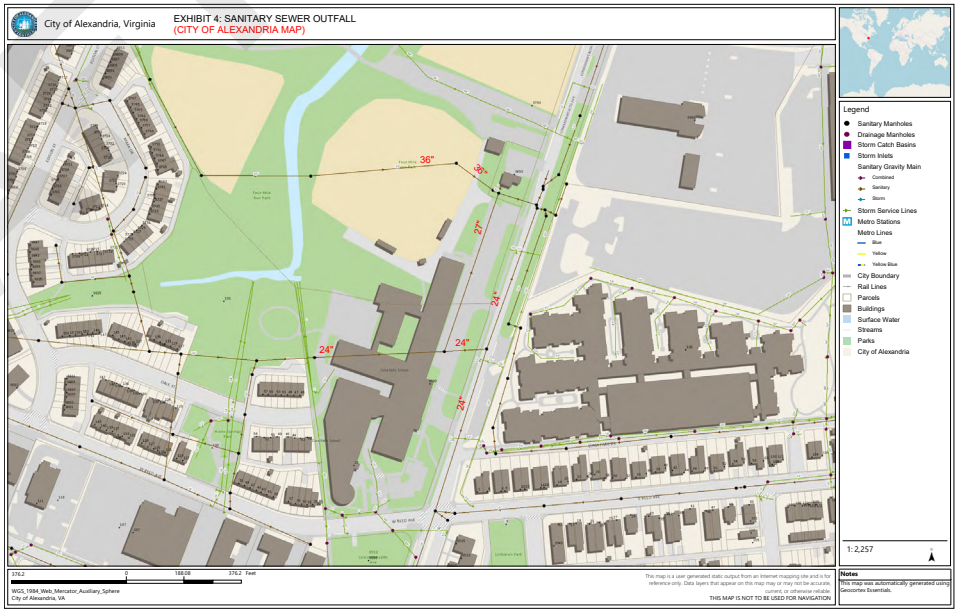
Note:

Due to location in drainage shed and proximity to Potomac River, A waiver for the detention requirement can be applied for. Refer to City Code section 13-109-F

Sanitary Sewer Analysis

Based on available information, we do not know exactly where the building's sanitary sewer lateral outfalls to, but we assume it flows out to the east towards Commonwealth Avenue and then to the north to Four Mile Run pump station. We assume that the new school will outfall to the same general area and the net increase in estimated peak wastewater flow does not exceed 10,000 GPD. Based on the City's memo to industry 06-14, a sanitary sewer outfall analysis will not need to be provided. However, if the net increase in flow exceeds 10,000 GPD, the sanitary sewer outfall analysis shall be completed up to a trunk sewer downstream with a minimum diameter of 24-inches (or to a point as directed by T&ES staff). We have reached out to the City to try and obtain any available City studies of the sewershed in this area and found out that there are none available. Without having any as-built data of the existing sanitary sewer or the existing flows of the system, the capacity of the system cannot be confirmed. However, it is our opinion that if the system currently has capacity, with an approximate 30% increase in the building size, the sanitary system would still have the capacity to serve the school. Refer to **Exhibit 4** for the sanitary sewer system and the extent of the outfall analysis.

Exhibit 4:



Waterline Analysis

The proposed building can tap into the existing 8" waterline located along Commonwealth Ave. Based on a fire hydrant flow test completed by Virginia American Water on 1/4/19, the calculated flow is 1215 gpm at a residual pressure of 20 psi. See **Exhibit 5** of Virginia American Water Flow test.

II. Cora Kelly Master Plan and Technical Data

Exhibit 5a

Virginia American Water – Fire Flow test

Virginia American Water
Fire Hydrant Flow Test Summary

Location:	15 W Glebe Rd		
Date:	1/4/2019	**Main Size**	8 inches
Time:	1:45pm		
		Flow Hydrant #	
Total Flow	**1215** gpm	Hydrant A	
		Residual Hydrant #	
Static pressure	48 psi	**Hydrant B (2195)**	
Residual pressure	20 psi		

Contact Person
Matthew Ganci
Project Engineer
Virginia American Water
2225 Duke St.
Alexandria, VA 22314
Office: 703-706-3862
Email: matthew.ganci@amwater.com

Calculated Flow gpm	Residual psi
1532	5
1433	10
1215	**20**
618	40
#NUM!	60
#NUM!	80
#NUM!	100
#NUM!	120
#NUM!	140

Notes:
1. Table calculation is for reference only. Virginia American Water will not guarantee the calculated flow.

2. 3500 gpm is the limit of available fire flow.

3. Individual (Non-public water supply) fire suppression systems shall be designed by the property owner to meet needed fire flow in excess of 3,500 gpm.

4. VAW does not provide hydrant elevations.

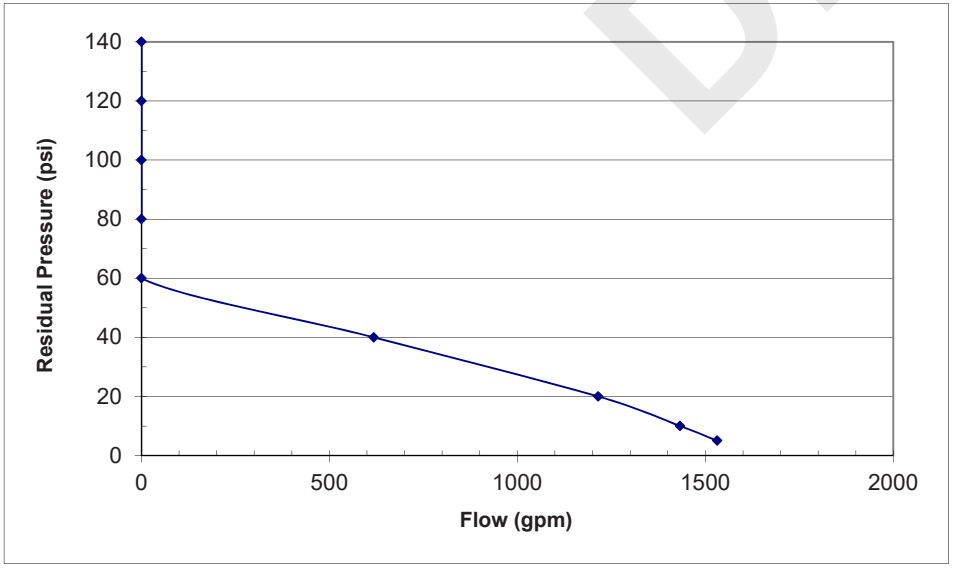


Exhibit 5b

REQUEST FOR FIRE FLOW TEST INFORMATION

Requested by: Brian Currie
Phone: (240) 375-9147 Fax:
Email: brian.currie@redhawkus.com
Project Name: Glebe House Apartments
Request Reason: Need flow information for hydraulic calculations

District: (A) P
Project address: 15 W Glebe Rd
Map sheet #:

Flow Hydrant#: Hydrant A use 4" nozzle w/diffuser
Residual Hydrant #: **Hydrant B**
Main size: 8 inches

Note: Before running this flow test, check all surroundings to avoid any potential damage to nearby residents landscaping, grounds, etc.

Flow duration 3-5 minutes

Tester D. Kirkpatrick
Date 1/4/19
Time 1:45p
Residual Hyd# **Hydrant B** - 2195 Make Mueller

Residual FH MUST Get at least a 10 lb. drop

Static Pressure (PSI) 48
Residual Pressure (PSI) 20

Flow Hydrants	1	2	3	4
Hydrant#	2196 (A)			
Hydrant make	Kennedy			
Nozzle Diameter (inch)	4			
Flow reading (PSI)	8			
Static Reading (PSI)	48			

Engineering Department

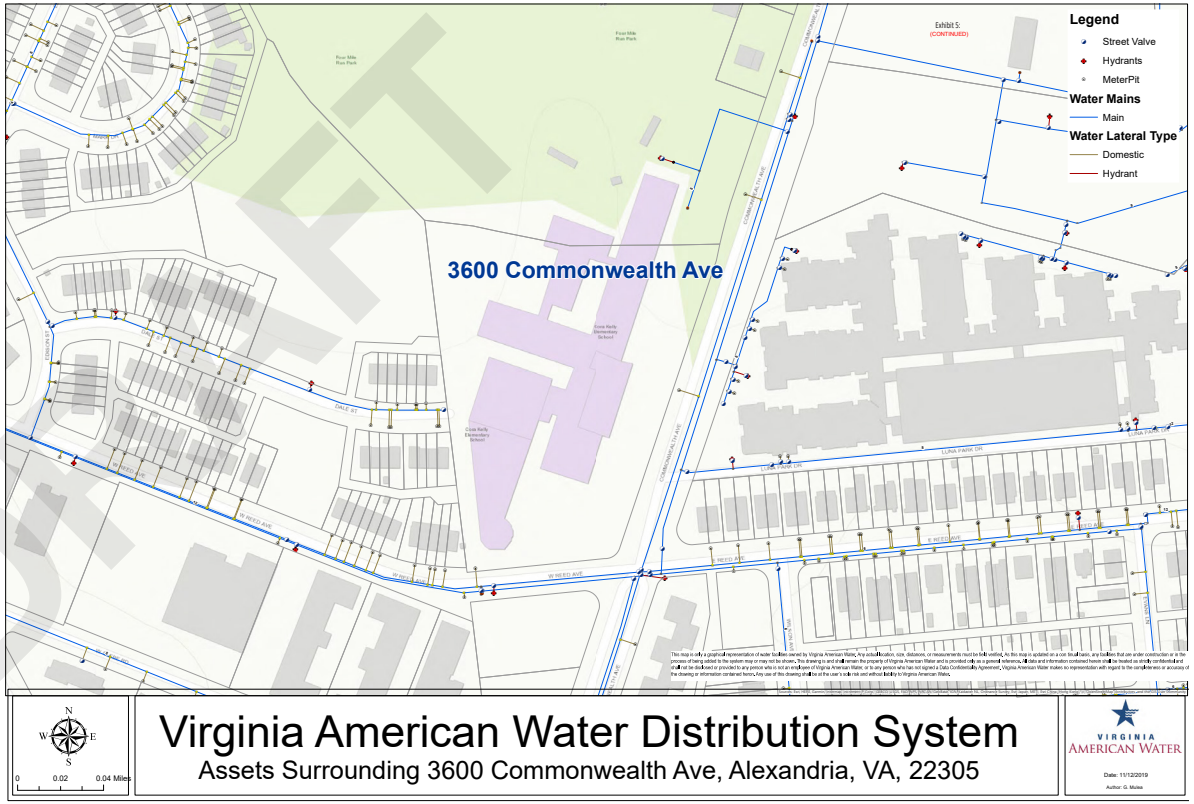
Requested by: Matthew Ganci Date: 12/5/2018

II. Cora Kelly Master Plan and Technical Data

Recommendations

- To reduce the requirements for BMP and SWM, changing the field and playground material from turf to grass will greatly help.

Exhibit 5c



II. Cora Kelly Master Plan and Technical Data

Cost Estimates - New Construction

CLARIFICATIONS & ASSUMPTIONS

PROJECT:	ACPS CORA KELLY ES
OWNER:	ALEXANDRIA CITY PUBLIC SCHOOLS
LOCATION:	ALEXANDRIA, VA
A / E:	STUDIO 27 ARCHITECTS
C/M:	N/A
PHASE:	MASTER PLAN ESTIMATE

February 4, 2020

CLARIFICATIONS & ASSUMPTIONS

BUILDING INFORMATION

- Building Type: EDUCATIONAL
- Project Type: NEW CONSTRUCTION
- Building GSF: 114,385 SF
- Stories: 3

MARK-UPS

- General Conditions: 10.0%
- Cm Fee: 5.0%
- Design Contingency: 15.0%
- Bonds & Insurance: 2.0%
- Escalation: EXCLUDED

DOCUMENTS

- Technical Site Study Assessment dated December 12, 2019 as issued by Studio 27 Architects

EXCLUSIONS

- A-E Fees
- Phasing
- Overtime
- Escalation
- Deep foundation systems
- Furniture and loose equipment
- Library shelving
- Lockers
- Photovoltaic systems
- Playground equipment
- Bleachers (exterior)
- Electronic score boards
- Trash compactors/bins
- Change order contingency
- Finance cost

QUALIFICATIONS

- Assume conventional concrete strip foundation systems
- Assume 12' floor to slab height for existing building
- Assume structural steel frame construction with concrete on metal deck slabs
- Structural steel framing assumed @ 12lbs/sf for the 1st level and 6.5lbs/sf for the 2nd level
- Assume typical floor to slab height of 14', double volume areas 25'
- Assume conventional built-up roof waterproofing system to 30% of overall roof area, green roof of 70% of roof area
- Assume 30lf of millwork per classroom
- Assume one (1) elevator with two (2) stops
- New school is assumed without a basement a slab on grade
- The existing building is assumed to maintain existing site utilities no upgrades

PROJECT SUMMARY

PROJECT:	ACPS CORA KELLY ES
OWNER:	ALEXANDRIA CITY PUBLIC SCHOOLS
LOCATION:	ALEXANDRIA, VA
A / E:	STUDIO 27 ARCHITECTS
C/M:	N/A
PHASE:	MASTER PLAN ESTIMATE

February 4, 2020

DIVISION	DESCRIPTION	TOTAL *GROSS SF:* TOTAL	TOTAL *114,385 SF* RATE/GSF	CORA KELLY *GROSS SF:* TOTAL	CORA KELLY *114,385 SF* RATE/GSF	REC CENTER *GROSS SF:* TOTAL	REC CENTER *61,619 SF* RATE/GSF
DIVISION 01	GENERAL REQUIREMENTS	$ 80,000	$ 0.70	$ 80,000	$ 0.70	$ -	$ -
DIVISION 02	EXISTING CONDITIONS	$ 1,997,840	$ 17.47	$ 1,997,840	$ 17.47	$ -	$ -
DIVISION 03	CONCRETE	$ 3,680,717	$ 32.18	$ 2,359,039	$ 20.62	$ 1,321,678	$ 21.45
DIVISION 04	MASONRY	$ 6,712,500	$ 58.68	$ 4,312,500	$ 37.70	$ 2,400,000	$ 38.95
DIVISION 05	METALS	$ 4,723,908	$ 41.30	$ 2,974,289	$ 26.00	$ 1,749,619	$ 28.39
DIVISION 06	WOODS & PLASTICS	$ 1,214,006	$ 10.61	$ 776,578	$ 6.79	$ 437,429	$ 7.10
DIVISION 07	THERMAL AND MOISTURE PROTECTION	$ 3,585,250	$ 31.34	$ 2,055,044	$ 17.97	$ 1,530,206	$ 24.83
DIVISION 08	OPENINGS	$ 3,910,750	$ 34.19	$ 2,456,250	$ 21.47	$ 1,454,500	$ 23.60
DIVISION 09	FINISHES	$ 5,332,921	$ 46.62	$ 3,465,866	$ 30.30	$ 1,867,056	$ 30.30
DIVISION 10	SPECIALTIES	$ 243,604	$ 2.13	$ 160,824	$ 1.41	$ 82,781	$ 1.34
DIVISION 11	EQUIPMENT	$ 2,810,000	$ 24.57	$ 1,755,000	$ 15.34	$ 1,055,000	$ 17.12
DIVISION 12	FURNISHINGS	$ 132,003	$ 1.15	$ 85,789	$ 0.75	$ 46,214	$ 0.75
DIVISION 13	SPECIAL CONSTRUCTION	$ -	$ -	$ -	$ -	$ -	$ -
DIVISION 14	CONVEYING EQUIPMENT	$ 330,000	$ 2.88	$ 110,000	$ 0.96	$ 220,000	$ 3.57
DIVISION 21	FIRE SUPPRESSION	$ 1,073,624	$ 9.39	$ 697,749	$ 6.10	$ 375,876	$ 6.10
DIVISION 22	PLUMBING	$ 2,640,060	$ 23.08	$ 1,715,775	$ 15.00	$ 924,285	$ 15.00
DIVISION 23	HVAC	$ 14,080,320	$ 123.10	$ 9,150,800	$ 80.00	$ 4,929,520	$ 80.00
DIVISION 25	INTEGRATED AUTOMATION	$ 2,640,060	$ 23.08	$ 1,715,775	$ 15.00	$ 924,285	$ 15.00
DIVISION 26	ELECTRICAL	$ 6,336,144	$ 55.39	$ 4,117,860	$ 36.00	$ 2,218,284	$ 36.00
DIVISION 27	COMMUNICATIONS	$ 1,619,237	$ 14.16	$ 1,052,342	$ 9.20	$ 566,895	$ 9.20
DIVISION 28	ELECTRONIC SAFETY AND SECURITY	$ 1,408,032	$ 12.31	$ 915,080	$ 8.00	$ 492,952	$ 8.00
DIVISION 31	EARTHWORK	$ 2,306,875	$ 20.17	$ 1,894,375	$ 16.56	$ 412,500	$ 6.69
DIVISION 32	EXTERIOR IMPROVEMENTS	$ 7,292,400	$ 63.75	$ 6,301,250	$ 55.09	$ 991,150	$ 16.09
DIVISION 33	UTILITIES	$ 870,000	$ 7.61	$ 435,000	$ 3.80	$ 435,000	$ 7.06
	DIRECT COST TOTAL	*$ 75,020,252*	*$ 655.86*	*$ 50,585,023*	*$ 442.23*	*$ 24,435,229*	*$ 396.55*
	GENERAL CONDITIONS: 10.0%	**$ 7,502,025**	**$ 65.59**	**$ 5,058,502**	**$ 44.22**	**$ 2,443,523**	**$ 39.66**
	SUB TOTAL	*$ 82,522,277*	*$ 721.44*	*$ 55,643,525*	*$ 486.46*	*$ 26,878,752*	*$ 436.21*
	CM FEE: 5.0%	**$ 4,126,114**	**$ 36.07**	**$ 2,782,176**	**$ 24.32**	**$ 1,343,938**	**$ 21.81**
	SUB TOTAL	*$ 86,648,391*	*$ 757.52*	*$ 58,425,701*	*$ 510.78*	*$ 28,222,689*	*$ 458.02*
	DESIGN CONTINGENCY: 15.0%	**$ 12,997,259**	**$ 113.63**	**$ 8,763,855**	**$ 76.62**	**$ 4,233,403**	**$ 68.70**
	SUB TOTAL	*$ 99,645,649*	*$ 871.14*	*$ 67,189,556*	*$ 587.40*	*$ 32,456,093*	*$ 526.72*
	BONDS & INSURANCE: 2.0%	**$ 1,992,913**	**$ 17.42**	**$ 1,343,791**	**$ 11.75**	**$ 649,122**	**$ 10.53**
	SUB TOTAL	*$ 101,638,562*	*$ 888.57*	*$ 68,533,348*	*$ 599.15*	*$ 33,105,215*	*$ 537.26*
	ESCALATION: EXCLUDED	$ -	$ -	$ -	$ -	$ -	$ -
TOTAL CONSTRUCTION COST		**$ 101,638,562**	$ 888.57	**$ 68,533,348**	$ 599.15	**$ 33,105,215**	$ 537.26

ESTIMATE

PROJECT:	ACPS CORA KELLY ES
OWNER:	ALEXANDRIA CITY PUBLIC SCHOOLS
LOCATION:	ALEXANDRIA, VA
A / E:	STUDIO 27 ARCHITECTS
C/M:	N/A
PHASE:	MASTER PLAN ESTIMATE — GROSS SF: 114,385 SF — *February 4, 2020*

DIVISION	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
01	**DIVISION 01 - GENERAL REQUIREMENTS**				
	Temporary construction fence	4,000	LF	$ 20.00	$ 80,000
					$ -
TOTAL FOR	**DIVISION 01 - GENERAL REQUIREMENTS**				$ 80,000
02	**DIVISION 02 - EXISTING CONDITIONS**				
	Demolish existing building	76,840	SF	$ 13.00	$ 998,920
	Allowance for removal of hazardous materials	76,840	SF	$ 13.00	$ 998,920
					$ -
TOTAL FOR	**DIVISION 02 - EXISTING CONDITIONS**				$ 1,997,840
03	**DIVISION 03 - CONCRETE**				
	Concrete foundations for new building	114,385	GSF	$ 6.50	$ 743,503
					$ -
	Concrete slab-on-grade, including stone fill, damp proofing complete	42,042	SF	$ 10.25	$ 430,931
	Under slab drainage system	42,042	SF	$ 3.50	$ 147,147
					$ -
	Concrete on metal decking	72,343	SF	$ 13.00	$ 940,459
					$ -
	New concrete stairs and landings	6	FLIGHTS	$ 13,000.00	$ 78,000
					$ -
	Elevator pit complete	1	EA	$ 19,000.00	$ 19,000
					$ -
TOTAL FOR	**DIVISION 03 - CONCRETE**				$ 2,359,039
04	**DIVISION 04 - MASONRY**				
	Allowance for Brick veneer on back-up system, includes insulation, air barriers, damp proofing, etc. complete (assume 70% is brick veneer and 30% is glazed system) Excludes curtain wall systems	57,500	SF	$ 75.00	$ 4,312,500
					$ -
TOTAL FOR	**DIVISION 04 - MASONRY**				$ 4,312,500
05	**DIVISION 05 - METALS**				
	Structural steel framing at 1st level @ 12lbs/sf	253	TON	$ 5,500.00	$ 1,391,500
					$ -
	Structural steel framing 2nd & 3rd floor @ 6.5lbs/sf	236	TON	$ 5,500.00	$ 1,298,000
	Structural steel framing for roof MEP and equipment screens (allow 20lbs/lf of screen area)	5	TON	$ 4,900.00	$ 24,500
					$ -
	Stair handrails	6	FLIGHTS	$ 4,300.00	$ 25,800
					$ -
	Miscellaneous metals allowance	114,385	GSF	$ 2.05	$ 234,489
					$ -
TOTAL FOR	**DIVISION 05 - METALS**				$ 2,974,289

ESTIMATE

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LOCATION:	ALEXANDRIA, VA
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C/M:	N/A
PHASE:	MASTER PLAN ESTIMATE — GROSS SF: 114,385 SF — *February 4, 2020*

DIVISION	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
06	**DIVISION 06 - WOODS & PLASTICS**				
	Rough carpentry	114,385	GSF	$ 1.50	$ 171,578
	Allowance for millwork/casework	1	ALLOW	$ 605,000.00	$ 605,000
					$ -
TOTAL FOR	**DIVISION 06 - WOODS & PLASTICS**				$ 776,578
07	**DIVISION 07 - THERMAL AND MOISTURE PROTECTION**				
	Insulation, damp proofing, air barrier, etc. to brick veneer façade				*Incl. in Div. 4*
	Insulation to the interior face of the existing exterior walls				*Assume not required*
					$ -
	Roof waterproofing system 30% of total roof area (built-up roofing)	12,613	SF	$ 25.00	$ 315,325
	Roof waterproofing system with green roof 70% of roof total	29,430	SF	$ 51.00	$ 1,500,930
					$ -
	Metal panels at roof screens assume 375lf at 8' high	3,000	SF	$ 51.00	$ 153,000
					$ -
	Allowance for joint sealants, fireproofing, etc.	114,385	GSF	$ 0.75	$ 85,789
					$ -
TOTAL FOR	**DIVISION 07 - THERMAL AND MOISTURE PROTECTION**				$ 2,055,044
08	**DIVISION 08 - OPENINGS**				
	Exterior glazing at new building (30% of total façade)	17,250	SF	$ 95.00	$ 1,638,750
					$ -
	Skylights allowance	1,000	SF	$ 250.00	$ 250,000
					$ -
	Exterior double doors at main entrance	2	PAIR	$ 20,000.00	$ 40,000
	Secondary entrance double doors	6	PAIR	$ 15,000.00	$ 90,000
					$ -
	Interior doors allowance	175	LEAFS	$ 2,500.00	$ 437,500
					$ -
TOTAL FOR	**DIVISION 08 - OPENINGS**				$ 2,456,250
09	**DIVISION 09 - FINISHES**				
	Interior wall construction (allowance includes all types of walls, including interior glazing)	114,385	GSF	$ 8.10	$ 926,519
					$ -
	Wall finishes, including tack boards, acoustical panels, paint, ceramic wall tile etc.	114,385	GSF	$ 6.50	$ 743,503
					$ -
	Floor finishes allowance	114,385	GSF	$ 8.75	$ 1,000,869
	Ceiling finish allowance	114,385	GSF	$ 6.95	$ 794,976
					$ -
					$ -
TOTAL FOR	**DIVISION 09 - FINISHES**				$ 3,465,866

ESTIMATE

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C/M:	N/A
PHASE:	MASTER PLAN ESTIMATE

GROSS SF: 114,385 SF

February 4, 2020

DIVISION	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
10	**DIVISION 10 - SPECIALTIES**				
	Toilet partitions, accessories, mirrors and vanity counter tops	114,385	GSF	$ 1.10	$ 125,824
					$ -
	Interior signage/way finding allowance	1	ALLOW	$ 35,000.00	$ 35,000
					$ -
TOTAL FOR	**DIVISION 10 - SPECIALTIES**				$ 160,824
11	**DIVISION 11 - EQUIPMENT**				
	Food service equipment	1	ALLOW	$ 650,000.00	$ 650,000
					$ -
	Gymnasium equipment (bleachers, scoreboards, basketball hoops,	1	ALLOW	$ 205,000.00	$ 205,000
					$ -
	Audiovisual equipment - gymnasium	1	ALLOW	$ 150,000.00	$ 150,000
	Audiovisual equipment - cafeteria	1	ALLOW	$ 75,000.00	$ 75,000
	Audiovisual equipment - Music classroom	1	ALLOW	$ 75,000.00	$ 75,000
	Audiovisual equipment - classrooms, etc.	1	ALLOW	$ 475,000.00	$ 475,000
					$ -
	Dry eraser marker boards, etc.	1	ALLOW	$ 125,000.00	$ 125,000
					$ -
TOTAL FOR	**DIVISION 11 - EQUIPMENT**				$ 1,755,000
12	**DIVISION 12 - FURNISHINGS**				
	Window blinds @ exterior windows	114,385	GSF	$ 0.75	$ 85,789
					$ -
TOTAL FOR	**DIVISION 12 - FURNISHINGS**				$ 85,789
13	**DIVISION 13 - SPECIAL CONSTRUCTION**				
					N/A
					$ -
TOTAL FOR	**DIVISION 13 - SPECIAL CONSTRUCTION**				$ -
14	**DIVISION 14 - CONVEYING EQUIPMENT**				
	Elevator 2 stops	1	EA	$ 110,000.00	$ 110,000
					$ -
TOTAL FOR	**DIVISION 14 - CONVEYING EQUIPMENT**				$ 110,000
21	**DIVISION 21 - FIRE SUPPRESSION**				
	Fire sprinkler system	114,385	GSF	$ 6.10	$ 697,749
					$ -
TOTAL FOR	**DIVISION 21 - FIRE SUPPRESSION**				$ 697,749

ESTIMATE

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C/M:	N/A
PHASE:	MASTER PLAN ESTIMATE

GROSS SF: 114,385 SF

February 4, 2020

DIVISION	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
22	**DIVISION 22 - PLUMBING**				
	Plumbing system allowance	114,385	GSF	$ 15.00	$ 1,715,775
					$ -
TOTAL FOR	**DIVISION 22 - PLUMBING**				$ 1,715,775
23	**DIVISION 23 - HVAC**				
	HVAC systems allowance	114,385	GSF	$ 80.00	$ 9,150,800
					$ -
TOTAL FOR	**DIVISION 23 - HVAC**				$ 9,150,800
25	**DIVISION 25 - INTEGRATED AUTOMATION**				
	HVAC systems controls allowance	114,385	GSF	$ 15.00	$ 1,715,775
					$ -
TOTAL FOR	**DIVISION 25 - INTEGRATED AUTOMATION**				$ 1,715,775
26	**DIVISION 26 - ELECTRICAL**				
	Electrical systems allowance	114,385	GSF	$ 36.00	$ 4,117,860
					$ -
TOTAL FOR	**DIVISION 26 - ELECTRICAL**				$ 4,117,860
27	**DIVISION 27 - COMMUNICATIONS**				
	Telecommunications, public address, clock and radio	114,385	GSF	$ 3.25	$ 371,751
	IT/Data systems	114,385	GSF	$ 5.20	$ 594,802
	A/V conduits and cabling	114,385	GSF	$ 0.75	$ 85,789
					$ -
					$ -
TOTAL FOR	**DIVISION 27 - COMMUNICATIONS**				$ 1,052,342
28	**DIVISION 28 - ELECTRONIC SAFETY AND SECURITY**				
	Access control and CCTV systems	114,385	GSF	$ 3.75	$ 428,944
	Fire alarm	114,385	GSF	$ 2.75	$ 314,559
	Intrusion detection system	114,385	GSF	$ 1.50	$ 171,578
					$ -
					$ -
					$ -
TOTAL FOR	**DIVISION 28 - ELECTRONIC SAFETY AND SECURITY**				$ 915,080

ESTIMATE

PROJECT:	ACPS CORA KELLY ES
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A / E:	STUDIO 27 ARCHITECTS
C/M:	N/A
PHASE:	MASTER PLAN ESTIMATE

GROSS SF: 114,385 SF

February 4, 2020

DIVISION	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
31	**DIVISION 31 - EARTHWORK**				
	Rough grading site	470,500	SF	$ 3.75	$ 1,764,375
					$ -
	Erosion and sediment control measures	1	ALLOW	$ 130,000.00	$ 130,000
					$ -
TOTAL FOR	**DIVISION 31 - EARTHWORK**				$ 1,894,375
32	**DIVISION 32 - EXTERIOR IMPROVEMENTS**				
	Clearing and grubbing site preparations	240,000	SF	$ 1.65	$ 396,000
					$ -
	Asphalt driveways and parking area	73,000	SF	$ 6.75	$ 492,750
	Concrete curbs	3,800	LF	$ 40.00	$ 152,000
					$ -
	Walkway allowance	6,500	SF	$ 22.00	$ 143,000
					$ -
	Site fencing allowance	3,500	LF	$ 90.00	$ 315,000
					$ -
	Landscaping allowance	1	ALLOW	$ 375,000.00	$ 375,000
					$ -
	Site lighting allowance	1	ALLOW	$ 210,000.00	$ 210,000
					$ -
	Baseball field backstop, bases, etc.	1	ALLOW	$ 35,000.00	$ 35,000
	Soccer field artificial turf Full sized	80,500	SF	$ 21.00	$ 1,690,500
	Goals	2	EA	$ 3,500.00	$ 7,000
	Soccer field artificial turf Junior	51,500	SF	$ 21.00	$ 1,081,500
	Goals	2	EA	$ 3,500.00	$ 7,000
	Field lighting	1	ALLOW	$ 460,000.00	$ 460,000
					$ -
	Courtyard for outdoor activities and views	14,700	SF	$ 45.00	$ 661,500
					$ -
	Stormwater bio-retention area	1	ALLOW	$ 275,000.00	$ 275,000
					$ -
					$ -
TOTAL FOR	**DIVISION 32 - EXTERIOR IMPROVEMENTS**				$ 6,301,250
33	**DIVISION 33 - UTILITIES**				
	Domestic water service	1	ALLOW	$ 100,000.00	$ 100,000
	Sanitary sewer service	1	ALLOW	$ 75,000.00	$ 75,000
	Strom water service	1	ALLOW	$ 75,000.00	$ 75,000
	Electrical service	1	ALLOW	$ 185,000.00	$ 185,000
					$ -
TOTAL FOR	**DIVISION 33 - UTILITIES**				$ 435,000

ESTIMATE

PROJECT:	ACPS CORA KELLY ES
OWNER:	ALEXANDRIA CITY PUBLIC SCHOOLS
LOCATION:	ALEXANDRIA, VA
A / E:	STUDIO 27 ARCHITECTS
C/M:	N/A
PHASE:	MASTER PLAN ESTIMATE

GROSS SF: 61,619 SF

February 4, 2020

DIVISION	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
01	**DIVISION 01 - GENERAL REQUIREMENTS**				
					N/A
					$ -
TOTAL FOR	**DIVISION 01 - GENERAL REQUIREMENTS**				$ -
02	**DIVISION 02 - EXISTING CONDITIONS**				
					N/A
					$ -
TOTAL FOR	**DIVISION 02 - EXISTING CONDITIONS**				$ -
03	**DIVISION 03 - CONCRETE**				
	Concrete foundations for new building	61,619	GSF	$ 6.50	$ 400,524
	Concrete slab-on-grade, including stone fill, damp proofing complete	30,810	SF	$ 10.25	$ 315,797
	Under slab drainage system	30,810	SF	$ 3.50	$ 107,833
					$ -
	Concrete on metal decking	30,810	SF	$ 13.00	$ 400,524
					$ -
	New concrete stairs and landings	6	FLIGHTS	$ 13,000.00	$ 78,000
					$ -
	Elevator pit complete	1	EA	$ 19,000.00	$ 19,000
					$ -
TOTAL FOR	**DIVISION 03 - CONCRETE**				$ 1,321,678
04	**DIVISION 04 - MASONRY**				
	Allowance for Brick veneer on back-up system, includes insulation, air barriers, damp proofing, etc. complete (assume 70% is brick veneer and 30% is glazed system) Excludes curtain wall systems	32,000	SF	$ 75.00	$ 2,400,000
					$ -
TOTAL FOR	**DIVISION 04 - MASONRY**				$ 2,400,000
05	**DIVISION 05 - METALS**				
	Structural steel framing at 1st level @ 12lbs/sf	185	TON	$ 5,500.00	$ 1,017,500
					$ -
	Structural steel framing 2nd @ 6.5lbs/sf	101	TON	$ 5,500.00	$ 555,500
	Structural steel framing for roof MEP and equipment screens (allow 20lbs/lf of screen area)	5	TON	$ 4,900.00	$ 24,500
					$ -
	Stair handrails	6	FLIGHTS	$ 4,300.00	$ 25,800
					$ -
	Miscellaneous metals allowance	61,619	GSF	$ 2.05	$ 126,319
					$ -
TOTAL FOR	**DIVISION 05 - METALS**				$ 1,749,619

ESTIMATE +C+

PROJECT:	ACPS CORA KELLY ES
OWNER:	ALEXANDRIA CITY PUBLIC SCHOOLS
LOCATION:	ALEXANDRIA, VA
A / E:	STUDIO 27 ARCHITECTS
C/M:	N/A
PHASE:	MASTER PLAN ESTIMATE — GROSS SF: 61,619 SF — *February 4, 2020*

DIVISION	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
22	**DIVISION 22 - PLUMBING**				
	Plumbing system allowance	61,619	GSF	$ 15.00	$ 924,285
					$ -
TOTAL FOR	**DIVISION 22 - PLUMBING**				$ 924,285
23	**DIVISION 23 - HVAC**				
	HVAC systems allowance	61,619	GSF	$ 80.00	$ 4,929,520
					$ -
TOTAL FOR	**DIVISION 23 - HVAC**				$ 4,929,520
25	**DIVISION 25 - INTEGRATED AUTOMATION**				
	HVAC systems controls allowance	61,619	GSF	$ 15.00	$ 924,285
					$ -
TOTAL FOR	**DIVISION 25 - INTEGRATED AUTOMATION**				$ 924,285
26	**DIVISION 26 - ELECTRICAL**				
	Electrical systems allowance	61,619	GSF	$ 36.00	$ 2,218,284
					$ -
TOTAL FOR	**DIVISION 26 - ELECTRICAL**				$ 2,218,284
27	**DIVISION 27 - COMMUNICATIONS**				
	Telecommunications, public address, clock and radio	61,619	GSF	$ 3.25	$ 200,262
	IT/Data systems	61,619	GSF	$ 5.20	$ 320,419
	A/V conduits and cabling	61,619	GSF	$ 0.75	$ 46,214
					$ -
TOTAL FOR	**DIVISION 27 - COMMUNICATIONS**				$ 566,895
28	**DIVISION 28 - ELECTRONIC SAFETY AND SECURITY**				
	Access control and CCTV systems	61,619	GSF	$ 3.75	$ 231,071
	Fire alarm	61,619	GSF	$ 2.75	$ 169,452
	Intrusion detection system	61,619	GSF	$ 1.50	$ 92,429
					$ -
TOTAL FOR	**DIVISION 28 - ELECTRONIC SAFETY AND SECURITY**				$ 492,952
31	**DIVISION 31 - EARTHWORK**				
	Rough grading site	110,000	SF	$ 3.75	$ 412,500
					$ -
TOTAL FOR	**DIVISION 31 - EARTHWORK**				$ 412,500

ESTIMATE +C+

PROJECT:	ACPS CORA KELLY ES
OWNER:	ALEXANDRIA CITY PUBLIC SCHOOLS
LOCATION:	ALEXANDRIA, VA
A / E:	STUDIO 27 ARCHITECTS
C/M:	N/A
PHASE:	MASTER PLAN ESTIMATE — GROSS SF: 61,619 SF — *February 4, 2020*

DIVISION	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
32	**DIVISION 32 - EXTERIOR IMPROVEMENTS**				
	Clearing and grubbing site preparations	120,000	SF	$ 1.65	$ 198,000
					$ -
	Asphalt driveways and parking area	45,800	SF	$ 6.75	$ 309,150
	Concrete curbs	1,800	LF	$ 40.00	$ 72,000
					$ -
	Walkway allowance	3,500	SF	$ 22.00	$ 77,000
					$ -
	Landscaping allowance	1	ALLOW	$ 125,000.00	$ 125,000
					$ -
	Site lighting allowance	1	ALLOW	$ 110,000.00	$ 110,000
					$ -
	Stormwater bio-retention area	1	ALLOW	$ 100,000.00	$ 100,000
					$ -
TOTAL FOR	**DIVISION 32 - EXTERIOR IMPROVEMENTS**				$ 991,150
33	**DIVISION 33 - UTILITIES**				
	Domestic water service	1	ALLOW	$ 100,000.00	$ 100,000
	Sanitary sewer service	1	ALLOW	$ 75,000.00	$ 75,000
	Strom water service	1	ALLOW	$ 75,000.00	$ 75,000
	Electrical service	1	ALLOW	$ 185,000.00	$ 185,000
					$ -
TOTAL FOR	**DIVISION 33 - UTILITIES**				$ 435,000

II. Cora Kelly Master Plan and Technical Data

Cost Estimate - Renovation

Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
	Conceptual Construction Total Direct Cost (Renovation and New Construction)					**$36,525,412.50**
-	**Description**	**Qty**	**Unit**	**Unit Cost**	**Subtotal**	**Mark-up Total**
-	**Markups**					
	General Conditions	1	ALLOW	10%	*$3,652,541*	$40,177,954
	CM Fee	1	ALLOW	5.00%	*$2,008,898*	$42,186,851
	Design Contingency	1	ALLOW	15.00%	*$6,328,028*	$48,514,879
	Bonds & Insurance	1	ALLOW	2.00%	*$970,298*	$49,485,177
	Total Conceptual Construction Cost (Renovation and New Construction)					**$49,485,176.74**
	Cost / SF					**$490.85**
	Exclusions					
	Architectural Engineering Fees					
	Escalation					
	Fees and Permits					
	Phasing					
	Overtime					
	Deep foundation systems					
	Library Shelving					
	Photovoltaic Systems					
	Playground Equipment					
	Bleachers					
	Electronic Scoreboards					
	Trash compactors/bins					
	loose Furniture Fixtures and Equipment					
	Locker refurbishment					
	Site Utilities					
	change order contingency					
	Finance Costs					
	Qualifications					
	Assume conventional concrete strip foundation systems					
	Assume 12' floor to slab height for existing building					
	Assume structural steel frame construction with concrete on metal deck slabs					
	Structural steel framing assumed @ 12lbs/sf for the 1st level and 6.5lbs/sf for the 2nd level					
	Assume typical floor to slab height of 14', double volume areas 25'					
	Assume conventional built-up roof waterproofing system to 30% of overall roof area, green roof of 70% of roof area					
	Assume 30lf of millwork per classroom					
	Assume one (1) elevator with two (3) stops					
	New school is assumed without a basement a slab on grade					
	The existing building is assumed to maintain existing site utilities no upgrades					

Project	Cora Kelly School for Math, Science, and Technology					
Client	Alexandria City Public Schools					
Location	3600 Commenwealth Ave; Alexandria, Virginia 22305					
	Construction and Renovation Area	**104,942**				

Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
1.0	**General Requirements**					
	Temporary Construction Fence	4,000	LF	$20.00	$80,000.00	*$80,000.00*
		Division 1 Subtotal				**$80,000.00**

Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
2.0	**Existing Conditions**					
	Shell interior of building	73,310	SF	$10.25	$751,427.50	*$751,427.50*
	Allowance for removal of hazardous material	73,310	SF	$18.00	$1,319,580.00	*$1,319,580.00*
		Division 2 Subtotal				**$2,071,007.50**

Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
3.0	**Concrete**					
	Concrete foundation for new building	28,100	GSF	$6.50	$182,734.30	*$182,734.30*
	Concrete slab-on-grade	14,050	SF	$10.25	$144,012.50	*$144,012.50*
	Underslab drainage	14,050	SF	$3.50	$49,175.00	*$49,175.00*
	Concrete on metal decking	14,050	SF	$13.00	$182,650.00	*$182,650.00*
	New concrete stairs and landings	6	FLIGHTS	$13,000.00	$78,000.00	*$78,000.00*
	Elevator Pit for New and Existing Building	2	EA	$19,000.00	$38,000.00	*$38,000.00*
		Division 3 Subtotal				**$674,571.80**

Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
4.0	**Masonry**					
	Brick Façade and assembly (air barrier, insulation etc.)	15,903	SF	$75.00	$1,192,725.00	*$1,192,725.00*
		Division 4 Subtotal				**$1,192,725.00**

Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
5.0	**Metals**					
	Structural Steel Framing @ first level	84	TON	$5,500.00	$463,650.00	*$463,650.00*
	Structural Steel Framing @ Second Level	46	TON	$5,500.00	$251,143.75	*$251,143.75*
	Structural Steel Framing for roof MEP equipment and screens	5	TON	$4,900.00	$24,500.00	*$24,500.00*
	Stair handrails	6	FLIGHTS	$4,300.00	$25,800.00	*$25,800.00*
	Miscellaneous metals allowance	28,100	GSF	$2.05	$57,605.00	*$57,605.00*
		Division 5 Subtotal				**$822,698.75**

Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
6.0	**Woods and Plastics**					
	Rough Carpentry	28,100	GSF	$1.50	$42,150.00	*$42,150.00*
	Allowance for millwork/casework	1	ALLOW	$605,000.00	$605,000.00	*$605,000.00*
		Division 6 Subtotal				**$647,150.00**

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Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
7.0	**Thermal and Moisture Protection**					
	Insulation and damp proofing incl. in Div 4					
	Built-up Roof waterproofing system 30% total roof area	4,215	SF	$25.00	$105,375.00	*$105,375.00*
	Green Roof water proofing system 70% total roof area	9,835	SF	$51.00	$501,585.00	*$501,585.00*
	New roofing at existing building	60,582	SF	$25.00	$1,514,550.00	*$1,514,550.00*
	Metal Panels at roof screen	3,000	SF	$51.00	$153,000.00	*$153,000.00*
	Allowance for joint sealers, fireproofing, etc.	74,632	GSF	$0.75	$55,974.00	*$55,974.00*
		Division 7 Subtotal				**$2,330,484.00**

Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
8.0	**Doors and Windows**					
	Exterior glazing at new building (30% of façade)	4,771	SF	$95.00	$453,235.50	*$453,235.50*
	Replace existing windows of existing bldg.	76,840	SF	$12.00	$922,080.00	*$922,080.00*
	Skylight allowance	1,000	SF	$250.00	$250,000.00	*$250,000.00*
	Exterior double doors at main entrance	2	PAIR	$20,000.00	$40,000.00	*$40,000.00*
	Secondary entrance double doors	6	PAIR	$15,000.00	$90,000.00	*$90,000.00*
	Existing main entrance doors	4	PAIR	$20,000.00	$80,000.00	*$80,000.00*
	Existing secondary entrances	13	PAIR	$15,000.00	$195,000.00	*$195,000.00*
	Interior doors allowance	64	LEAFS	$2,500.00	$160,000.00	*$160,000.00*
		Division 8 Subtotal				**$2,190,315.50**

Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
9.0	**Finishes**					
	New Construction Interior wall construction allowance (includes interior glazing)	28,100	GSF	$8.10	$227,610.00	*$227,610.00*
	New Construction Wall finishes (paints, tack boards, ceramic, etc.)	28,100	GSF	$6.50	$182,650.00	*$182,650.00*
	Floor Finishes	28,100	GSF	$8.75	$245,875.00	*$245,875.00*
	Existing Ceiling Finish	28,100	GSF	$6.95	$195,295.00	*$195,295.00*
	Existing Interior wall construction allowance (includes interior glazing)	76,840	GSF	$8.10	$622,404.00	*$622,404.00*
	Existing Interior wall construction allowance (includes interior glazing)	76,840	GSF	$6.50	$499,460.00	*$499,460.00*
	Existing Floor Finishes	76,840	GSF	$8.75	$672,350.00	*$672,350.00*
	Existing Ceiling Finish	76,840	GSF	$6.95	$534,038.00	*$534,038.00*
		Division 9 Subtotal				**$3,179,682.00**

Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
10.0	**Specialties**					
	Toilet Partitions, accessories, mirrors and vanity counter tops	28,100	SF	$1.10	$30,910.00	*$30,910.00*
	Interior signage way finding allowance	1	ALLOW	$35,000.00	$35,000.00	*$35,000.00*
		Division 10 Subtotal				**$65,910.00**

Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
11.0	**Equipment**					
	Food Service Equipment	1	ALLOW	$650,000.00	$650,000.00	*$650,000.00*
	Dry Eraser marker boards	1	ALLOW	$125,000.00	$125,000.00	*$125,000.00*
	Audiovisual equipment - Cafeteria	1	ALLOW	$75,000.00	$75,000.00	*$75,000.00*
	Audiovisual equipment - Music Classroom	1	ALLOW	$75,000.00	$75,000.00	*$75,000.00*
	Audiovisual equipment - Classrooms	1	ALLOW	$475,000.00	$475,000.00	*$475,000.00*
		Division 11 Subtotal				**$1,400,000.00**

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Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
12.0	**Furnishings**					
	New Construction Window blinds	28,100	GSF	$0.75	$21,075.00	*$21,075.00*
	Existing Construction window blinds	76,840	GSF	$0.75	$57,630.00	*$57,630.00*
		Division 12 Subtotal				**$78,705.00**
Division Code	**Description**	**Qty**	**Unit**	**Unit Cost**	**Subtotal**	**Division Total**
14.0	**Convey Systems**					
	Elevator 2 Stops	2	EA	$110,000.00	$220,000.00	*$220,000.00*
		Division 14 Subtotal				**$220,000.00**
Division Code	**Description**	**Qty**	**Unit**	**Unit Cost**	**Subtotal**	**Division Total**
21.0	**Fire Suppression**					
	New Sprinkler System (Existing and New Construction)	104,942	GSF	$6.10	$640,146.20	*$640,146.20*
		Division 21 Subtotal				**$640,146.20**
Division Code	**Description**	**Qty**	**Unit**	**Unit Cost**	**Subtotal**	**Division Total**
22.0	**Plumbing**					
	Plumbing System Allowance (Existing and New Construction)	104,942	GSF	$15.00	$1,574,130.00	*$1,574,130.00*
		Division 22 Subtotal				**$1,574,130.00**
Division Code	**Description**	**Qty**	**Unit**	**Unit Cost**	**Subtotal**	**Division Total**
23.0	**Mechanical**					
	HVAC System allowance (Existing and New Construction)	104,942	GSF	$80.00	$8,395,360.00	*$8,395,360.00*
		Division 23 Subtotal				**$8,395,360.00**
Division Code	**Description**	**Qty**	**Unit**	**Unit Cost**	**Subtotal**	**Division Total**
25.0	**Integrated Automation**					
	HVAC System controls allowance (Existing and New Construction)	104,942	GSF	$15.00	$1,574,130.00	*$1,574,130.00*
		Division 25 Subtotal				**$1,574,130.00**
Division Code	**Description**	**Qty**	**Unit**	**Unit Cost**	**Subtotal**	**Division Total**
26.0	**Electrical**					
	Electrical System allowance (Existing and New Construction)	104,942	GSF	$36.00	$3,777,912.00	*$3,777,912.00*
		Division 26 Subtotal				**$3,777,912.00**
Division Code	**Description**	**Qty**	**Unit**	**Unit Cost**	**Subtotal**	**Division Total**
27.0	**Communications**					
	Telecommunications, public address, clock and radio	104,942	GSF	$3.25	$341,061.50	*$341,061.50*
	IT/Data Systems	104,942	GSF	$5.20	$545,698.40	*$545,698.40*
	A/V Conduits and Cabling	104,942	GSF	$0.75	$78,706.50	*$78,706.50*
		Division 26 Subtotal				**$965,466.40**

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Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
28.0	**Electronic Safety and Security**					
	Access control and CCTV systems	104,942	GSF	$3.75	$393,532.50	*$393,532.50*
	Fire Alarm	104,942	GSF	$2.75	$288,590.50	*$288,590.50*
	Intrusion detection system	104,942	GSF	$1.50	$157,413.00	*$157,413.00*
		Division 26 Subtotal				**$839,536.00**

Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
31.0	**Earthwork**					
	Rough grading site	161,314	SF	$3.75	$604,927.50	*$604,927.50*
	Erosion and Sediment Control	1	ALLOW	$100,000.00	$100,000.00	*$100,000.00*
		Division 26 Subtotal				**$704,927.50**

Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
32.0	**Exterior Improvements**					
	Clearing and grubbing site preparations	161,314	SF	$1.65	$266,168.10	*$266,168.10*
	Asphalt driveways and parking area	35,961	SF	$6.75	$242,736.75	*$242,736.75*
	Concrete curbs	1,800	LF	$40.00	$72,000.00	*$72,000.00*
	Walkway allowance	2,900	SF	$22.00	$63,800.00	*$63,800.00*
	Site Fencing allowance	1,800	LF	$90.00	$162,000.00	*$162,000.00*
	Landscaping allowance	1	ALLOW	$225,000.00	$225,000.00	*$225,000.00*
	Site lighting allowance	1	ALLOW	$150,000.00	$150,000.00	*$150,000.00*
	Baseball filed	1	ALLOW	$35,000.00	$35,000.00	*$35,000.00*
	Soccer Field	12,000	SF	$21.00	$252,000.00	*$252,000.00*
	Goals	2	EA	$3,500.00	$7,000.00	*$7,000.00*
	Field lighting	1	ALLOW	$360,000.00	$360,000.00	*$360,000.00*
	Outdoor activities and views	12,330	SF	$45.00	$554,850.00	*$554,850.00*
	Stormwater bio retention area	1	ALLOW	$275,000.00	$275,000.00	*$275,000.00*
		Division 26 Subtotal				**$2,665,554.85**

Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
33.0	**Utilities**					
	Domestic water service	1	ALLOW	$100,000.00	$100,000.00	*$100,000.00*
	Sanitary sewer service	1	ALLOW	$75,000.00	$75,000.00	*$75,000.00*
	Storm water service	1	ALLOW	$75,000.00	$75,000.00	*$75,000.00*
	Electrical service	1	ALLOW	$185,000.00	$185,000.00	*$185,000.00*
		Division 26 Subtotal				**$435,000.00**
	Conceptual Construction Total Direct Cost (Renovation and New Construction)					**$36,525,412.50**

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II. Cora Kelly Master Plan and Technical Data

Program - Capacity

Table 1 Core Academic Program

	Cora Kelly Existing Program				Ed Spec Student Model		
Use	**Program Space**	**# of spaces**	**Avg SF / Room**	**Total SF**	**# of Spaces**	**SF / Room**	**Total SF**
Core Academic	Pre-K	1		830	*8*	*1,175*	*9,400*
	Kindergarten	3	1,062	3,185	*5*	*1,175*	*5,875*
	K-2	1		965			
	1st Grade	3	773	2,320	*4*	*900*	*3,600*
	2nd Grade	3	715	2,145	*4*	*900*	*3,600*
	3rd Grade	3	800	2,400	*4*	*900*	*3,600*
	4th Grade	3	710	2,130	*4*	*900*	*3,600*
	5th Grade	3	778	2,335	*4*	*900*	*3,600*
	Extended Learning Area	2	775	1,550	*5*	*600*	*3,000*
	Classroom Bathroom						
	Special Ed	2	775	1,550	*3*	*250*	*750*
	Resource Classroom (Other)				*2*	*250*	*500*
	TAG	1	800	800	*1*	*900*	*900*
	Student Project Storage				*1*	*150*	*150*
	Headstart	2	873	1,745	*2*	*873*	*1,745*
	Citywide ED Program	4	733	2,930	*4*	*733*	*2,932*
	STEM Specialist	1		1,255	*1*	*1,255*	*1,255*
	Math Specialist	1		710	*1*	*710*	*710*
	Reading Specialist	1		770	*1*	*710*	*710*
	Sensory Room	1		275			
	Misc. Pullout	1		160			
	ELL	4	713	2,850	*4*	*713*	*2,852*
	Student Services				*4*	*100*	*400*
	Psychologist	1		215			
	Counselor	1		340			
	Speech Language Provider (SLP)	1		255			
	Occupational Therapist (OT)	1		310	*1*	*400*	*400*
	Storage				*4*	*200*	*800*
	Teacher Collab Room				*5*	*250*	*1,250*
	Early Childhood Learning				*1*	*2,000*	*2,000*
	Early Childhood Storage				*1*	*200*	*200*
	Total			**32,025**			***53,829***

21,804 SF Deficiency ***40.51%*** ***Deficiency***

Table 2 Shared Program

		Cora Kelly Existing Program			Ed Spec Student Model						
Use	**Program Space**	**# of spaces**	**Avg SF / Room**	**Total SF**	**# of Spaces**	**SF / Room**	**Total SF**				
Visual Art / Music / Science	Art Lab	1		805	*1*	*1,200*	*1,200*				
	Kiln Room				*1*	*75*	*75*				
	Art Storage	1		300							
	General Music Room				*1*	*1,200*	*1,200*				
	Instrumental Music Room				*1*	*1,000*	*1,000*				
	General Music Storage				*1*	*150*	*150*				
	Instrument Storage				*1*	*250*	*250*				
	Orchestra/Music	1		870							
	Total			**1,975**			***3,875***	***1,900***	***SF Deficiency***	***49.03%***	***Deficiency***
Media Center / Library	Reading / Learning / Circulation	1		4,375	*1*	*3,000*	*3,000*				
	Technical Processing Room				*1*	*200*	*200*				
	Combined Office / Workroom				*1*	*200*	*200*				
	Device / Changing Room				*1*	*150*	*150*				
	Storage				*1*	*200*	*200*				
	Small Group Room				*2*	*150*	*300*				
	Computer Lab	1		755							
	Total			**5,130**			***4,050***	***-1,080***	***SF (Excess)***	***-26.67%***	***(Increase)***
Physical Education	Gymnasium	1		9,265	*1*	*6,500*	*6,500*				
	PE Office				*2*	*150*	*300*				
	PE Storage				*2*	*250*	*500*				
	Multi-Purpose	-		-	*1*	*1,500*	*1,500*				
	Total			**9,265**			***8,800***	***Uses Existing Rec Center***			
Student Dining and Food Services	Student Dining Area	1		3,725	*1*	*3,000*	*3,000*				
	Chair and Table Storage				*1*	*350*	*350*				
	Serving Area				*1*	*700*	*700*				
	Kitchen Suite	1		1,655	*1*	*2,150*	*2,150*				
	Stage with Storage				*1*	*1,100*	*1,100*				
	Total			**5,380**			***7,300***	***1,920***	***SF Deficiency***	***26.30%***	***Deficiency***

Table 3 Admin. Program

		Cora Kelly Existing Program			Ed Spec Student Model						
Use	**Program Space**	**# of spaces**	**Avg SF / Room**	**Total SF**	**# of Spaces**	**SF / Room**	**Total SF**				
Administration	**Lobby**	1		565	*1*	*700*	*700*				
	Welcome Center	1		390	*1*	*450*	*450*				
	Conference Room	1		230	*1*	*250*	*250*				
	Principals Office	1		220	*1*	*180*	*180*				
	Asst. Principals Office				*1*	*150*	*150*				
	Misc. Office	1		270							
	Administrators' Workroom	2		370	*1*	*200*	*200*				
	Teacher Lounge	1		450							
	Mail Room				*1*	*125*	*125*				
	Records Room				*1*	*150*	*150*				
	Family and Community Engagement				*1*	*470*	*470*				
	Staff Toilet				*1*	*50*	*50*				
	Student Services Office				*2*	*150*	*300*				
	Student Services Conference				*1*	*200*	*200*				
	Health Suite	1		650	*1*	*900*	*900*				
	Child and Family Network	1		710	*1*	*710*	*710*				
	Data/Instructional Coach	1		235							
	After School Storage				*1*	*250*	*250*				
	Total			**4,090**			***5,085***	***995***	***SF Deficiency***	***19.57%***	***Deficiency***
Maint./ Custodial Services	**Total**			**60**			*850*	***790***	***SF Deficiency***	***92.94%***	***Deficiency***
Building Services and Restrooms	Corridors			12,625			*13,400*				
	Other Services and Restrooms			2,760			*8,600*				
	Total			**15,385**			***22,000***	***6,615***	***SF Deficiency***	***30.07%***	***Deficiency***

Table 4 Support Program and Total

	Cora Kelly Existing Program				Ed Spec Student Model						
	Use	Program Space	# of spaces	Avg SF / Room	Total SF	# of Spaces	SF / Room	Total SF			
Total Net Area (sf)					73,310			*105,789*	*32,479*	*SF Deficiency*	*30.70%*	*Deficiency*
Total Gross Bldg. Area (sf)					76,840			*114,464*	*37,624*	*SF Deficiency*	*32.87%*	*Deficiency*

II. Cora Kelly Master Plan and Technical Data

Scenario 1: Renovation and Addition

Narrative

The first scenario master plan study illustrates a condition where the existing school is kept in place with a full renovation of the existing school building and constructing a **new 28,000 sf addition** to the west of the existing school building.

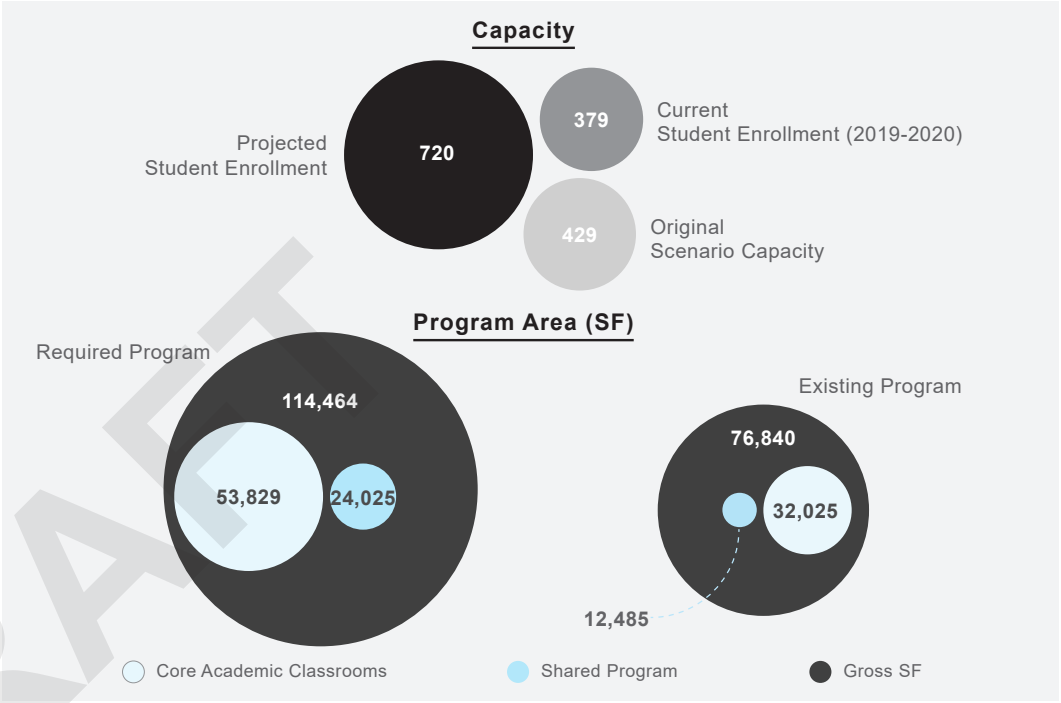
The addition may either be one or two stories but would encroach heavily into the POS at the north, and nears the RPA boundary to the west.

This is an approach that responds to immediate challenges but critically limits expandability and flexibility due to the existing site constraints. It should also be emphasized that if school capacity increases, the capacity of the shared gymnasium and its associated program in the recreation center will also increase and may succumb to over-utilization.

Swing space would need to be allocated in the city since the entire existing school building would need to be entirely shelled to meet MEP system and energy code (LEED and Net Zero) requirements. A renovated MEP system would cost approximately **$2,000,000 more** ($14.8-15.3M total renovated MEP cost) than a completely new MEP system in a new construction scenario.

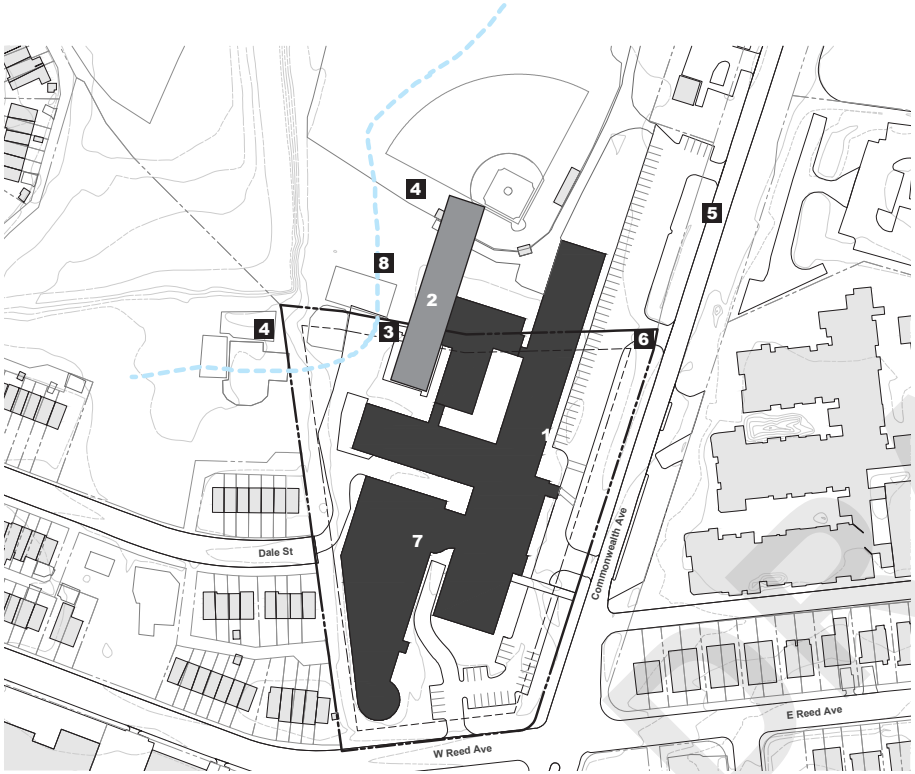
Conceptual Cost

Concept Cost Renovation School:	$48M
New Building MEP:	$12.5-13.5M
Annual Savings:	$100,000
Renovated MEP:	$14.8-15.3M
Annual Savings:	$90,000



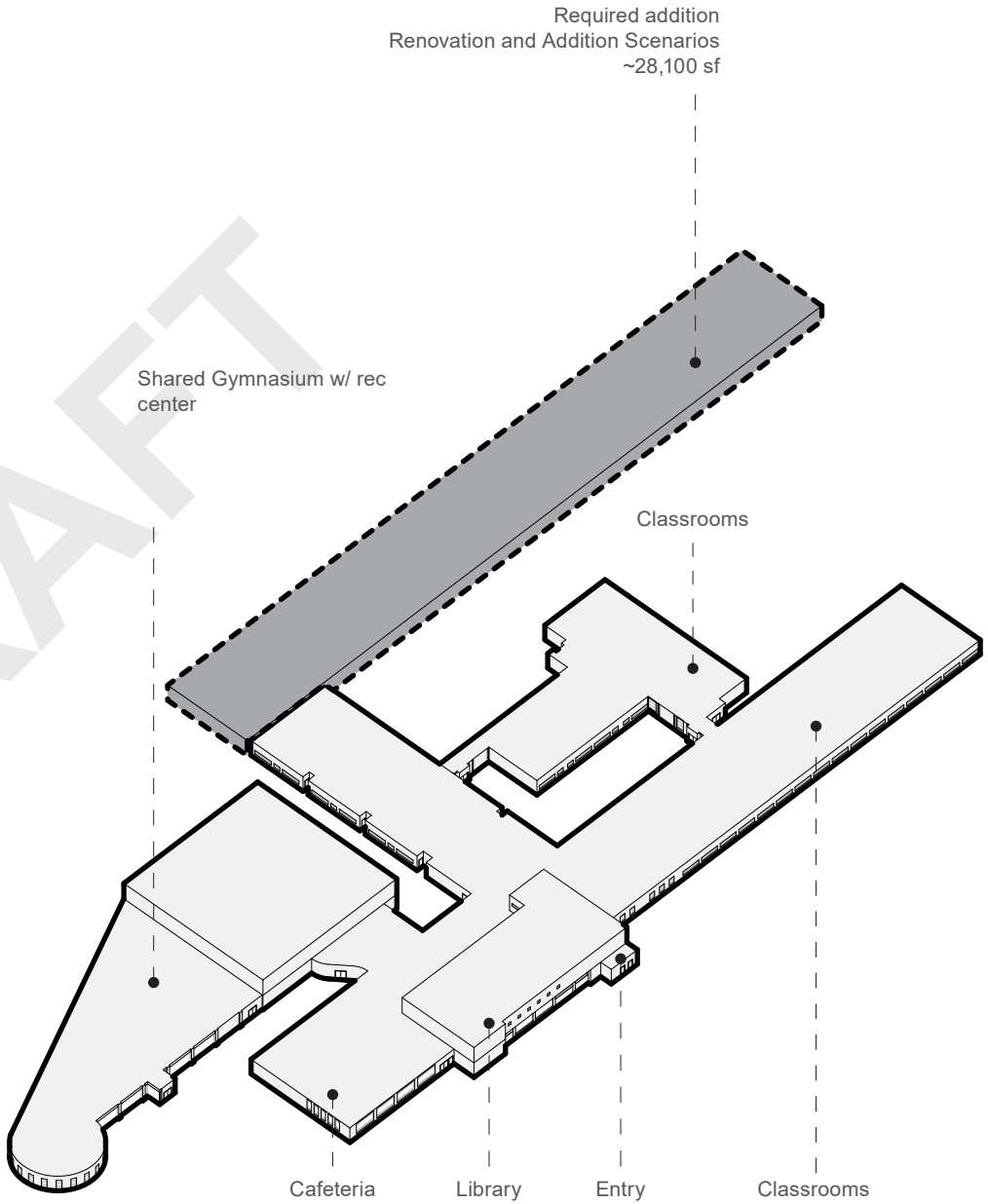
II. Cora Kelly Master Plan and Technical Data

Scenario 1: Renovation and Addition



Site Plan

1. Existing renovated school
2. 28,000 sf addition
3. Limited exterior play space.
4. Encroachment into POS.
5. Existing car drop-off
6. 72 Existing parking space.
7. Existing rec center limits siting of new construction or renovation.
8. RPA Line



II. Cora Kelly Master Plan and Technical Data

Scenario 2: Replacement School and Recreation Center (no swing space required)

Narrative

The second scenario master plan study illustrates a condition where the existing school is replaced and relocated to the northern end of the POS lot. The collegiate-sized baseball field shift slightly southeast further away from the RPA line; additional open field space is provided between the baseball field and a new recreation center with additional parking. This is an approach that responds to long-term goals and supports expandability and flexibility for future capacity changes.

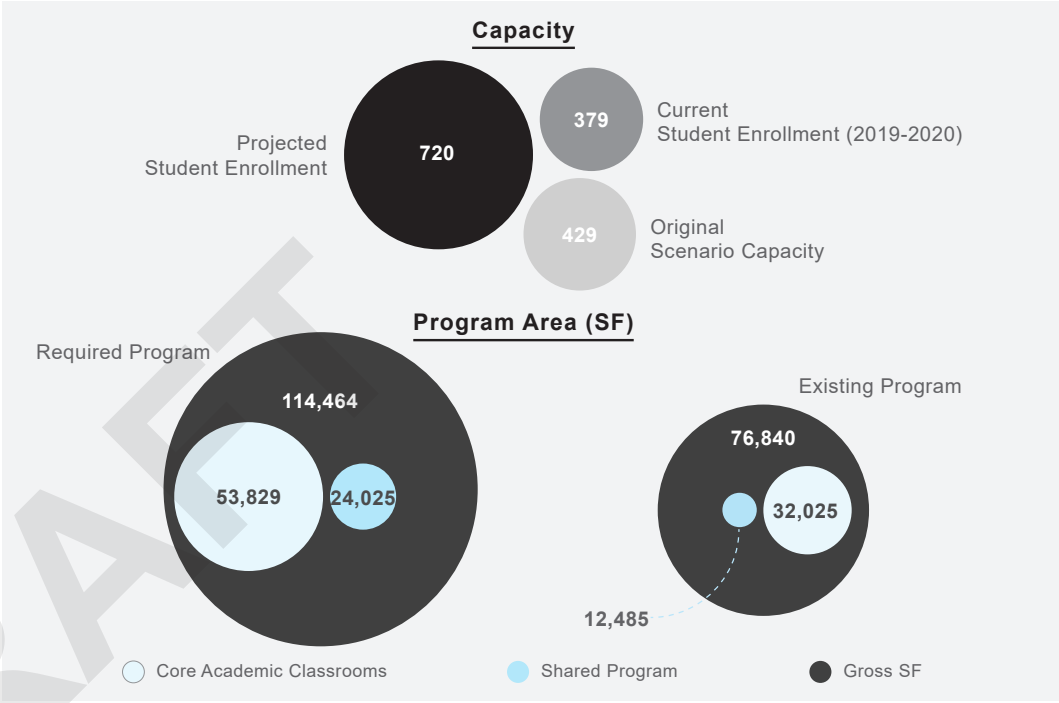
This master plan scenario allows for a dedicated entry, drop-off, and parking sequence for the school and completely separates any traffic (vehicular and pedestrian) between recreation center visitors and students. The recreation center and fields receive their dedicated parking.

Locating the school north and closer to the water (but respecting the RPA line), reinforces the STEM identity by celebrating the natural context and allowing students to explore the flora and fauna discovered along the creek and park, but within the immediate boundaries of the school. This scenario will need to account for the Four Mile Run AlexRenew Pump Station needs to accommodate the existing facilities.

Replacing and relocating the school would eliminate the need for swing space which would be a crucial cost and time savings. MEP system would cost approximately **$2,000,000 less** ($12.5-13.5M total New MEP cost) than a completely renovated MEP system in a renovation and addition scenario.

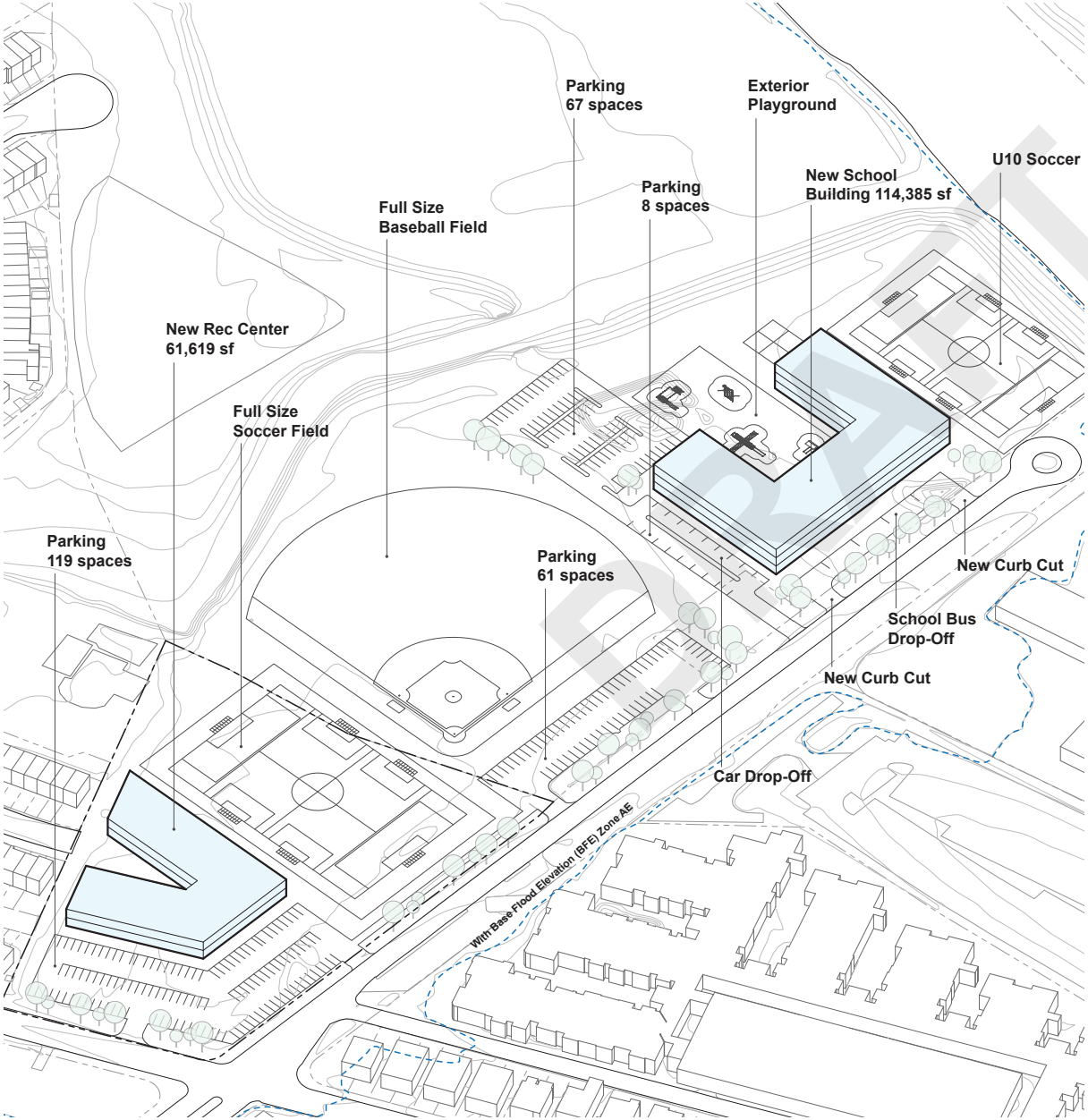
Conceptual Cost

Concept Cost New School:	$68M
New Recreation Center:	$33M
New Building MEP:	$12.5-13.5M
Annual Savings:	$100,000
New Recreation Center MEP:	$14.8-15.3M
Annual Savings:	$90,000

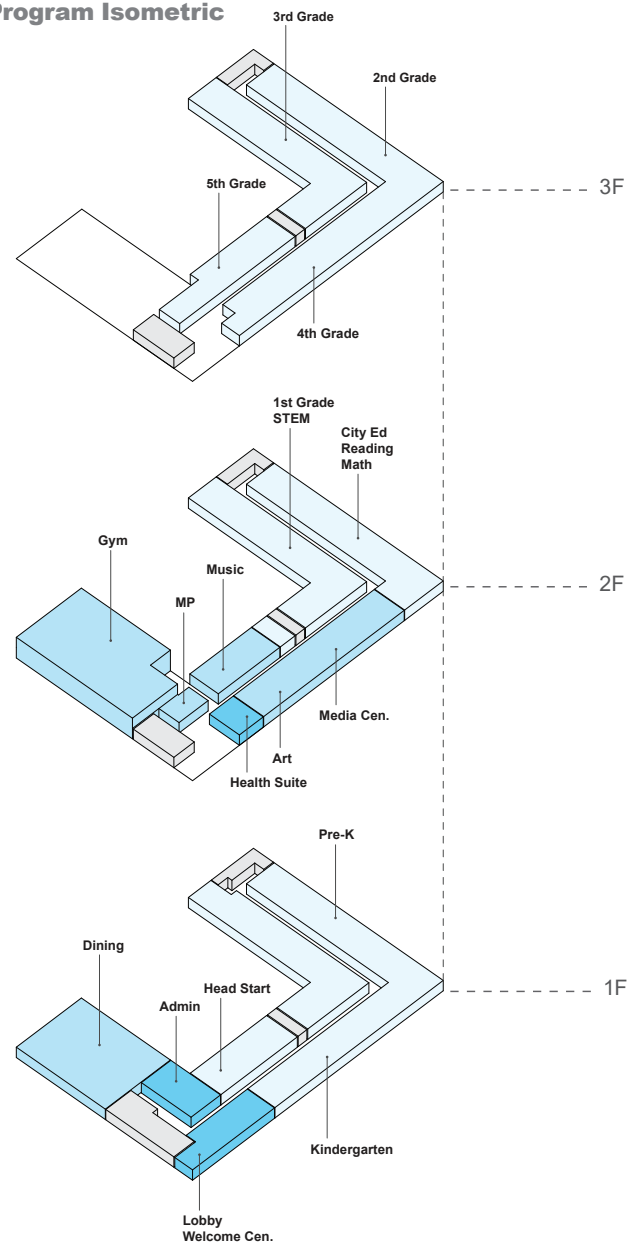


II. Cora Kelly Master Plan and Technical Data

Scenario 2: Replacement School and Recreation Center (no swing space required)



Program Isometric



II. Cora Kelly Master Plan and Technical Data

Scenario 3: Replacement School (in-place) and Existing Recreation Center

Narrative

The third scenario master plan study illustrates a condition where the existing school is replaced in place. This is an approach that responds to a long-term goal and supports expandability and flexibility for future capacity changes. However, off-site swing space would be required.

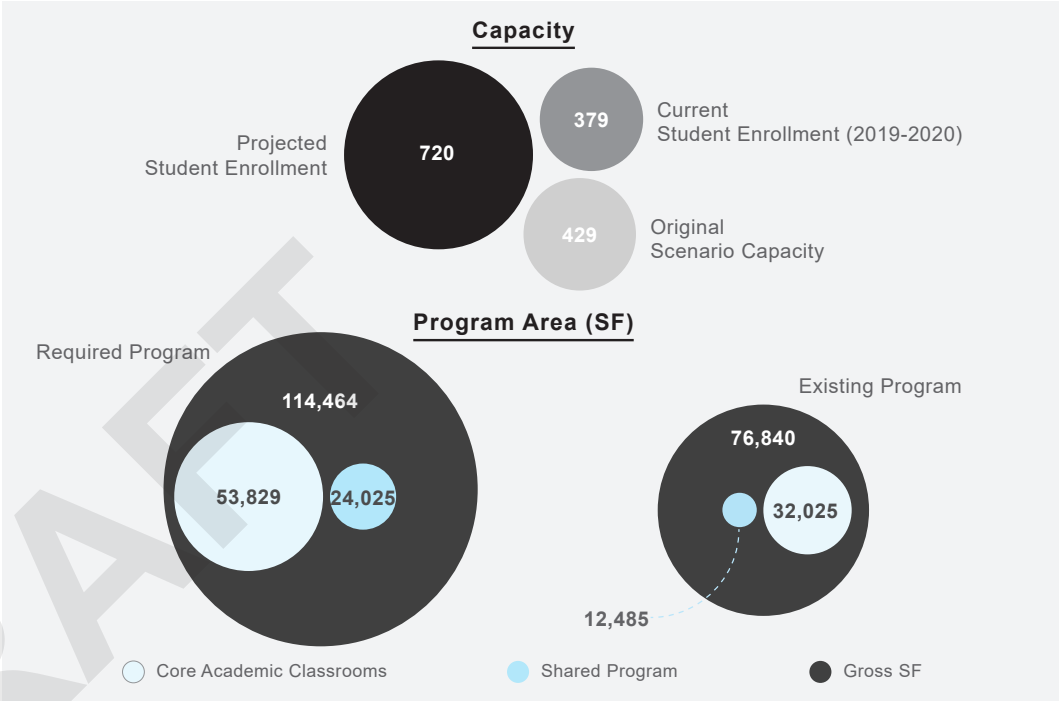
This master plan scenario allows for a dedicated entry, drop-off, and parking sequence for the school and completely separates any traffic (vehicular and pedestrian) between recreation center visitors and students. The recreation center and fields receive their dedicated parking. The recreation center would not be shared since this scenario considers a separate gymnasium within the school.

The courtyard configuration creates a private outdoor play area for the students, increases natural daylight into all occupiable rooms, and establishes a dialogue with the Four Mile Run Park and creek.

Replacing the school in place would require swing space. MEP system would cost approximately **$2,000,000 less** ($12.5-13.5M total New MEP cost) than a completely renovated MEP system in a renovation and addition scenario.

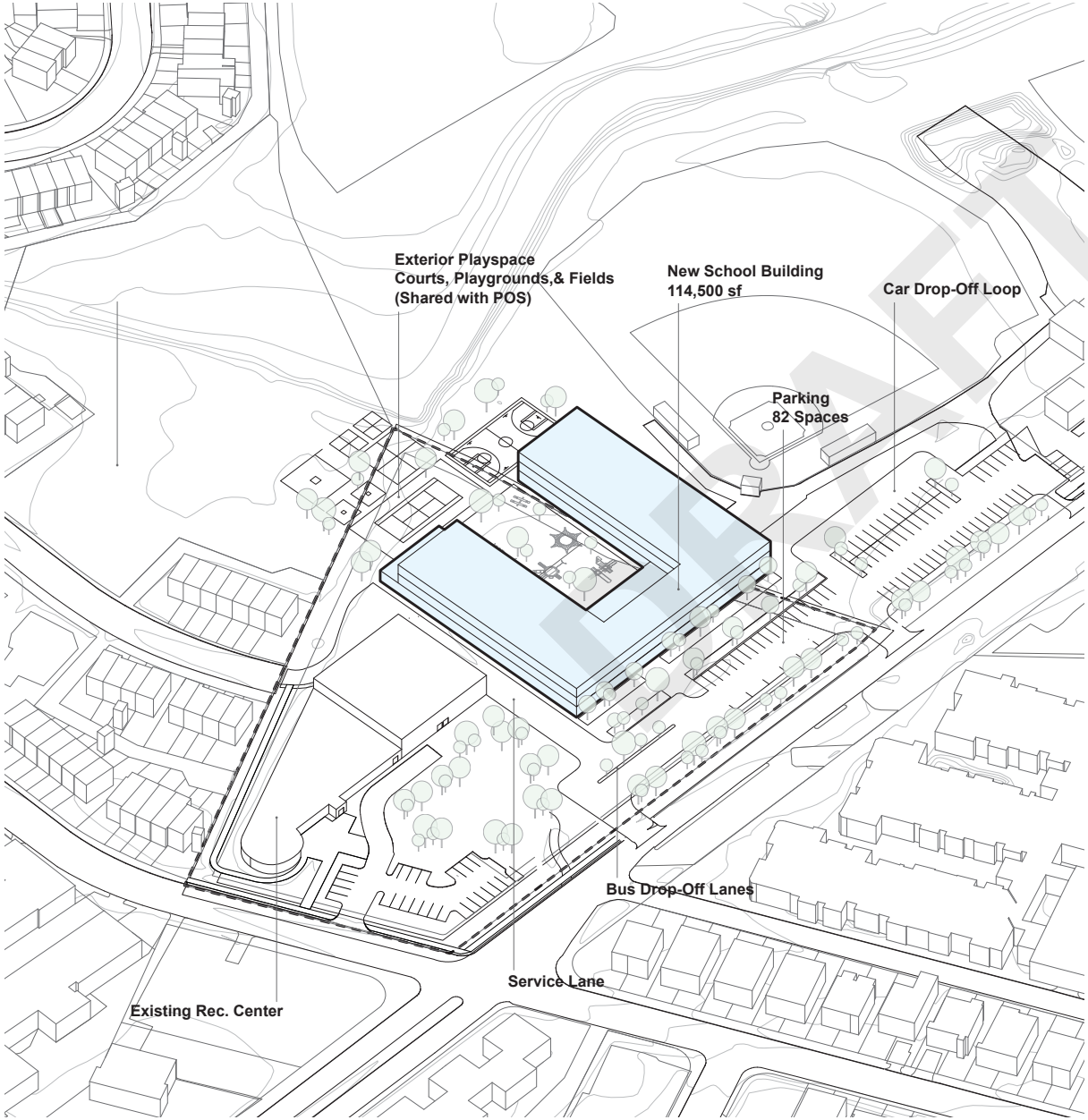
Conceptual Cost

Concept Cost New School:	$68M
New Building MEP:	$12.5-13.5M
Annual Savings:	$100,000
Renovated MEP:	$14.8-15.3M
Annual Savings:	$90,000

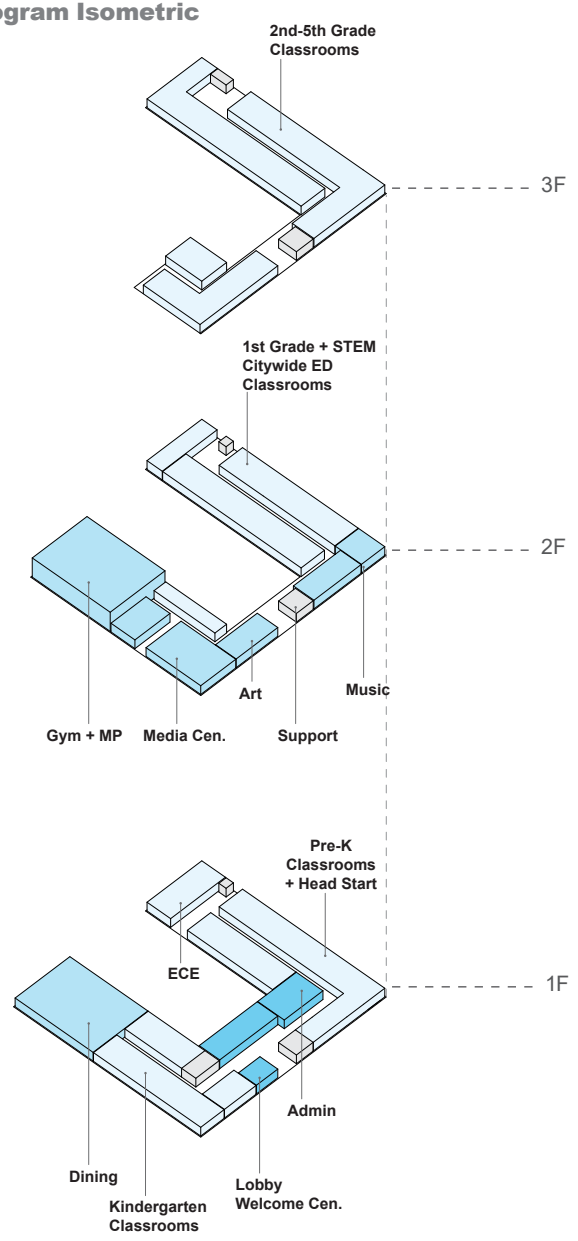


II. Cora Kelly Master Plan and Technical Data

Scenario 3: Replacement School (in-place) and Existing Recreation Center



Program Isometric



II. Cora Kelly Master Plan and Technical Data

Scenario 4: Replacement School (in-place) and Existing Recreation Center

Narrative

The fourth scenario master plan study illustrates a condition where the existing school is replaced in place and shares the existing gymnasium in the recreation center. This is an approach that responds to a long-term goal and supports expandability and flexibility for future capacity changes. However, this scenario would require off-site swing space.

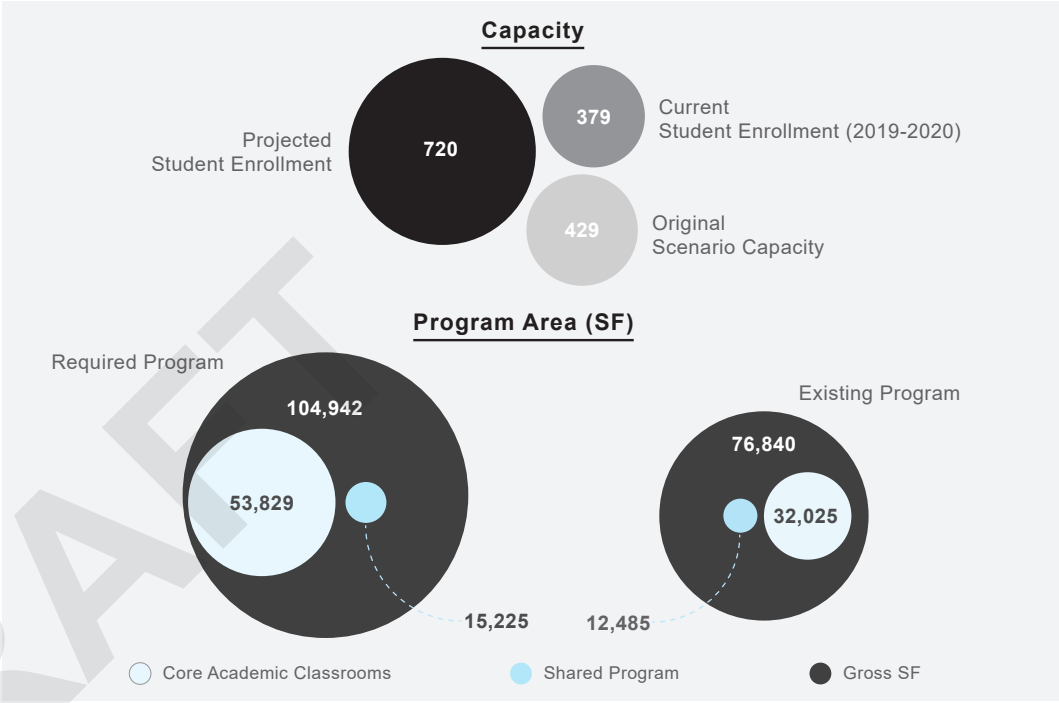
This master plan scenario allows for a dedicated entry, drop-off, and parking sequence for the school and completely separates any traffic (vehicular and pedestrian) between recreation center visitors and students. The recreation center and fields receive their dedicated parking. Although the recreation center is shared, the school is oriented on the site to allow for future expansion if the school decided to construct a dedicated gymnasium.

The courtyard configuration creates a private outdoor play area for the students, increases natural daylight into all occupiable rooms, and establishes a dialogue with the Four Mile Run Park and creek.

Replacing the school in place would require swing space. MEP system would cost approximately **$2,000,000 less** ($12.5-13.5M total New MEP cost) than a completely renovated MEP system in a renovation and addition scenario.

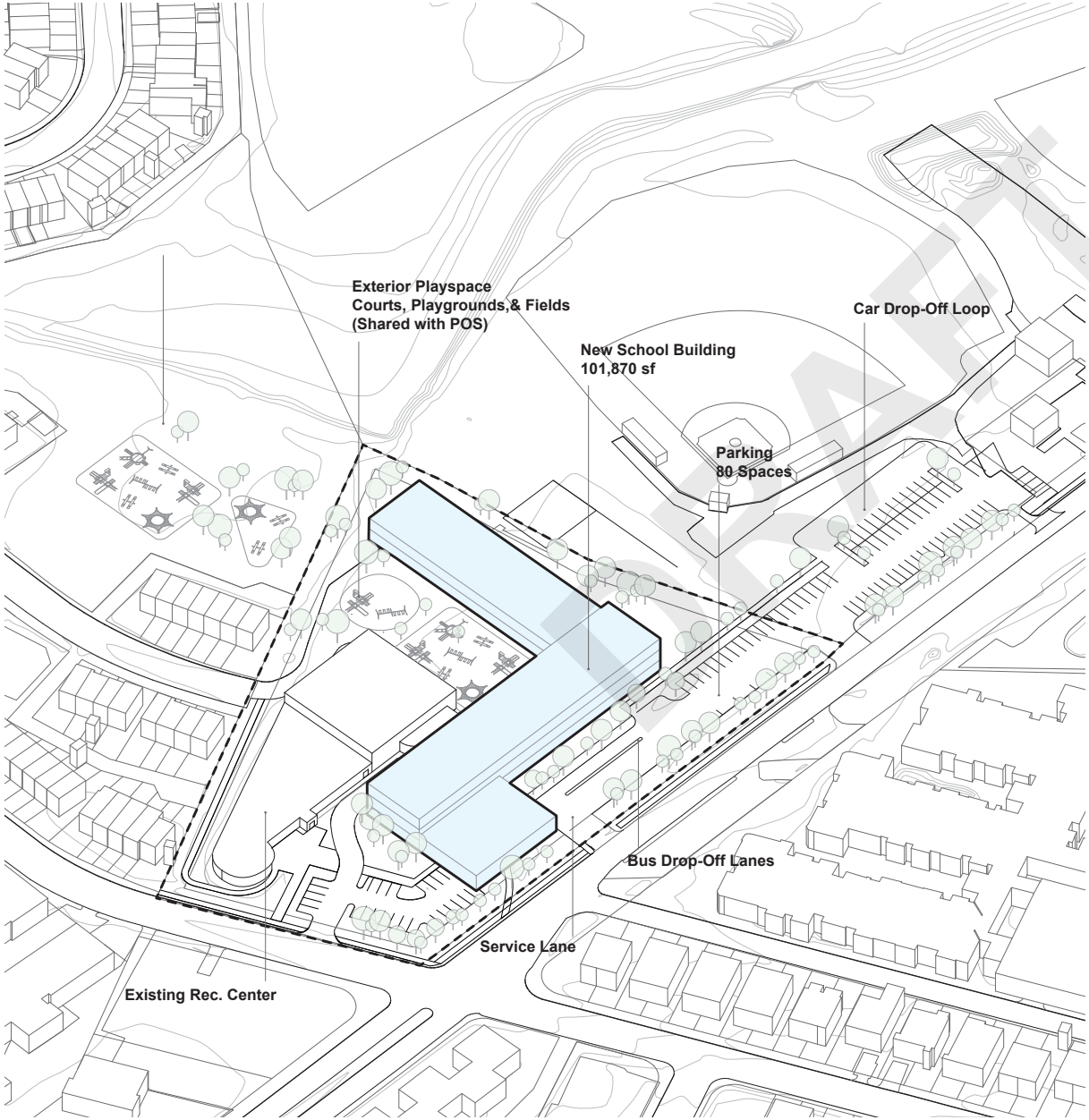
Conceptual Cost

Concept Cost New School:	$68M
New Building MEP:	$12.5-13.5M
Annual Savings:	$100,000
Renovated MEP:	$14.8-15.3M
Annual Savings:	$90,000

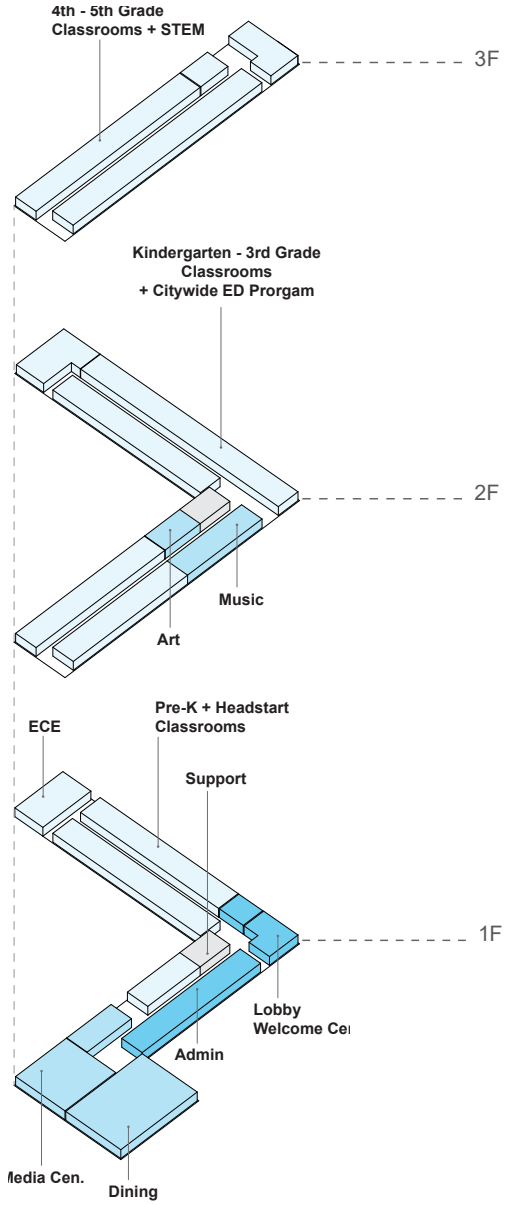


II. Cora Kelly Master Plan and Technical Data

Scenario 4: Replacement School (in-place) and Existing Recreation Center



Program Isometric



III. George Mason Master Plan and Technical Data

III. George Mason Master Plan and Technical Data

Introduction

George Mason Elementary School

George Mason was built in 1939 on a generous 9 acre lot, and since then has undergone 5 previous phases of work, which has resulted in a fragmented construction of additions used to address immediate challenges.

Critical Findings

Given the projected student capacity, the current site would exhibit a strain on on-site access for parking and drop-off, the playground space will over-utilized due to an increase in student population, and less open green space would be available. George Mason is situated in a residential context with a historic fabric that requires careful attention to site access without disrupting the character of the neighborhood. In both masterplan scenario studies, the historic frontage would be maintained and clear site access has been established on Cameron Mills Road. The master plan study provides possible scenarios in either relocating the school to the east end of the site and maintaining the historic frontage as a community building. The recreational and open green space would be shared between the community and the school. This scenarios would not require swing space or co-location. The other master plan study explores the possible scenarios of replacing the school in place and maintaining the historic frontage for the community.

The Limits and Benefits of a Feasibility Study

Although a TSSA and a Masterplan Study provide a plethora of information with respect to cost, time, and quantity, the TSSA and Masterplan do not offer, nor does it try to offer, a level of specificity that can be used as a solution or design. The benefits of a TSSA and Feasibility Study can be found both in its objective assessment of current conditions, and conceptual rigor of conveying the possible approaches to current challenges.

Issues that Require Future Study

The George Mason Park and street access entry are critical in understanding the limits and possibilities of future growth, whether it is an addition or replacement and reorientation of the school. Currently, George Mason park is limiting the school's expansion to the east, although the park is within the parcel of the school. The current site access will be critical if the student capacity grows. The school is located in a dense residential neighborhood, and an increase in vehicular movement within the neighborhood may cause unintentional disruption to the neighborhood. If George Mason experiences a substantial growth of student capacity, the current site configuration will experience severe limitations with accommodating a new addition while maintaining public open space and easing site access.

Educational Specifications

Capacity and Program

George Mason is currently **60,875 gross square feet.** Per the Ed Specs, the school is **39,940 square feet deficient** in gross building area and **49,600 square feet deficient** in the outdoor play space area. George Mason's **projected** capacity is **670 students**, with a current enrollment of 420 students based on Sept 30, 2019 enrollment data.

Site Plan

1. Insufficient area for required growth. Multiple additions built at different phases. All building systems need to be replaced.
2. No drop-off for cars and Buses, limited on-site parking.
3. Insufficient area for loading; limited turn-around space. 28 existing parking spaces.
4. Limited exterior play space bound by George Mason Park.

III. George Mason Master Plan and Technical Data

Site Assessments

Zoning and Site Utilization

George Mason Elementary school is located on 2601 Cameron Mills Rd in an R8 (Single Family) zoning district. The current lot is 407,290 square feet and the school currently shares the lot with George Mason Park which houses outdoor recreation activities.

Map and Zoning Information

Address	2601 Cameron Mills Road
Tax Map	23.04
Zoning	R8
Lot Size	407,290
Current SF	50,935
FAR	0.35
Allowed SF	142,552
Setbacks	Front- 30'
	Side- 25', 1:1 ratio
	Rear- 25', 1:1 ratio
Max Height	40'
Parking	~27 reqd, ~28 exst

Site Access and Circulation

Table 10 provides a summary of the existing and future demands for George Mason. The planned increase in student population will increase the number of buses serving the site, parking demand, and the maximum dismissal queue length. This assumes that each category of demand will increase linearly by approximately 48% to 59%, due to the 48% to 59% increase in student population. It is important to note that the existing parking supply includes the reserved spaces in the adjacent church parking lot and is currently supplemented by on-street parking on adjacent streets. If the staff population grows, the projected parking supply will still require a supplemental parking supply to accommodate the demand. If the adjacent church parking lot becomes unavailable in the future and parking on the school site does not increase, overflow onto the streets will increase, which will cause further disruption to the neighborhood.

Table 10
George Mason

	Population/Demand	
	Existing	Future
Students	420 students	650-700 students
Buses Serving Demand	3 buses	4-5 buses
Parking Demand	77 spaces	114-123 spaces
Max Dismissal Queue	6 vehicles	9-10 vehicles

Play and Open Space

In addition to the state requirements, Alexandria's new Green Building Policy requires that the existing and future stormwater demands for Cora Kelly and George Mason are 100% treated by green infrastructure practices.

To achieve 100% treatment of stormwater and meet BMP requirements, it is recommended to divide the site into multiple drainage areas. A combination of rain gardens, stone base, and under basins below permeable turf fields, over 50% green roof, and permeable parking spaces would achieve a phosphorous removal over the required 2.81 lb/yr.

All play areas should be protected from vehicular and pedestrian traffic, so students can be assured of a safe and secure environment on the entire school site. The Virginia Department of Education Facilities Guidelines recommends that each school "site have areas that can be developed to provide the minimum number of play areas require for physical education" as indicated by the chart on **Table 11.**

Alexandria school sites are urban in nature and most current and future sites cannot accommodate the recommendations outlined in the Guidelines for School Facilities in Virginia's Public Schools. However, every elementary school site should accommodate non-structured or natural play-areas as well as at least one playground. It is recommended that architects work with ACPS and RPCA to prioritize types of outdoor space development on a site-specific basis.

III. George Mason Master Plan and Technical Data

Due to the configuration and siting of George Mason and the abrupt adjacency to George Mason Park to the East, play space is heavily deficient. George Mason averages around 34,000 Sf of play area making it **49,600 sf deficient.**

Table 11
Playspace Size and Quantity

SPACE	QUANTITY
Multiuse (Hard Surface)*	(2) 100' x 120'
Fitness Development Fenced Equipment Area (PK-1)	(1) 100' x 120'
Fitness Development Fenced Equipment Area (2-5)	(1) 100' x 120'
Multiuse Field Play Area	(2) 180' x 140'

*A gymnasium may substitute for one multiuse (hard surface) play area
**Ed Specs are for a school population of 600+

Building Assessment

Safety and Security

ACPS maintains an inviting and de-institutionalized environment, while simultaneously providing a safe environment for students, staff, and community who use the facility and adjacent support services. Studio 27 Architecture evaluated the safety and security of each school in 6 categories: Building Layout, Building Materials, Uses of Technology, Visitor Management, Vehicular and Pedestrian Traffic, and Other Site Concerns.

The categories of largest concern for George Mason Elementary are Building Layout, Building Materials, Visitor Management, and Vehicular and Pedestrian Traffic. Interior circulation paths have many blind spots. Staff spaces are isolated to the front entrance and do not have views of major circulation paths. Interior finishes were adequate when installed but are now in poor condition. While the school has a very small entrance vestibule, there is no security desk and sightlines are very restricted from the entrance lobby. Bus and car drop off should occur in individual designated lanes separate from public roads and pedestrian traffic should not cross these lanes if possible.

Envelope

Cora Kelly and George Mason Elementary schools are housed in aging facilities and will require a substantial renovation or upgrade to meet LEED and Net Zero standards. Studio 27 Architecture interviewed school leaders and visited both schools to assess the current conditions of the building envelopes and evaluate the impact of the observed envelope issues.

The George Mason envelope is in poor condition. The two areas of largest concern are the windows and roof. School leaders reported concerns about the condition of the windows. Windows have been replaced in different areas of the building at different times, and there are unique issues related to each type. Older wood windows are water damaged and have non-thermal single pane glass. The newer replacement windows are very poor quality, leak, and do not lock. School leaders also reported that the roof leaks often, and S27 observed that there is visible ponding at drain locations. Other issues to note are visible cracks in the masonry, exterior entrances are in poor condition with visible rust and flaking paint, as well as large undercuts that allow an unwanted thermal transfer. Floor slab and exterior settlement cracking can be seen from the interior of the building at the main entrance and in classrooms. Like Cora Kelly, George Mason also has a very high form factor, which has a negative impact on building energy efficiency and use

Accessibility

ACPS has made it a strong priority to make its facilities accessible to all students and staff. Universal Design is one of ACPS's 10 driving design principles, established in the 2015 Educational Specifications. Universal Design is the design of buildings and environments to make them accessible to all people, regardless of age, disability, or other factors.

Since 2012, accessibility in schools has been the law. Title II of the Americans with Disabilities Act prohibits disability discrimination by all public entities, including schools, at the local and state level.

George Mason has similar accessibility deficiencies. Water fountains, classroom sinks, and bathroom facilities are not up to current standards. The majority of entrances do not have ramps and most exterior stair railings are not ADA or code compliant. Most play areas are not connected to accessible paths, and no accessible play equipment was observed.

Existing Envelope Condition






III. George Mason Master Plan and Technical Data

Technical Information

Traffic Study

This memorandum presents the findings of an operational review of the existing George Mason Elementary School located at 2601 Cameron Mills Road in Alexandria, Virginia. The purpose of this memorandum is to review site circulation, student arrival and dismissal, and parking at this location to help plan for future improvements.

At the time when Gorove/Slade our certified traffic engineering firm observed conditions at the existing location, George Mason ES served a total of 440 students. The site includes a 23-space surface parking lot with an additional 10 spaces reserved for school-use in the church parking lot adjacent to the site. The school is planned to increase its student population to include approximately 650 to 700 students in the future. Potential changes to arrival/dismissal operations and parking on the site are currently being evaluated. Figure 1 provides a map showing an overview of the George Mason ES site.

This memorandum reaches the following conclusions:

- Based on observations, the existing George Mason ES does not have any significant parking or queuing issues during arrival and dismissal. This is mainly because most of these activities being dispersed around the site and heavy use of the adjacent church parking lot for pick-up/drop-off activities.
- Parent/guardian pick-up/drop-off activity primarily occurs outside of the designated pick-up/drop-off area on Cameron Mills Road. The majority of pick-up/drop-off activity occurs in the church parking lot adjacent to the site. Several other locations are used, including Virginia Avenue and Taylor Avenue. No significant queuing issues were observed on the adjacent streets due to this

Site Operations

Regular school hours for George Mason ES are from 7:50 AM to 2:35 PM. Gorove/Slade performed arrival/dismissal site observations on Tuesday, November 12, 2019, from 7:15 AM to 8:15 AM and on Tuesday, November 19, 2019, from 2:15 PM to 3:15 PM. Based on these observations, the arrival and dismissal operations are summarized in Figure 2 and Figure 3.

Arrival Operations

Bus

There are three (3) buses that serve the school and the existing bus area can accommodate the demand with no queuing issues during arrival. Buses drop-off students in the designated bus in front of the school along Cameron Mills Road. Bus arrivals begin at approximately 7:25 AM. The second and third buses arrive in 5- to 10-minute intervals after the first, dropping-off students in the same location. Parents/guardians that arrive after all buses have departed use the bus area to drop-off their student(s) closest to the front door of the school.

Parent/Guardian Drop-off

Parent/guardian drop-off operations occur between 7:20 AM and 7:50 AM. The designated area for parent/guardian drop-off is located along Cameron Mills Road behind the bus loading/unloading area. No queues were observed in the designated drop-off area on Cameron Mills Road, most likely because (1) drop-off does not operate as first-in/first-out, so vehicles can use any available curb space and depart as soon as they drop-off independent of other vehicles and (2) the primary location for drop-offs is in the church parking lot. The church parking lot is accessible from Monticello Boulevard. Students are dropped off in the lot and enter the school property through the playground between the parking lot and the school building. Once students exit each vehicle, the vehicle departs the parking lot onto Monticello Boulevard, as shown in Figure 2. Additional drop-off activity occurs curbside along Virginia Avenue and Taylor Avenue. Overall, arrival operations are effective with no significant queuing issues.

Student Bike/Walk

In addition to bus and parent/guardian drop-off, there are several students that bike and walk to George Mason ES. Starting from 7:20 AM, crossing guards are stationed on Cameron Mills Road at the intersections of Monticello Boulevard and Virginia Avenue to assist with students that are crossing. Students begin arriving at approximately 7:30 AM. The heaviest period for walk-in students is between 7:40 AM and 7:50 AM. Most students arrive via Summit Avenue from the east, Monticello Boulevard from the west, and Cameron Mills Road from the north and south, and enter the school through the front entrance on Cameron Mills Road. Students also utilize the walking path behind the school between Westminster Place and George Mason Place.

Dismissal Operations

Bus

Three (3) buses queue in the bus loading area on Cameron Mills Road by approximately 2:20 PM to wait for student dismissal at 2:35 PM. Once dismissed, students exit the school from the front entrance and load onto their respective buses. Parents/guardians that arrive after all buses have departed use the bus area to pick-up their student(s) closest to the front door of the school.

Parent/Guardian Pick-up

Parent/guardian drop-off operations occur between 2:25 PM and 3:10 PM. The

designated area for parent/guardian drop-off is located along Cameron Mills Road behind the bus loading/unloading area. Because vehicles arrive before students are dismissed at 2:35 PM, a queue builds in the designated area. The maximum peak queue length during the dismissal period was observed to consist of six (6) vehicles. This queue did not extend past Virginia Avenue thus the queue minimally impacts non-school traffic.

Similar to arrival, heavy pick-up activity occurs in the adjacent church parking lot. Vehicles enter and exit on Monticello Boulevard. Pick-up activity also occurs in several other curbside locations, particularly along Virginia Avenue, Taylor Avenue, Summit Avenue, and Clay Street through the pedestrian path behind the school. Overall, dismissal operations are effective with no significant queuing issues.

Student Bike/Walk

Similar to arrival, there are a number of students that bike and walk from George Mason ES. It was observed that fewer students bike/walk at dismissal than arrival. A crossing guard is stationed at the intersection of Cameron Mills Road and Monticello Boulevard to assist with students that are crossing. Students exit the school through the front entrance on Cameron Mills Road that they enter through in the morning. Most students exit to the north along Cameron Mills Road, east along Monticello Boulevard, and west on Summit Avenue.

Parking

George Mason ES provides a total of 33 parking spaces. There is a 23-space surface parking lot located on the site behind the school building. An additional 10 spaces of off-street staff-only parking is provided in the church parking lot adjacent to the school. On-street parking on the adjacent streets serves as overflow parking for school staff.

The 23 spaces located behind the school building are typically occupied first. These spaces are mostly full by approximately 7:15 AM before students arrive. Once these spaces are full, staff rely on the 10 spaces in the church parking lot and the adjacent streets. It was observed that school staff currently utilize more than the designated 10 spaces in the parking lot, approximately 20 spaces. These staff parking locations remain mostly full throughout the day and during the dismissal period. Based on observations, around 30-35 staff park on-street near the school, mainly on Virginia Avenue and Taylor Avenue.

Expected Future Demand

The planned increase in student population will increase the number of buses serving the site, parking demand, and the maximum dismissal queue length. This memorandum assumes that each category of demand will increase linearly by approximately 48% to 59%, due to the 48% to 59% increase in student population. The future demands projections are based on linear growth and maybe lower, either through having fewer than the planned number of students or through additional Transportation Demand Management (TDM) programs and policies. Thus, they represent the worst-case projections of demand. It is important to note that the existing parking supply includes the reserved spaces in the adjacent church parking lot and is currently supplemented by on-street parking on adjacent streets. If the staff population grows, the projected parking supply will still require a supplemental parking supply to accommodate the demand.

- Buses Serving Demand

  The increased bus demand can be accommodated within the existing bus area on Cameron Mills Road. If a formal, on-site bus facility is added in the future, it should be able to accommodate up to five (5) buses.

- Parking Supply and Demand

  The increased parking demand cannot be accommodated within the existing 33-space parking supply on-site and in the adjacent church parking lot. If additional parking cannot be added on-site, there will be increased overflow onto the nearby streets. The existing parking supply is dependent on the availability of the adjacent church parking lot. Considerations should be as to how the site will accommodate the parking demand should this lot become unavailable.

- Maximum Dismissal Queue

  The increased bus demand can be accommodated within the existing designated pick-up/drop-off area on Cameron Mills Road. Most arrival/dismissal activity occurs in the adjacent church parking lot. If that is expected to be the long-term plan, considerations should be made as to how the site is accessed from the direction. If a formal, on-site pick-up/drop-off facility is added in the future, it should be able to accommodate up to 10 vehicles (assuming the Church lot is also used in conjunction).

Table 1
Summary of Demand

	Population/Demand	
	Existing	Future
Students	420 students	650-700 students
Buses Serving Demand	3 buses	4-5 buses
Parking Demand	77 spaces	114-123 spaces
Max Dismissal Queue	6 vehicles	9-10 vehicles

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Conclusions

The goal of arrival/dismissal operations is to minimize impacts the site may have on the surrounding areas. This memorandum concludes that the arrival and dismissal operations observed and outlined above are adequate for the needs on the site and can be conducted efficiently and effectively with minimal impacts on nearby streets. The planned increase in student population and potential site improvements present opportunities to better meet the demands of the site. Based on the projections outlined above, this memorandum recommends providing a bus loading/unloading area that can accommodate up to five (5) buses, up to 123 parking spaces, and up to 10 queued pick-up vehicles during dismissal to meet the anticipated demand. Several changes can be made to better accommodate these projected demands, specifically adjustments to; (1) the size and location of the bus area, (2) the amount of available parking, and (3) the size and location of the designated pick-up/drop-off area.

The projected five (5) bus demand can be accommodated in the existing curbside area, but a more formal or relocated area may be desired. The 123-parking space recommendation is based on anticipated growth in staff. The anticipated parking supply assumes that a supplemental parking supply will continue to be utilized, the adjacent church parking lot and nearby on-street parking in this case. If the adjacent church parking lot becomes unavailable in the future and parking on the school site does not increase, overflow onto the streets will increase. The existing designated parent/guardian pick-up/drop-off location on Cameron Mills Road is underutilized as the adjacent church parking lot is the preferred scenario. Potential site improvements present the opportunity to create a designated pick-up/drop-off area that will better meet the demands of the site. If a formal, on-site pick-up/drop-off facility is added in the future, it should be able to accommodate up to 10 vehicles (assuming the Church lot is also available, if the Church lot is not available a larger facility would be necessary).

Figure 5
Existing Site Overview

December 12, 2019

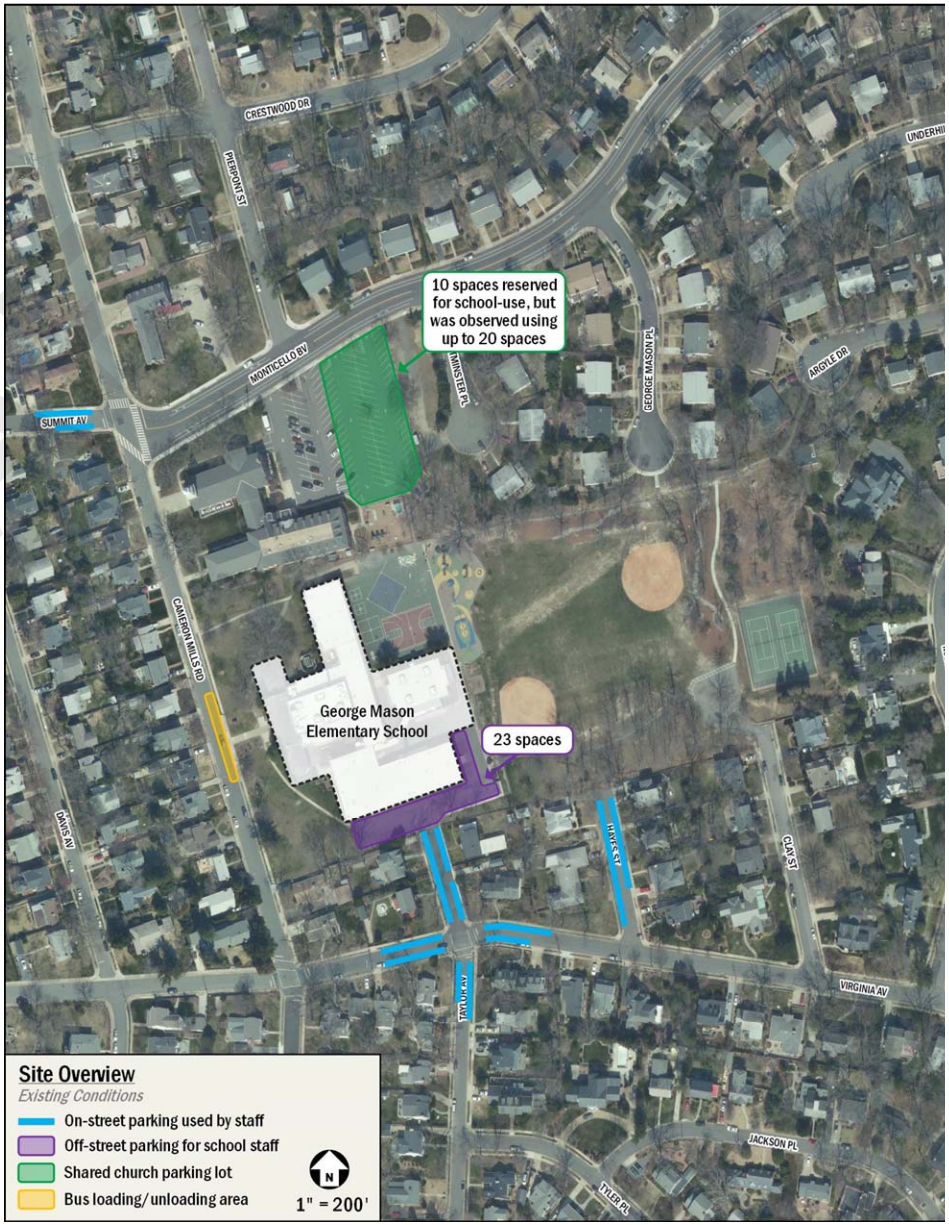

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Figure 6
Existing Drop-off Procedure Driving Arrival

December 12, 2019

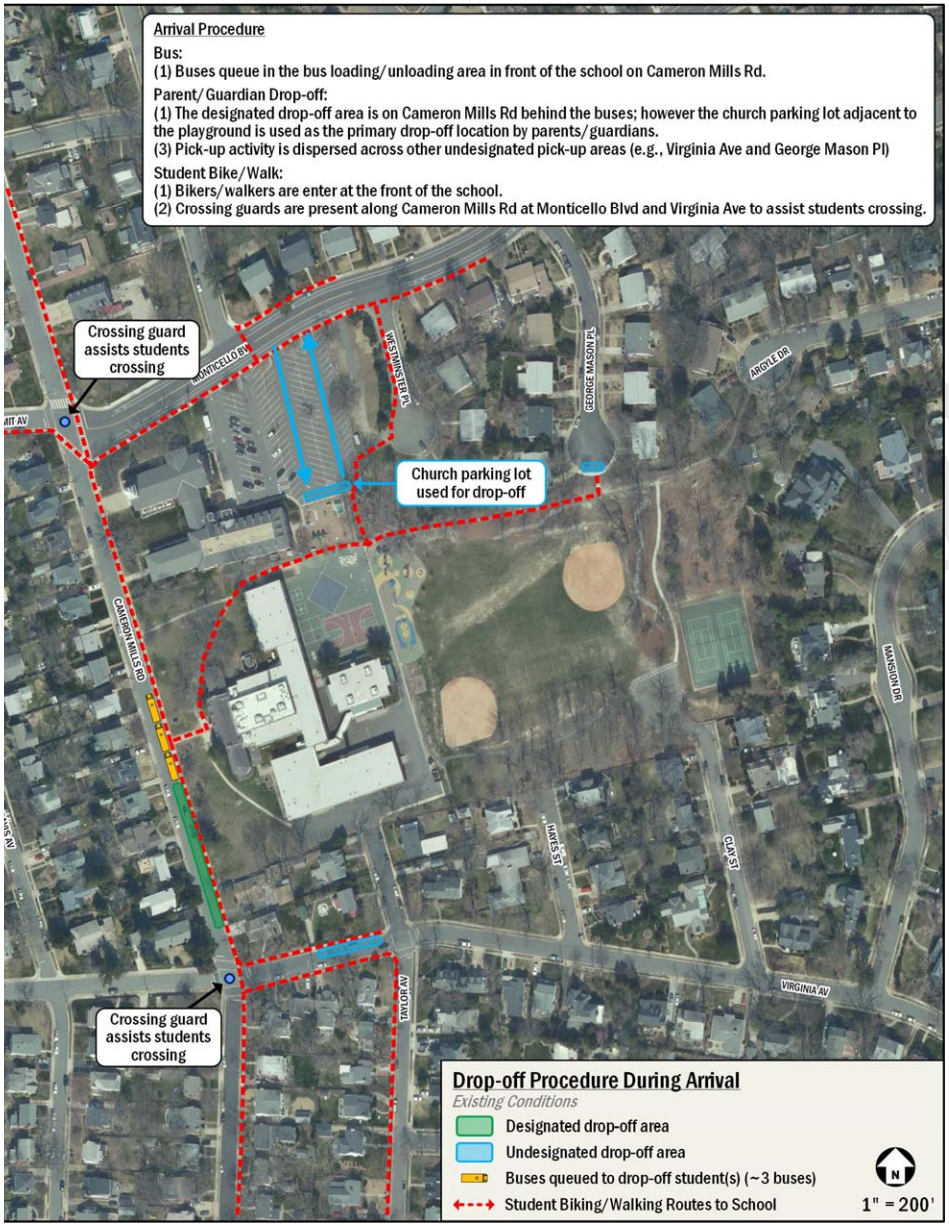
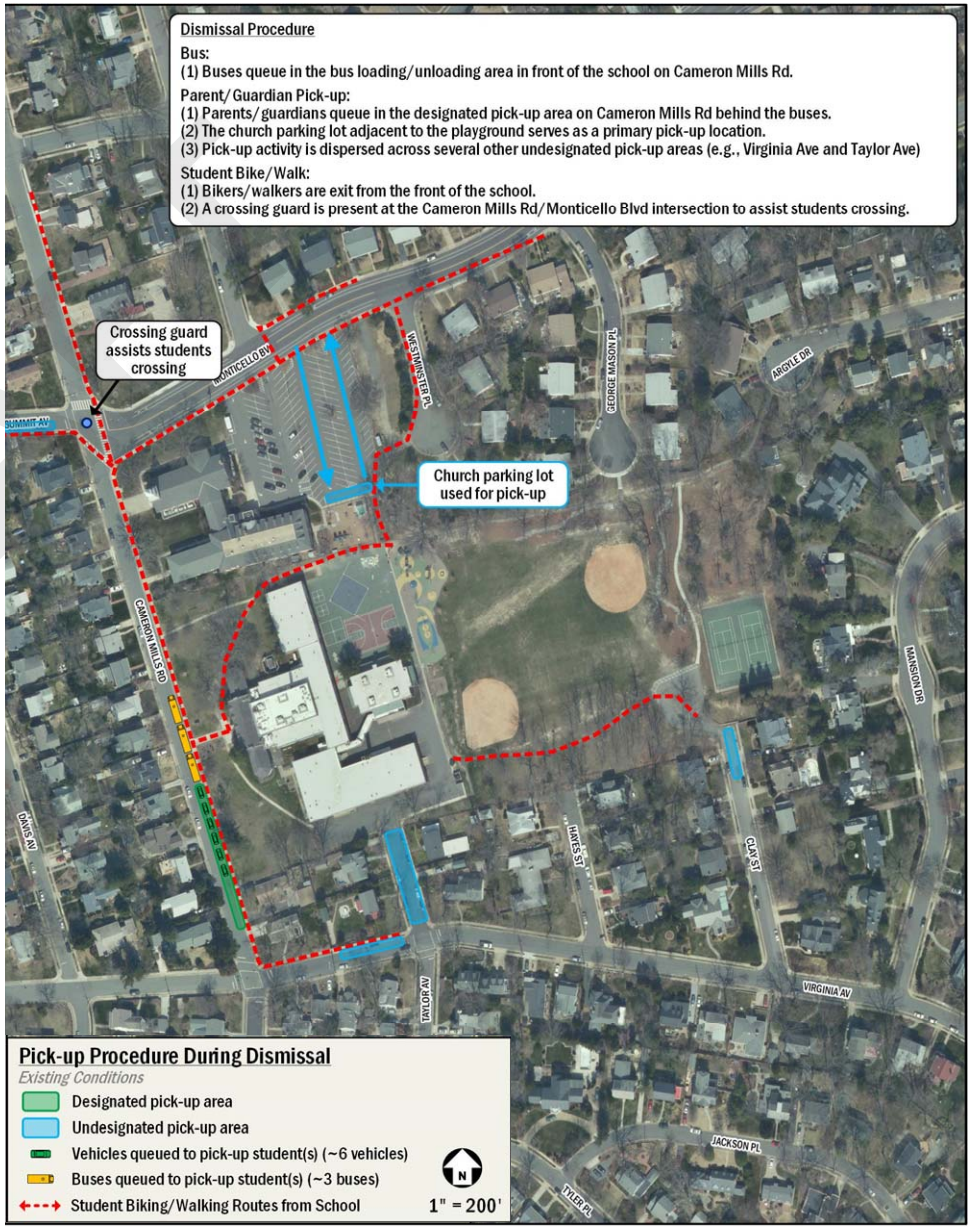


Figure 7
Existing Pick-up Procedure During Dismissal

December 12, 2019



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Technical Information

Building Assessment Data

Structural Assessment

The existing school was constructed in 1939 with numerous additions in the years since. A classroom wing was built on the south-east end of the building in 1949 and a second level was added above the central portion of the original building. In 1961 a multipurpose room was built to the east of the original building. In 2014, the space between the multi-purpose room and the 1949 classroom wing was filled with additional classrooms and the cafeteria was expanded on the west side. Apart from the second story addition, the remainder of the building is one story. Two mechanical and electrical rooms are constructed below grade, one in the original building, and one in the 1949 addition.

Existing Structural Systems

The roof systems are typically open web steel joists with bulb tee purlins supporting gypsum sheathing. Often with this type of construction, a shallow layer of gypsum is poured on top of the sheathing, but this could not be verified as it was hidden by the roofing. The typical roof is flat or slightly sloped for drainage. There is a gabled roof over the west entrance and the kindergarten classrooms that were part of the original building. The cafeteria expansion also features a gabled roof; that likely is framed with prefabricated trusses. Access to the attic spaces of the gable roofs to verify the structural framing was not possible. Mechanical units are supported with steel dunnage or curbs above the roof structure. A steel-framed roof-mounted screen wall shields the mechanical equipment zone on the 2014 classroom addition.

The 2014 classroom addition was built using modular construction. Each classroom is formed with two prefabricated units that were manufactured off-site. The roofs of these modular units are framed with cold-formed steel channels with steel deck. The ground floors are typically concrete grade slabs. The building is likely supported on shallow spread footings which are commonly used for buildings of this type. Typically, the vertical support for the floors and roof are load-bearing masonry walls. The load-bearing walls are a mixture of multi-wythe brick and concrete masonry blocks. The modular classroom units have cold-formed steel stud bearing walls. The basement walls for the mechanical and electrical rooms are a combination of multi-wythe brick and concrete block masonry.

Existing Conditions Assessment

A site visit was performed on August 27th, 2019 by Lee Ressler, PE. Generally, the existing buildings are in good structural condition, with no significant deteriorations or deficiencies observed. The existing roof membrane appeared to have been replaced within the last fifteen years, although we understand that it leaks in numerous locations. Many loose roofing screws were observed scattered on the low slope roof surfaces, and in a few instances, sticking through the membrane. From conversations with the building staff, we understand that these screws are leftover from the roof being tarped in anticipation of heavy rains that were expected from a hurricane.

Around the exterior perimeter of the original building, there are a few cracks observed in the brick masonry. Many of these cracks were around openings and appeared to be related to thermal movement, restraint cracking, rust jacking of the lintels, and minor settlement of the building. (see photos #7 thru #10). In select locations, cracked mortar joints have been routed and repointed (see photos #7 and #8).

Several roof drains were observed clogged or filled with debris. This problem typically occurred where trees were in close proximity to the roof structure (see photos #11 and #12).

At one of the stairs down to the below-grade mechanical rooms, the structural steel supporting the roof of the stairwell was badly rusted. This is likely caused by water intrusion, and being in direct contact with masonry basement walls (see photo #13).

Summary

Generally, the structure of the building is in good working condition with only minor deficiencies observed. The gypsum roof system used in the original building construction is susceptible to degradation if exposed to water. The roof leaks described by the building staff are likely related to holes in the membrane caused by tarping the roof. Water damage to the roof was not observed in the survey, but it seems probable that some damage has occurred and is hidden from view. To identify and locate any damage, the roofing would need to be removed and the gypsum deck inspected. The exterior masonry walls of the building have age-related deterioration. This deterioration will continue to progress and require periodic maintenance.

Limitations

The services provided were limited to visual observation of the condition of the building structure. No physical testing was performed and no analysis or calculations have been performed to determine the adequacy of the structural systems. Portions of the buildings and building systems were below grade or finished with materials which made them inaccessible and unobservable. In these areas, latent problems may exist which could not be identified. This report has been prepared solely and exclusively for the client to assist in the evaluation and rehabilitation of this project. It is not intended for use by others or for other than the stated purpose. The conditions reported are as visually observed on the denoted timeframes. We reserve the right to amend this report in the future, if and when previously unknown or unseen conditions are discovered or additional information becomes available.

Ehlert Bryan has strived to perform the services in a manner consistent with that level of care and skill ordinarily exercised by members of the architectural/engineering profession currently practicing in the same locality under similar conditions. No other

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representation, express or implied, and no warranty or guarantee is included or intended in this report.

MEP Narrative

Current Code and Standard Compliance:

2015 Virginia Statewide Building Code (VUSBC)

2015 International Building Code (IBC) with Virginia Amendments

2015 International Mechanical Code (IMC) with Virginia Amendments

2015 International Plumbing Code (IPC) with Virginia Amendments

2015 Virginia Statewide Fire Prevention Code
NFPA 90A

2014 National Electric Code / NFPA 70

2015 International Fuel Gas Code (IFGC) with Virginia Amendments

2015 International Energy Conservation Code (IECC) (or ASHRAE equivalent)

ASHRAE 90.1-2010

ASHRAE 55-2013

2005 SMACNA HVAC Duct Construction Standards - Metal and Flexible

Existing Facility Mechanical

Overview

George Mason Elementary School was built in 1939. The building had two major renovations, in 1949 and 1977. Other building renovations took place in 1988, 1997, and 2005. In 2014 the school had an expansion which included an enlarged cafeteria, and four new classrooms.
The majority of the existing building is served by floor-mounted fan coil units, rooftop-mounted VAV air handling units that were manufactured in 2013, DX split systems as well as VRF systems in the newer addition. RTUs are gas-fired and DX cooled. In a replacement scenario, it is not recommended to repurpose any of these units.

Fan coil units are in poor condition. They are no longer being controlled with thermostats and are extremely noisy. It is recommended that these units be replaced.

The rooftop units are in fair condition and have 5-10 years of remaining expected useful life.

DX split system was observed to be inoperable. It was noted by the building staff that the unit was not connected and is inoperable. It is recommended that this unit be investigated and repaired/replaced.

The VRF system in the new addition was in good condition. These systems have an additional expected useful of 10-12 years.

Hydronic piping is noted that is experiencing leaks and throughout the system. It is recommended that the existing building piping be replaced.

Heating hot water for the fan coil units is produced via (2) Fulton Gas Fired pulse combustion boilers. The boilers appear to be approximately 15 years old. Expect to replace in the next 3-5 years.

Chilled water for the fan coil units is produced by a Carrier air-cooled chiller. The chiller appears to be new and in good condition.

Heating hot water and chilled water is distributed throughout the facility by centralized pumps with variable frequency drives. The pumps appear to be in fair condition.

Building air is exhausted with roof-mounted exhaust ventilators. The ventilators are in fair condition.

All existing units, associated ductwork, controls, and air devices in areas to be renovated shall be removed. Existing terminal equipment, such as unit heaters, VAVs, etc. shall be removed. It is not anticipated that any existing mechanical infrastructure in renovated areas will be utilized for future use.

Demolition of existing equipment shall be performed in a phased manner as required by overall project phasing.

Photo #7
Typical Brick Deterioration & Repairs

Photo #8
Typical Brick Deterioration & Repairs

Photo #9, #10
Typical Brick Crack & Deterioration

Photo #11
Clogged Roof Drain

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Scope of Work

New Facility Mechanical

If it is determined that the existing building will be demolished or be required to have a major renovation, see the following recommendations for new system design.

Replacement Design Conditions

The design criteria listed below shall be used for conceptual HVAC design, payback evaluation, and heating/cooling load calculations.

Site Data:

Building Location: Alexandria, VA
Physical Address: 3600 Commonwealth Ave
Square Footage of Renovated Area: See Architectural sq. ft.
Main Building Total Area: See Architectural sq. ft.
Latitude: 38.82 / Longitude: -77.07, Elevation: 60 feet
Building Orientation: Main entrance faces East/Southeast
ASHRAE 90.1 Climate Zone: 4A

Outdoor Design Conditions

Based on ASHRAE 2017 Handbook - Fundamentals for Ronald Reagan Washington Natl, VA, USA

Heating - ASHRAE 99.6% Peak Design Condition: 17.9 deg F DB

Cooling - ASHRAE 0.4% Peak Design Condition: 94.7 deg F DB / 75.5 deg F MCWB

Indoor Design Conditions

Equipment shall be sized and designed to maintain the following setpoints within a 2-degree deadband. The maximum class size is assumed to be 24 students and one teacher.

Classrooms / Support Spaces:

Heating Season:	Occupied Mode:	70 deg F DB / no humidity control
	Vacant Mode:	68 deg F DB
	Unoccupied Mode:	60 deg F DB
Cooling Season:	Occupied Mode:	75 deg F DB / 40-60% RH
	Vacant Mode:	78 deg F DB
	Unoccupied Mode:	85 deg F DB

Toilet Rooms / Group Restrooms: Ventilated/Exhausted

Cafeteria:

Heating Season:	Occupied Mode:	70 deg F DB / no humidity control
	Vacant Mode:	68 deg F DB
	Unoccupied Mode:	60 deg F DB
Cooling Season:	Occupied Mode:	78 deg F DB / 40-60% RH
	Vacant Mode:	82 deg F DB
	Unoccupied Mode:	85 deg F DB

Building Occupancy & Schedule

The facility is anticipated to be occupied Monday through Friday, 7 am-5 pm and Saturday/Sunday based on a special event scheduling only. The building will not be utilized year-round. The administration area (out of scope) is the only area that was stated to have year-round occupancy. Detailed occupancy and loading schedules shall be provided as part of future space by space analysis.

System Options

System modeling and selection will be determined during the design phase. For budgeting purposes, two probable system options are as follows:

Option 1 - Geothermal Heat Pumps with DOAS

This option has been explored by CMTA due to energy performance and overall system simplicity as it relates to controls and operation. The HVAC system for this option consists of unitary geothermal heat pumps for zone thermal comfort control and dedicated outdoor air handling units (DOAS) with fixed-plate energy recovery for delivery of code required outside air. The ventilation (outside) air is de-coupled from the HVAC heating and cooling with each space (or zone) receiving outside air separately utilizing demand control ventilation.

Photo #12
Clogged Roof Drain

Photo #13
Rusted Steel Roof Over Mechanical Room Stair

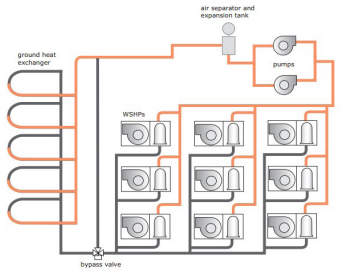

Figure 3
Ground Loop Heat Pumps

Figure 4
Water Source Heat Pump

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Each heat pump will be a high efficiency, variable speed compressor heat pump unit (below 5 tons) with an ECM fan motor. Units can be horizontally hung and installed in the plenum space above the ceiling or floor mounted in closets outside of the classroom. Each heat pump unit will utilize refrigerant R-410A and will have an ozone-depleting potential (ODP) of 0.05 or less.

Each classroom zone is anticipated to have its heat pump and space temperature sensor, one per room or shared (1 per two adjacent classrooms – TBD). The unit will operate by maintaining the temperature of the space based on the adjustable space temperature setpoint. Each space temperature sensor shall have a push-button override for a 2-hour (adjustable) override to the occupied mode of operation.

Each office and corridor zone is anticipated to have a shared heat pump with VAV diffusers to allow thermal comfort control in each office. The unit will operate with a static pressure reset controlling the ECM fan motor. Each space temperature sensor shall have a push-button override for a 2-hour (adjustable) override to the occupied mode of operation. The Cafeteria will each have a new single-zone VAV geothermal water-cooled packaged RTU installed. The unit will operate by maintaining the temperature of the space-based on averaging multiple space temperature sensors. Each space temperature sensor shall have a push-button override for a 2-hour (adjustable) override to the occupied mode of operation. Where demand control ventilation is applied, spaces will include a CO2 sampling/measuring port and occupancy sensors. The thermostat (and associated sensors), CO2, and occupancy sensors are to interface to the building automation system. The CO2 measuring port and occupancy sensor inputs will be utilized to control the space ventilation terminal unit and space temperature setpoints.

All heat pump units shall have a fully ducted supply and return with sheet metal ductwork. Each heat pump unit will include a duct-mounted pre-filter rack. The pre-filters shall be 24”x24” Flanders/FFI PrePleat 40. Each heat pump shall include an integral disconnect switch. Condensate for each unit will be disposed of through a floor drain or open receptacle into the sanitary system.

Approximate sizes are as follows:

- Classrooms - The heat pump unit zones serving classrooms will utilize units sized between 2-6 tons, depending on classroom size and location within the building.
- Corridors - The heat pump unit zones serving corridors will utilize units sized at approximately 2 tons.
- Offices - The heat pump unit zones serving offices will utilize units sized at approximately 2 -3 tons, depending on office zone size and location within the building.
- Cafeteria – The water-cooled packaged RTU will be sized for approximately 25-tons.

Ventilation Systems (DOAS)

The DOAS unit shall provide ventilation air as described in Option 2. However, it shall be configured as a water-cooled unit with listed manufacturers as Trane, Valent, or Carrier or other approved equal.

Geothermal Well Field and Piping System

The well field geothermal system pumping system shall consist of two variable flow pumps (one operational – one 100% standby) for pumping the water to all heat pumps and geo AHU’s/RTU’s throughout the building. The pumps shall be located in the Mechanical Room and circulate water throughout the well field.

Option 2 – 4-Pipe Fan Coil Units and Dedicated Outdoor Air System (DOAS)

The HVAC system for this option shall utilize 4-pipe fan coil units for zone thermal comfort control and outside air handling units with fixed-plate energy recovery for delivery of code required outside air. A central air-cooled chiller, pumping system, and chilled water piping network will be utilized to circulate chilled water to each unit. Chiller shall be equal to Trane Stealth, tonnage to be determined. Chiller contains two refrigerant circuits. The boilers shall be gas-fired, high-efficiency condensing style boilers to reduce energy consumption. Boilers shall be equal to Viessmann Vitocrossal 300, 3,000 MBH, 2 each.

The ventilation (outside) air is de-coupled from the HVAC heating and cooling with each space (or zone) receiving outside air separately utilizing demand control ventilation. Each fan coil unit will be equipped with an ECM fan motor, 1” disposable MERV 8 filter, hydronic heating and cooling coil,

Figure 1
Fan Coil Units

Figure 2
DOAS Unit with Heat Recovery

piping package with two-way modulating control valve, strainer, balance valve, and isolation valves. Units can be configured horizontally (hung and installed in the plenum space above the ceiling) or vertically (floor-mounted in the space). The unit controller shall either be provided by Temperature Controls Contractor and field installed or provided by Unit Manufacturer and factory-installed.

Hydronic (chilled water and heating hot water) piping and insulation shall be as follows:

- 2" and smaller: Type L drawn-copper tubing with brazed or pressure-seal (Propress) joints and wrought, cast copper fittings, brazed or pressure-seal. Mineral fiber preformed pipe insulation with all service jacket for indoor, concealed piping.

- 2 ½" and larger: Carbon steel, Schedule 40, with wrought-steel fittings and wrought-cast or forged-steel flanges and flange fittings, welded and flanged joints. Mechanical grooved couplings may be considered as a bid alternate. Mineral fiber preformed pipe insulation with all service jacket for indoor, concealed piping. Outdoor exposed piping shall have stucco embossed aluminum jacket.

- Each classroom zone is anticipated to have it's unit and space temperature sensor, one per room. The unit will operate by maintaining the temperature of the space based on the adjustable space temperature setpoint. Each space temperature sensor shall have a push-button override for a 2-hour (adjustable) override to the occupied mode of operation.

- Each office zone is anticipated to have a shared unit with VAV diffusers to allow thermal comfort control in each office or a dedicated unit. The unit will operate with a static pressure reset controlling the ECM fan motor for variable flow with shared units. Each space temperature sensor shall have a push-button override for a 2-hour (adjustable) override to the occupied mode of operation.

- The Cafeteria will be served by a single-zone VAV Air Handling Unit, 4-pipe. The unit will operate by maintaining the temperature of the space-based on averaging multiple space temperature sensors. Each space temperature sensor shall have a push-button override for a 2-hour (adjustable) override to the occupied mode of operation.

- IT Rooms shall be served by air-cooled DX split systems, approximately 1 to 1.5 tons each.

Where demand control ventilation is applied, spaces will include a CO2 sampling/measuring port and occupancy sensors. The thermostat (and associated temperature sensors), CO2, and occupancy sensors are to interface to the building automation system. The CO2 measuring port and occupancy sensor inputs will be utilized to control the space ventilation terminal unit and space temperature setpoints.

All fan coil units mounted above the ceiling shall have a fully ducted supply and return with sheet metal ductwork. Each unit shall include an integral disconnect switch. Condensate for each unit will be gravity drained where possible.

Approximate sizes are as follows:

- Classrooms - The zones serving classrooms will utilize units sized between 2-6 tons, depending on classroom size and location within the building.
- Corridors - The zones serving corridors will utilize units sized at approximately 2 tons.
- Offices - The zones serving offices will utilize units sized at approximately 2 -3 tons, depending on office zone size and location within the building.
- Cafeteria – The RTU will be sized for approximately 25-tons.

Ventilation Systems (DOAS)

The outside air systems for the building shall be de-coupled from the conditioning systems. In general, outside air shall be provided directly to the occupied zone. The dedicated outside air handling unit will be outdoor, roof-mounted, double-wall construction, and include dual supply/exhaust plenum fans. The units shall be variable volume energy recovery type units utilizing building exhaust and general exhaust air to precondition the outside air through a total energy recovery enthalpic plate. All conditioned outside air ductwork and building exhaust air ductwork will not be insulated – this applies to positive pressure outside air ductwork and negative pressure exhaust air ductwork. All unconditioned air ducts shall be insulated with 3" thick, ¾ pcf duct wrap with vapor barrier – this applies to negative pressure outside air ductwork and positive pressure exhaust air ductwork.

The DOAS unit shall be a packaged air-cooled, DX cooling, natural gas heat, unit with listed manufacturers like Trane, Valent, Carrier, or other approved equal. The outside air units will consist of the following sections/components: stacked and in the direction of airflow will be an inlet filter, enthalpic plate, plenum type, dual exhaust air fans (each sized at 50% airflow), on the bottom will be an inlet filter, enthalpic plate, access, gas-fired heating section, access, plenum type, dual supply air fans (each sized for 50% airflow), and final filter bank. Each fan bank will be controlled by a VFD for varying airflow conditions. During low ventilation conditions, only one of the fans would be needed to meet the ventilation requirements. The exhaust fan is sized at 20% reduction in capacity (thus maintaining building pressurization). The supply air distribution system will supply outside air to terminal units for distribution of outside air to each zone. The outside air conditioning system will be provided with an air-cooled DX circuit. The resulting winter supply temperature is approximately 70 degrees F and the summer supply air temperature shall be approximately 68 degrees F DB/63 degrees F WB.
To control outside air, a central CO2 monitoring system (Aircuity) will be provided to take advantage of building diversity. Each variable occupied area/room will contain

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a CO2 measuring port with a high quality central CO2 sensor. The VAV terminal will modulate in accordance with space CO2 measurements. The VAV terminal will also be interlocked with a room occupancy sensor. The ventilation rate will be modulated based on occupied and vacant spaces conditions. The total space by space occupancy count is expected to exceed actual building occupancy. Designing a variable ventilation system based on actual building occupancy reduces the central ventilation system by approximately 30 percent, thus reducing the overall HVAC load.

Building Automation System (BAS) / HVAC Controls

All new packed equipment shall be provided with DDC controllers for integration to BAS. All existing equipment shall be integrated into new BAS.

The following shall be included as part of the controls scope of work:

- Control or integration of new terminal equipment (fan coil units).
- Control devices (valves, sensors, etc.) and controller by TCC or equipment manufacturer has not yet been determined.
- Integration of new Air Handling Units and DOAS Units. It is anticipated that unit level controls and controller will be provided by unit manufacturer.
- Integration of rooftop HVAC units (gym, etc).
- Integration of HVAC central plant (boilers/chillers)
- Control of hydronic pumps
- Exhaust fan control for toilet rooms, restrooms, etc.
- Supplemental heater control (unit heaters, cabinet heaters, etc.)
- IT Server / MDF rooms – space temperature monitoring and alarming
- Plumbing –domestic hot water heater temperature monitoring and alarming
- Plumbing –domestic water circulation pump control and monitoring
- Kitchen –makeup air unit monitoring and cooler/freezer temperature monitoring and alarming
- Energy Meters – monitoring and BTU/energy tabulation for primary natural gas and electric consumption

Existing Facility Plumbing

Overview

The existing building plumbing systems, including domestic hot and cold water, sanitary and vent piping. The existing piping systems in the original building appears to be original to building.

Natural Gas Service

A metered natural gas service is currently supplied to the building by Washington Gas. The service serves the RTUs and domestic hot water heaters . No documentation was found to indicate the age of the existing piping system. The exterior piping has flaking paint and is beginning to rust on surface and at flanges.

Recommend refinish/paint exposed piping if building is to remain and be renovated.

Plumbing Waste and Vent Piping

Waste and Vent piping that was observed appeared to be original which is 60+ years old and past its rated useful life. Recommend replace all building original piping with new.

Roof Drains and Piping

Roof Drains appear to have been recently replaced and are in fair to poor condition. Storm piping that was observed throughout the building appears to be original which is 60+ years old and is past its rated useful life. Recommend replace all building original piping with new. Some roof drains were observed as being blocked with plants growing out of them recommend walking the roof and cleaning out all roof drains.

Domestic Water Piping

Domestic water enters the building into a classrooms casework on Commonwealth Ave side of the building. The service size is approximated as 2 1/2”. Domestic water piping that was observed appeared to be original which is 60+ years old and past its rated useful life. Recommend replace all building original piping with new. In addition it is recommended to relocate the service entrance to an area where it can be serviced. A check valve was not observed.

Plumbing Fixtures

Plumbing fixtures appear to be original to building.

- Water closets – White vitreous china; with battery or manual operated flush valve
- Urinals – White vitreous china; with battery operated flush valve
- Sinks – Wall mounted are white vitreous china
- Sinks – Wall mounted gang are solid surface (3) gang; sensor operated
- Sinks – Counter mounted are stainless steel.
- Electric water fountains in facility are found to wall mounted and free standing.

New Facility Plumbing

If it is determined that the existing building will be demolished or be required to have a major renovation, see the following recommendations for new system design.

Plumbing Waste and Vent Piping

- Extra Heavy Hubless Cast Iron pipe and fittings shall be manufactured from gray cast iron and shall conform to ASTM A 888 and CISPI Standard 301. All pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute ® and listed by NSF® International. Hubless

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Couplings shall conform to CISPI Standard 310 and be certified by NSF® International. Heavy Duty couplings shall conform to ASTM C 1540 and shall be used. Gaskets shall conform to ASTM C 564. All pipe and fittings to be produced by a single manufacturer and are to be installed in accordance with manufacturer's recommendations and applicable code requirements. Couplings shall be installed in accordance with the manufacturer's band tightening sequence and torque recommendations. Tighten bands with a properly calibrated torque limiting device. The system shall be hydrostatically tested after installation to 10 ft. of head (4.3 psi maximum).

- Type DWV copper drainage piping with cast bronze drainage pattern fittings with solder joints.
- The sanitary piping will require cleanouts at every pipe direction change and on 75 foot centers. All sanitary and roof drainage piping shall service weight cast iron hub and spigot piping with compression gasket joints. All plumbing vents shall terminate a minimum of 50 feet from any outdoor air intake.

Roof Drains and Piping

The primary roof drainage system shall consist of standard round dome-type drains with cast iron body, flashing clamp, sump receiver, and 15" cast iron locking strainers. The secondary roof drainage system shall consist of overflow scuppers provided on flat roof areas with parapets or roof drains adjacent to the primary drains with standard round dome-type drains, cast iron body, flashing clamp, sump receiver, 15" cast iron locking strainers, and 4" pipe overflow extension.

Domestic Water Piping

The domestic water system for the building shall be served by a NSF 61 compliant water supply with gate service valves and ASSE or CSA compliant reduced pressure zone backflow preventer located in the main mechanical room. A domestic water booster pump is not anticipated to be required.

Domestic water distribution within the building will serve the toilet rooms, janitor closets, classrooms, kitchen, health unit, pantries, drinking fountains, hose bibbs, and non-freeze wall hydrants. Piping shall be NSF 61 compliant type L Hard Copper with lead-free solder and 150 lb, flanged or screwed, gate or ball, bronze valves. Piping insulation shall be a minimum of 1 inch for all hot water and a minimum of 1/2 inch for cold water 4 inches and above.

Domestic Hot Water shall be provided by two (2) hydronic natural gas-fired condensing style boilers, an indirect storage tank, ASME rated thermal expansion tank, in-line circulating pumps, and ASSE 1017 compliant central thermostatic mixing valve. Domestic hot water shall be designed for 140 deg F supply distribution temperature and a 120 deg F return water temperature at peak demand.

Plumbing Fixtures

Plumbing fixtures shall be lead-free, low flow, Water Sense type, and ADA compliant. All water closets, lavatories, sinks, drinking fountains, emergency showers, floor drains, etc. shall be commercial grade.

- Adult water closets shall be Water Sense and ADA compliant wall-mounted type with "Capacitive sensor" type handsfree, top spud flush valves with the side-mounted operator, and a maximum flow rate of 1.28gpf. The power source shall be (4) "C" size battery or self-generating with battery backup..
- Urinals shall be Water Sense and ADA compliant wall-mounted type with "Capacitive sensor" type handsfree, top spud flush valves with the side-mounted operator, and a maximum flow rate of 0.125gpf. The power source shall be (4) "C" size battery or self-generating with battery backup.
- Urinals shall be Water Sense and ADA compliant wall-mounted type with "Capacitive sensor" type handsfree, top spud flush valves with side mounted operator and a maximum flow rate of 0.125gpf. Power source shall be (4) "C" size battery or self-generating with battery backup.
- Lavatory faucets shall be Water Sense and ADA compliant "Capacitive sensor" type handsfree faucets with a maximum flow rate of 0.5gpm. The power source shall be battery or self-generating with battery backup. Lavatories shall have an ASSE 1070 compliant manual thermostatic mixing valve w/ lockable box centrally located to control a maximum of 4 lavatories.
- Sinks serving pantries, classrooms, and art areas shall be stainless steel type with a maximum flow rate of 2.5gpm and local sediment interceptors provided as required. Classroom sinks shall have a 5.25" radius gooseneck faucet, less bubbler, centered on the back ledge with lever handles.
- Electric water cooler and drinking fountains shall be bi-level ADA compliant with manually operated bubbler controls. Indoor electric water coolers shall have bottle fillers and filters while the exterior non-chilled drinking fountains shall be non-freeze type units.

Floor drains shall be provided to serve mechanical equipment, drain discharges, bathrooms, kitchens, and washdown areas. Floor drains shall be of size and type suitable for the application.

Existing Facility Electrical

Electrical Distribution

The facility is served by a 208Y/120 volt, 3-phase,4 wire 2500A electric service. The main electric switchboard is manufactured by Siemens in 2003 with a bus rated at 2500A with a 2500A switch. The switchboard is in fair condition. It was noted that the facility has experienced ingress of stormwater from outside and into the electrical room through and around the switchboard area. It is recommended that this be fully investigated and that the switchboard be repaired/maintained to prevent future damage. Recommend annual maintenance, infrared scanning as well as

completion of a short circuit/coordination/arc flash hazard study. Surge protection was not observed on the main switchgear or on any of the secondary panel boards. The addition of surge protection is recommended to minimize the effects of electrical transients that may be transmitted on the incoming power lines. Voltage surges and other electrical transients can cause damage to equipment resulting in untimely equipment replacement or repair.

The normal power main switchboard and some distribution panel boards are located in the main Electric Room. Branch panel boards are located throughout the school in hallways, classrooms, etc. Many of the Panel boards appear to be antiquated and original to the building and it is recommended that they along with their feeders be replaced. Infrared scanning is recommended for all electrical connections in the panel boards that are to remain to ensure proper operation and prevent future failures.

Emergency Electrical Distribution

Building is served by a 150KW diesel fueled emergency generator. The generator is located on the exterior of the building. It is estimated that the generator and associated automatic transfer switch was manufactured and installed in 2003/2004. There is no reported issues with the operation of the generator. It is recommended that ACPS continue with regular scheduled maintenance and plan for replacement in the next 3-5 years.

Interior Lighting

Most areas in the facility utilize linear fluorescent lighting. Linear fluorescent fixtures in the facility are typically 2'x4' troffers with acrylic or parabolic lens with T-8 lamps. The fluorescent lighting is estimated to be near or past its rated useful life, in addition is very inefficient as compared to current LED lighting solutions. Recommend replacement with new LED light fixtures. This will assist with energy efficiency and help lower electric utility costs. Other lighting such as specialty lighting in private restrooms and closets appears to be original to building. It is recommended that these fixtures be replace with new LED lighting fixtures.

Exterior Lighting

Exterior lighting is provided by wall mounted high intensity discharge wall packs. These are inefficient and should be replaced.

Wiring Devices

Switches and receptacles that were observed in the original sections of the school appeared to be original. Multiple layers of paint has been applied to the devices which can affect their operation. In addition, some of the light switches did not appear to be switching normally and were a little "spongy". It is recommended that all wiring devices that are original to the facility be replaced with new.

Wiring

Wiring that is existing to building is estimated to be approximately 63 years old. The useful life expectancy for wiring is 50 years. It is recommended that all wiring that is original to the facility be replaced with new.

Fire Alarm

The building is served by a Firelite addressable fire alarm system. Devices throughout the facility are both newer and those that are past their useful life. Recommend complete replacement of FA devices and antiquated system components.

New Facility Electrical

If it is determined that the existing building will be demolished or be required to have a major renovation, see the following recommendations for new system design.

Electrical Distribution

Underground primary electric service shall be routed to a new pad mounted utility transformer located near the new building. A new secondary service will be extended from the utility transformer to feed the new 2500A/208/120V/3PH/4W (est) switchgear located in the main electric room. Each floor of the building shall have dedicated electrical spaces with 208/120V/3PH/4W branch circuit panel boards separated for specific loads such as mechanical equipment, lighting, receptacles, etc.

All new panel boards that are installed to replace old ones shall be hinged cover (door-in-door) construction. All feeders and exposed branch circuits shall be insulated copper conductors routed in EMT conduit.

A multi-circuit sub-metering device connected to the building automation system shall monitor all building load categories including renewable energy and report to the energy dashboard system.

All wiring shall be copper, minimum #12AWG installed in conduit, minimum size ¾". MC cable is not acceptable. Power connections and code required disconnecting means will be provided for all HVAC and plumbing equipment. Combination starter/ fusible disconnects will be provided for selected equipment as required.

Integral surge protective devices will be provided for the main service switchgear and all branch circuit panels. Main Circuit breaker on the switchgear will be equipped with Phase loss monitors and undervoltage/overvoltage trip settings.

Receptacles will be located at each teacher's workstation location, equipment locations, and on each wall for convenience. All collaboration spaces in the corridors will be provided with additional power per classroom standards.
Emergency Electrical Distribution

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A new 150kW diesel generator (BOD: Cummins) with a 48-hour dual-wall sub-base fuel tank will be provided for life-safety and general emergency loads.

All Life safety emergency electrical distribution equipment will be housed in a separate room from the normal power equipment. The Emergency system shall consist of two automatic transfer switches - one each for life-safety and general branch, two distribution transformers - one each for life-safety and general branch, and a limited number of life-safety and general branch panel boards. All life-safety emergency loads shall be selectively coordinated to 0.1 seconds. A remote generator annunciator panel will be provided.

Interior Lighting

Interior artificial lighting will be accomplished with recessed high-performance LED direct/indirect fixtures throughout the building with more decorative LED lighting in selected spaces such as Media Center, Entry Lobby, Dining, etc. Alternate pricing shall be provided for Dynamic Lighting fixtures (tunable white) in all classrooms with the ability to independently raise/lower lighting intensity and CCT. Lighting in the Gymnasium will be LED high bays with semi -diffuse acrylic lens. Lighting throughout will meet the latest Illuminating Engineering Society of North America (IESNA)

Interior egress lighting shall be connected to the life-safety branch of emergency power.

100% occupancy/vacancy sensor coverage will be provided throughout except in electrical and mechanical rooms. Occupancy sensors will be automatic on/automatic off. Vacancy sensors will be manual on/automatic off. Automatic daylight dimming will be employed in all daylight zones.

Dimming controls/scene controls will be provided in all classrooms and offices. All interior lighting controls will be stand-alone systems (BOD: nLight).

Exterior Lighting

Dark sky compliant LED exterior lighting will be provided at all exit doors for egress lighting. Site pathway lighting will be post top LED fixtures (BOD: Lithonia #DSX) on a straight round aluminum poles and in accordance with the site guidelines. Color temperature shall be 4000K. Backlight shielded optics will be utilized to minimize glare to adjacent properties as necessary. Exterior lights will also feature integral motion sensing for reduced glare, energy usage, and extended LED lamp life. Exterior egress lighting shall be connected to the life-safety branch of emergency power.

Exterior lighting will be controlled through a photocell/timeclock combination. A lighting contractor will be provided with HOA option and tied into the BAS system. Exterior light fixtures will feature integral motion sensors for reduced glare, energy usage, and extended LED lamp life.

Fire Alarm

A new fully addressable voice evacuation type fire alarm system (BOD: Simplex) shall be provided with notification and initiation devices per NFPA requirements. All peripheral devices shall be installed per ADA requirements. Manual pull stations will be located within five (5) feet of each exterior egress door, and within 150 feet of an egress door. Fire alarm strobe/audio devices will be provided to comply with ADA requirements. Smoke detectors will be photoelectric type. Connections will be provided to all fire suppression equipment, air handling units over 2,000CFM, door access controls, etc. A Graphic annunciator panel will be placed at the main entrance to the building and at each fire department entrance into the building.

Technology

Telephone/Data

The contractor will provide all rough-in's, faceplates, cabling paths, cabling, and patch panels for all telephone and data systems. The telephone system shall be IP based. The owner shall provide active components including wireless access points. The minimum stub-out conduit size will be 1'' and cabling paths will consist of 12'' cable tray with J-hook assemblies on 48'' centers.

The horizontal data network will utilize CAT 6 infrastructure. Wireless coverage will be provided for the entire school utilizing CAT 6A cabling.
WAPs will be laid out to create a fence to fence coverage pattern both on the interior of the building and the exterior of the building.

The phone system will be as per the owner's specification.

Fiber backbone will consist of 12 strand multimode OM3 fiber optic cable with LC connectors supporting full 10gig uplinks.

Public Address System

A building-wide Public Address System will be integrated into the Unified Communications system with visual devices in select rooms that will be determined as the design progresses.

Electronic Safety & Security

A new ESS system will include interior and exterior Video Management Systems (VMS) coordinated with Dedicated Micros and a Security Management Control System (SMS) (BOD: Software House).

The SMS includes door access and logic capabilities such as visitor management, time schedules, intrusion detection, and digital signage for emergency notification features. VMS will include security cameras that will be specified along with servers

III. George Mason Master Plan and Technical Data

and analytics (motion detection) that run them. Both VMS and SMS systems will be integrated with a single web portal interface at a later time after this project is complete by the District.

Lightning Protection

See attached document for lighting protection risk analysis. The building shall feature a complete Lightning Protection System certified to NFPA 780 standards. The system shall comply with UL #96A. Building steel shall not be used as a down conductor. Down conductors shall be concealed within the building. Each down conductor shall be terminated to a dedicated ground rod. Surge protective devices shall be provided for all systems identified in NFPA 780.

Fire Protection

The building currently does not have a fire suppression system.

Safety and Security

ACPS maintains an inviting and de-institutionalized environment, while simultaneously providing a safe environment for students, staff, and community who use the facility and adjacent support services. Studio27 Architecture evaluated the safety and security of each school in 6 categories: Building Layout, Building Materials, Uses of Technology, Visitor Management, Vehicular and Pedestrian Traffic, and Other Site Concerns.

The categories of largest concern for George Mason Elementary are Building Layout, Building Materials, Visitor Management, and Vehicular and Pedestrian Traffic. Interior circulation paths have many blind spots. Staff spaces are isolated to the front entrance and do not have views of major circulation paths. Interior finishes were adequate when installed but are now in poor condition. While the school has a very small entrance vestibule, there is no security desk and sightlines are very restricted from the entrance lobby. Bus and car drop off should occur in individual designated lanes separate from public roads and pedestrian traffic should not cross these lanes if possible.

Envelope

George Mason Elementary schools are housed in aging facilities and will require a substantial renovation or upgrade to meet LEED and Neto Zero standards. Studio 27 Architecture interviewed school leaders and visited both schools to assess the current conditions of the building envelopes and evaluate the impact of the observed envelope issues.

Condition and stains on the brick below window sills Water appear to pool where the play surface meets the exterior brick. Most entrance doors are in poor condition with visible rust and large undercuts allowing unwanted thermal transfer between the The George Mason envelope is in poor condition. The two areas of largest concern are the windows and roof. School leaders reported concerns about the condition of the windows. Windows have been replaced in different areas of the building at different times, and there are unique issues related to each type. Older wood windows are water damaged and have non-thermal single pane glass. The newer replacement windows are very poor quality, leak, and do not lock. School leaders also reported that the roof leaks often, and S27 observed that there is visible ponding at drain locations. Other issues to note are visible cracks in the masonry, exterior entrances are in poor condition with visible rust and flaking paint, as well as large undercuts that allow an unwanted thermal transfer. Floor slab and exterior settlement cracking can be seen from the interior of the building at the main entrance and in classrooms.

Like Cora Kelly, George Mason also has a very high form factor, which has a negative impact on building energy efficiency and use.

Systems

Per the building assessment, it was observed that George Mason require either a full system upgrade or complete replacement of MEP systems due to its antiquated nature and sometimes, a complete lack of system usage or availability, like a sprinkler and fire alarm system, which are crucially linked to the life safety of building occupants.

In addition to code requirements of the state of Virginia, the City of Alexandria has implemented a new 2019 Green Building Policy. This newly approved policy requires that major or new public projects be required to meet minimum level certifications of LEED and/or other Green building certifications as well as they shall perform as a Net Zero Energy building. In order for a facility to meet the aforementioned requirements, it would be expected that the building's annual energy consumption be in the 18-22 EUI (Energy Use Intensity) range where EUI is defined as kBtu/SF/YEAR. This requirement further justifies the complete upgrade or replacement of building systems.

Accessibility

ACPS has made it a strong priority to make its facilities accessible to all students and staff. 'Universal Design' is one of ACPS's 10 driving design principles, established in the 2015 Educational Specifications. Universal design is the design of buildings and environments to make them accessible to all people, regardless of age, disability, or other factors.

Since 2012, accessibility in schools has been the law. Title II of the Americans with Disabilities Act prohibits disability discrimination by all public entities, including schools, at the local and state level.

George Mason has similar accessibility deficiencies. Water fountains, classroom sinks, and bathroom facilities are not up to current standards. The majority of entrances do not have ramps and mot exterior stair railings are not ADA or code compliant Most play areas are not connected to accessible paths, and no accessible play equipment was observed.

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George Mason Safety and Security Evaluation

Category	Consideration	Rating	*Notes*
Building Layout	Maintain clear lines of sight along circulation paths and avoid blind spots, corners, and cubby holes	Poor	
	Locate administrative and teacher preparation with good visual contact of major circulation areas	Inadequate	
	Develop spatial relationships that naturally transition from one location to another	Poor	
	Locate toilets in close proximity to classrooms	Good	
	Design toilets to balance the need for privacy with the ability to supervise	Fair	
	Locate areas likely to have significant community use (after school) close to parking and where these areas can be closed off from the rest of the building	Good	
Building Materials	Use durable wall surfaces and maintainable flooring material that are easy to clean so graffiti and dirt can be removed	Fair	*Glazed block in corridors is very durable and graffiti resistant however it is in bad condition*
	Operational windows should high above ground to prevent access	Inadequate	
	Install non-slip floors and walk-off mats at points of entry	Poor	
	Use of interior glass to create a transparent environment within the school	Inadequate	
	Use of colors, natural day lighting, and interior furnishings to create an environment that is aesthetically pleasing in order to support student and faculty pride within the building	Poor	
Uses of Technology	Phones in every instructional and support area	TBD	
	Building wide all-call or intercom system to be heard throughout the school and in outdoor play spaces when needed	TBD	
	Exterior and interior video security cameras	Poor	*No interior or exterior security cameras were observed*
	Motion or infra-red detectors	TBD	
	Smoke and heat detectors location throughout the building	Poor	*Smoke detectors are present however there is no sprinkler system*
	Magnetic locking systems and carefully selected door hardware to facilitate lock downs if needed	TBD	
Visitor Management	The main lobby should be welcoming and inviting for students, staff, and visitors and a central visitor registration area should be prominent upon entry	Poor	
	Clear wayfinding signage should be included that directs visitors upon campus arrival to visitor registration as well as throughout the building to provide overall building guidance	Poor	
	A secured double vestibule system with either clear sight lines to a security desk or a video enabled front intercom buzzer system should be provided to manage visitor entry	Inadequate	
	Front lobby and security desk should have clear views to parking lot and building approach	Inadequate	
Vehicular and Pedestrian Traffic	Bus drop off area should be separated from other vehicular traffic	Inadequate	
	Clear wayfinding signage and pavement striping should direct vehicular traffic on where to go	Inadequate	
	Sperate staff and community parking areas	Inadequate	
	Sperate pedestrian traffic from vehicular traffic and if possible avoid having pedestrian traffic cross vehicular drive lanes	Inadequate	
Other Site Concerns	Use native high trees and low bushes (less than 3'-0" high) to deter hiding	Fair	
	Use aesthetically pleasing fencing around perimeter of the building	Inadequate	*No perimeter fence*
	Non-intrusive lighting should light all areas or site, according to the LEED light pollution credit guidelines with no lighting to leave the property line	Fair	
	Provide security lighting around building and parking lots with photocell timer, motion sensor, and on/off capacity	Poor	

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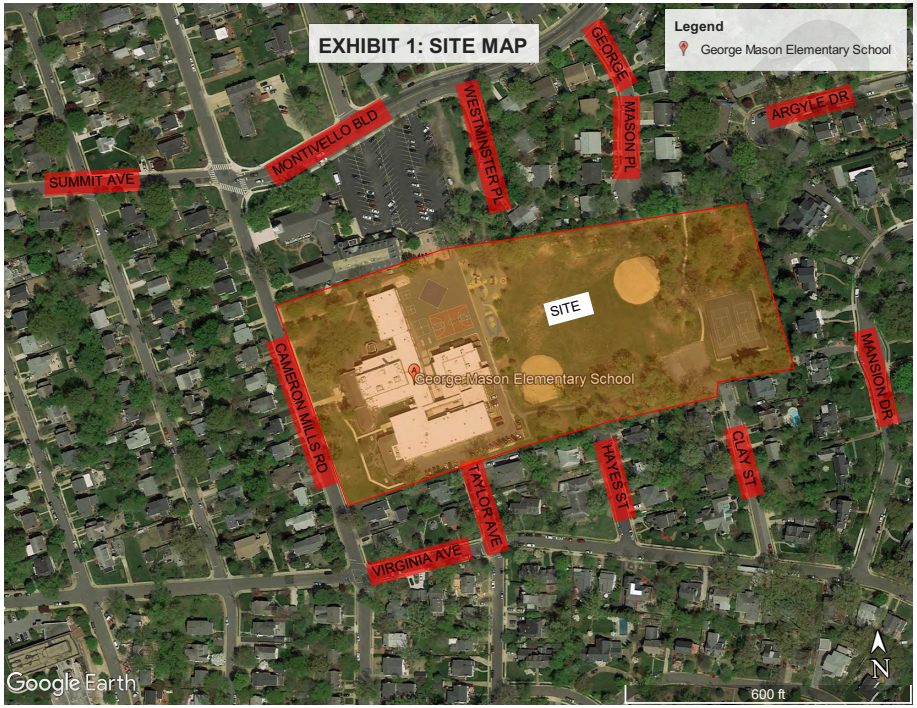
III. George Mason Master Plan and Technical Data

Site Assessment Data

The subject site for this study is George Mason Elementary School and it is located in City of Alexandria at 2601 Cameron Mills Rd, Alexandria VA 22302. Refer to **Exhibit 1** for the Site Location Map. The scope of our site study for the subject project included the evaluation of Best Management Practices (BMP), Storm Water Management (SWM), Sanitary Sewer, and Waterline. For our analysis, we gathered information from:

- Available records of approved plans of surrounding relevant projects
- Existing utility locations of the project area
- Boundary survey of the project area
- Soil maps of the area
- RPA maps of the area
- City of Alexandria stormwater technical criteria.
- City of Alexandria GIS, and
- CAD provided by Studio 27

Exhibit 1

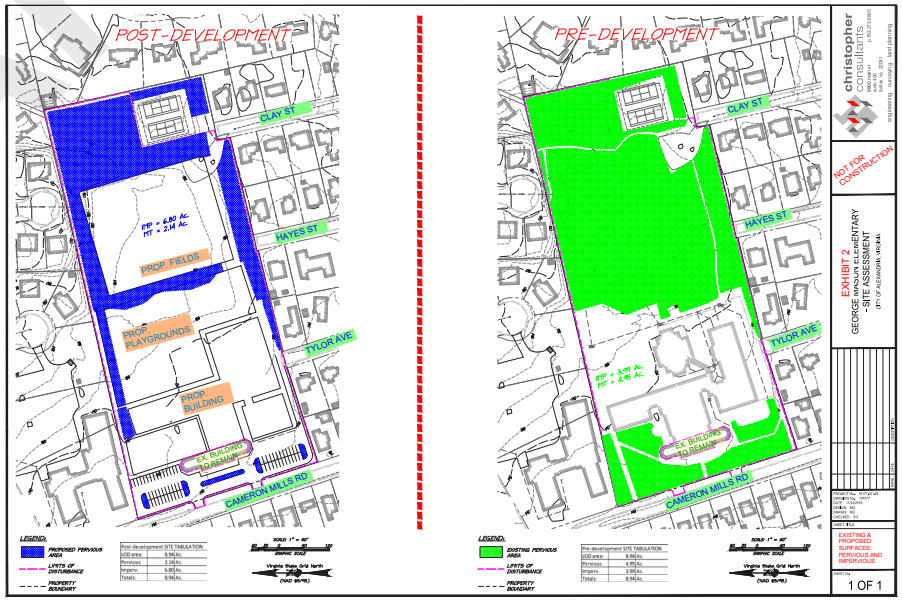


Findings

BMP Evaluation

To determine BMP requirements, we used the Virginia Runoff Reduction Method (VRRM) spreadsheet and made some assumptions of the area disturbed and the pre-developed and post-developed pervious/impervious areas. During our preparation, we looked into three possible scenarios. For scenarios 1 and 2, we assumed a total disturbed area of 8.94 acres as the BMP area. For scenario 3, we excluded the area of proposed turf fields and assumed a total disturbed area of 4.63 acres. We calculated the amount of existing and proposed pervious/impervious areas and entered the VRRM spreadsheet to calculate the required Total Phosphorus removal of 7.84 lb/yr, 4.38 lb/yr, and 3.50 lb/yr for scenario 1, scenario 2, and scenario 3, respectively. Refer to **Exhibit 2** for existing and proposed pervious/impervious areas.

Exhibit 2

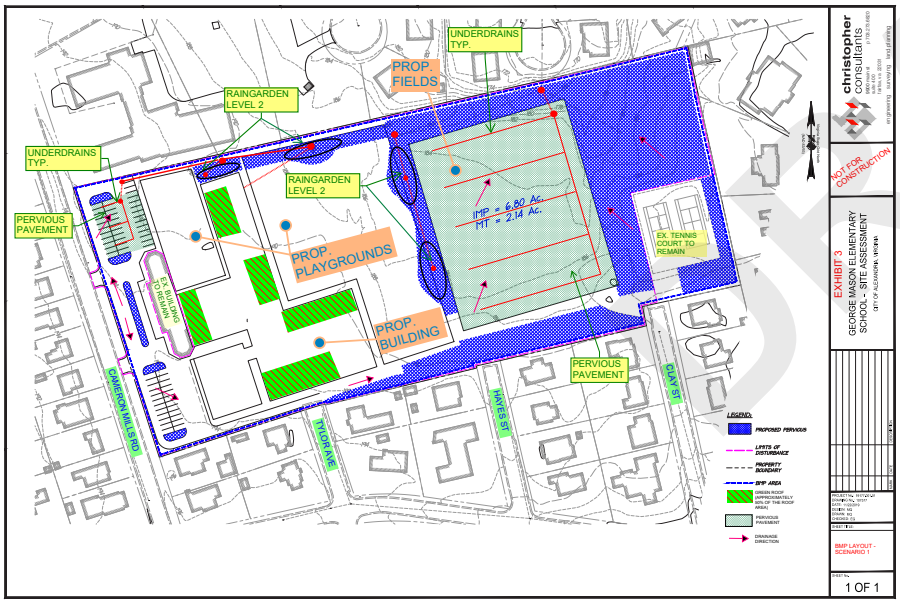


In addition to the state requirements, City's new Green Building Policy requires the treatment of 100% of the stormwater through green infrastructure. To achieve 100% treatment of stormwater and meet BMP requirements, we assumed the site consists of one drainage area and analyzed the three scenarios.

III. George Mason Master Plan and Technical Data

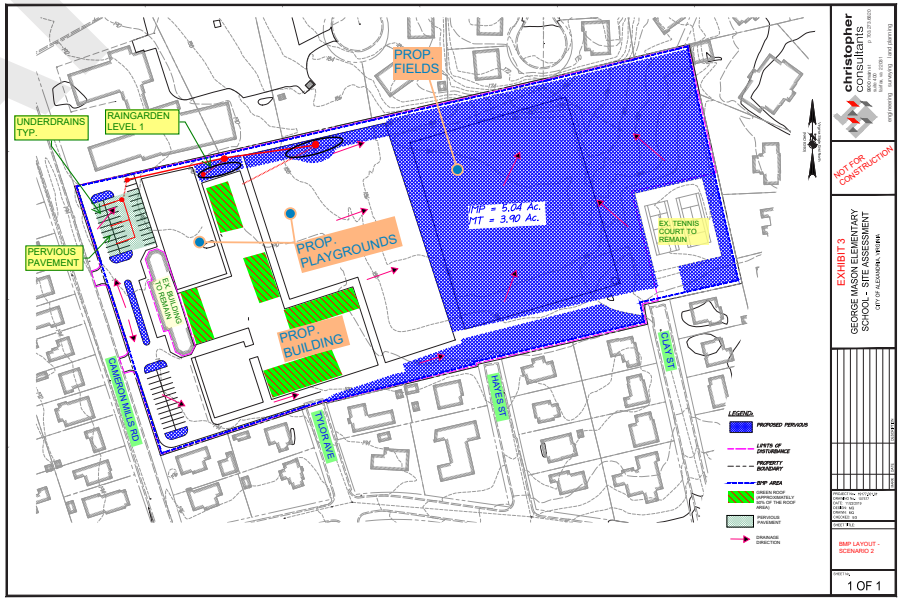
For scenario 1, we have proposed a pervious pavement for the proposed parking area with underdrains tying to an existing storm structure, considered the proposed fields as pervious pavement with underdrains, proposed level 2 rain gardens along the northern and eastern edges of the proposed playground, and included 50% of proposed building roof as green roof. Refer to **Exhibit 3** for the layout of these measures.

Scenario 1



For scenario 2, we considered the proposed fields as a grass surface. This scenario decreases the required Total Phosphorus removal by approximately half in comparison to scenario 1 thus requiring a thinner stone layer of the pervious pavement for the proposed parking area, level 1 rain garden along the northern edge of the proposed playground, and included 50% of proposed building roof as green roof.

Scenario 2



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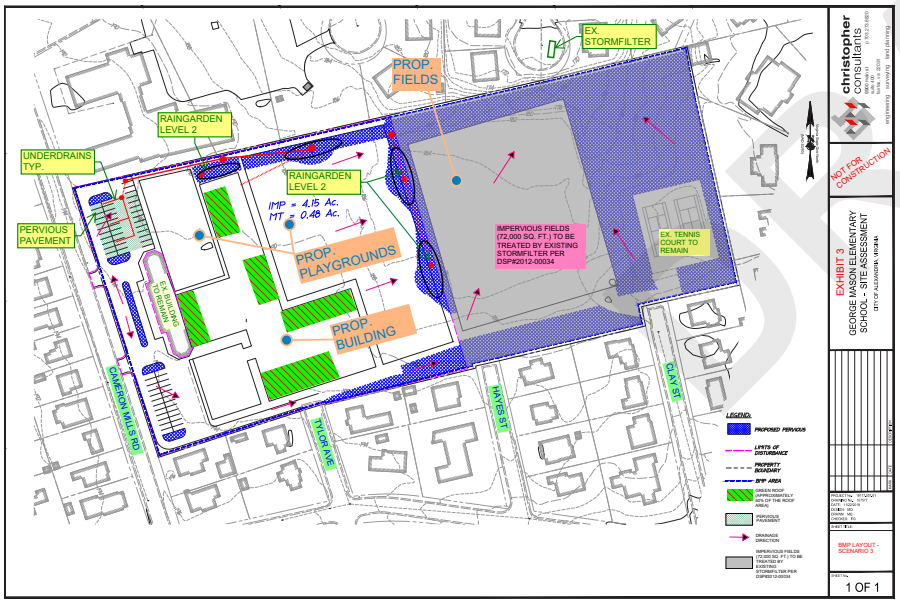
For scenario 3, we assumed that the proposed fields of overall size of 72,000 Sq. Ft. will be treated by an existing stormwater Filter structure with cartridges per plans of DSP2012-00034. Therefore, we considered the limits of disturbance approximately the western half of the site and analyzed accordingly. We proposed pervious pavement for the proposed parking area with underdrains tying to an existing storm structure, level 2 rain gardens along the northern and eastern edges of the proposed playground, and included 50% of the proposed building roof as green roof.

Scenario 3



Assumptions Made

- The overall site drains to the east to the existing storm system therefore we assumed that the proposed layout will maintain the same drainage divides as the existing condition.
- We assumed that the proposed fields will be turf and its ground cover is considered impervious and outfalling to the northeast for scenario 1.
- Overall green roof area on the roof accounts for up to 50% of the roof surface area.
- The building's roof drains outfall to the east.
- For any impervious area that is untreated, a contribution will need to be paid into City's WQIF at $2 per SF.

SWM Evaluation

To meet SWM requirements in Section 13-109 of City of Alexandria, we analyzed Channel Protection and Flood Protection of the drainage area of the proposed development. The site is located within the Four Mile Run Watershed. Refer to below values of Pre and Post development of drainage areas, curve number, peak discharge (Q), and runoff volume (RN). Since the majority of the site flows to a single outfall location, we are analyzing the site as a whole for the channel protection and flood protection requirements.

Pre-development		
	Area (ac)	8.94
	CN	86
	1-year	
	Q (cfs)	21.22
	RV (qf)	42,905
	2-year	
	Q (cfs)	27.5
	RV (qf)	55,894
	10-year	
	Q (cfs)	53.23
	RV (qf)	111,296

Post-development		
	Area (ac)	8.94
	CN	95
	1-year	
	Q (cfs)	30.28
	RV (qf)	65,630
	2-year	
	Q (cfs)	36.63
	RV (qf)	80,469
	10-year	
	Q (cfs)	61.74
	RV (qf)	140,489

Channel Protection

The extent of the review to meet channel protection for the site ends in a pipe, not causing any erosion, therefore no detention is required.

Flood protection

To meet flood protection requirements per city code 13-109-F-2, the 10-year post-developed peak flow must be less than the pre-developed peak flow for the same storm. Based on our assumptions made on the site's drainage areas and ground covers, the 10-year peak flow for the drainage area slightly increases the among of peak flow and some detention will be required. The detention can be provided in the pervious pavement stone layer.

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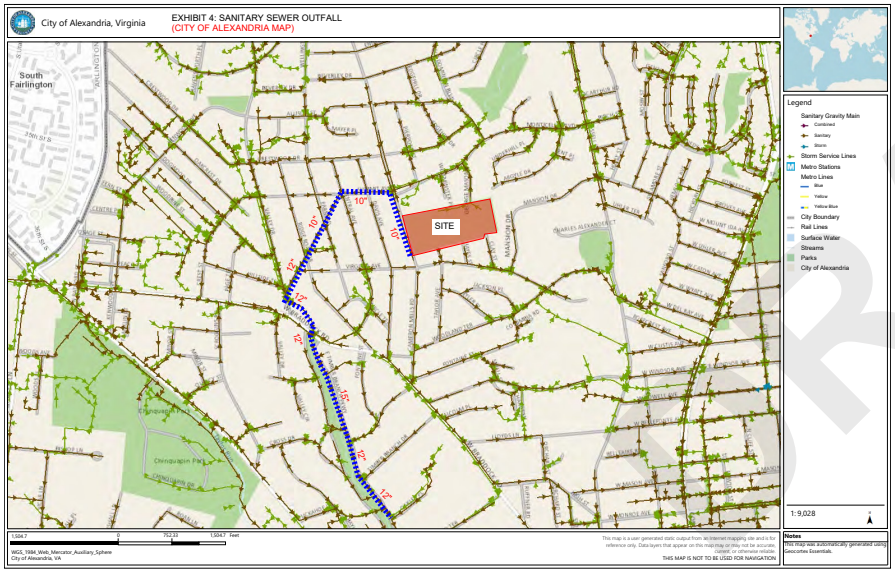
Sanitary Sewer Analysis

The current existing sanitary sewer system outfalls to the west into an existing sanitary pipe then north along Cameron Mills Rd. It is assumed that the proposed building sanitary sewer lateral will tie into the existing sanitary sewer system located on the west of the existing building. The extent of the sanitary sewer review, per City of Alexandria Memo to Industry 06-14, doesn't require review if a net increase is below 10,000 gpd. The proposed building will increase by 38% in the net area. The current capacity will increase in the existing sanitary sewer system. Refer to **Exhibit 4** of the Sanitary sewer analysis.

Exhibit 4



Waterline Analysis

The proposed building can tap into the existing 8" waterline located along Cameron Mills Rd. Based on a fire hydrant flow test completed by Virginia American Water on 11/18/19, the calculated flow is 4355 gpm at a residual pressure of 20 psi. See **Exhibit 5** of Virginia American Water Flow test.

Exhibit 5a

Virginia American Water – Fire Flow test

Virginia American Water
Fire Hydrant Flow Test Summary

Location:	2601 Cameron Mills Rd		
Date:	11/18/2019	**Main Size**	8 inches
Time:	1:30PM		
		Flow Hydrant #	
Total Flow	**2273** gpm	3028	
		Residual Hydrant #	
Static pressure	50 psi	**3023**	
Residual pressure	41 psi		

Contact Person
Matthew Ganci
Project Engineer
Virginia American Water
2225 Duke St.
Alexandria, VA 22314
Office: 703-706-3862
Email: matthew.ganci@amwater.com

Calculated Flow gpm	Residual psi
5420	5
5086	10
4355	**20**
2406	40
#NUM!	60
#NUM!	80
#NUM!	100
#NUM!	120
#NUM!	140

Notes:
1. Table calculation is for reference only. Virginia American Water will not guarantee the calculated flow.

2. 3500 gpm is the limit of available fire flow.

3. Individual (Non-public water supply) fire suppression systems shall be designed by the property owner to meet needed fire flow in excess of 3,500 gpm.

4. VAW does not provide hydrant elevations.

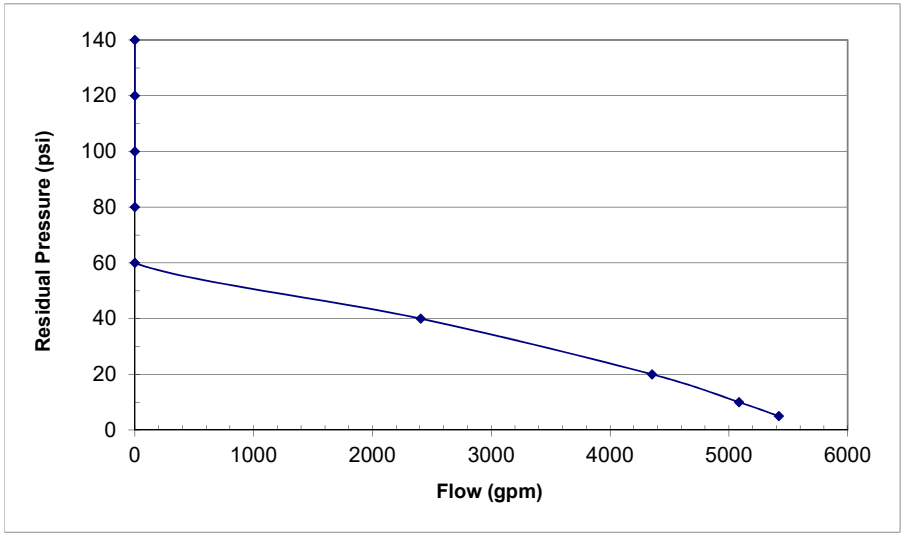


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Exhibit 5b

REQUEST FOR FIRE FLOW TEST INFORMATION

Requested by	Moustafa Qaddora
Phone	(703) 766-3925 Fax
Email	moustafaqaddora@ccl-eng.com
Project Name	George Mason Elementary School Expansion
Request Reason	Need flow information for hydraulic calculations
District	(A) P
Project address	2601 Cameron Mills Rd
Map sheet #	
Flow Hydrant#	3028 use 4" nozzle w/diffuser
Residual Hydrant #	3023
Main size	8 inches

Note: Before running this flow test, check all surroundings to avoid any potential damage to nearby residents landscaping, grounds, etc.

Flow duration 3-5 minutes

Tester D. Kinkamp

Date 11/18/19

Time 1:30 pm

Residual Hyd# 3023 Make mueller

Residual FH MUST Get at least a 10 lb. drop

Static Pressure (PSI) 50

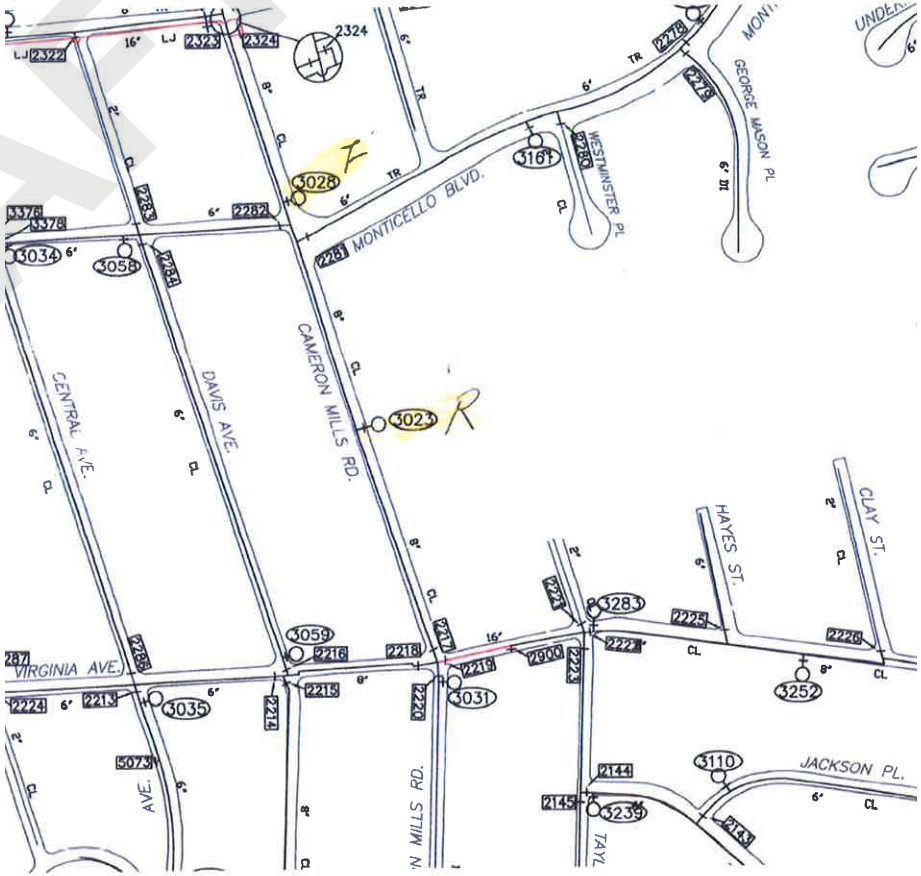
Residual Pressure (PSI) 41

Flow Hydrants	1	2	3	4
Hydrant#	3028			
Hydrant make	mueller			
Nozzle Diameter (inch)	4			
Flow reading (PSI)	28			
Static Reading (PSI)	50			

Engineering Department

Requested by Matthew Ganci Date 11/11/2019

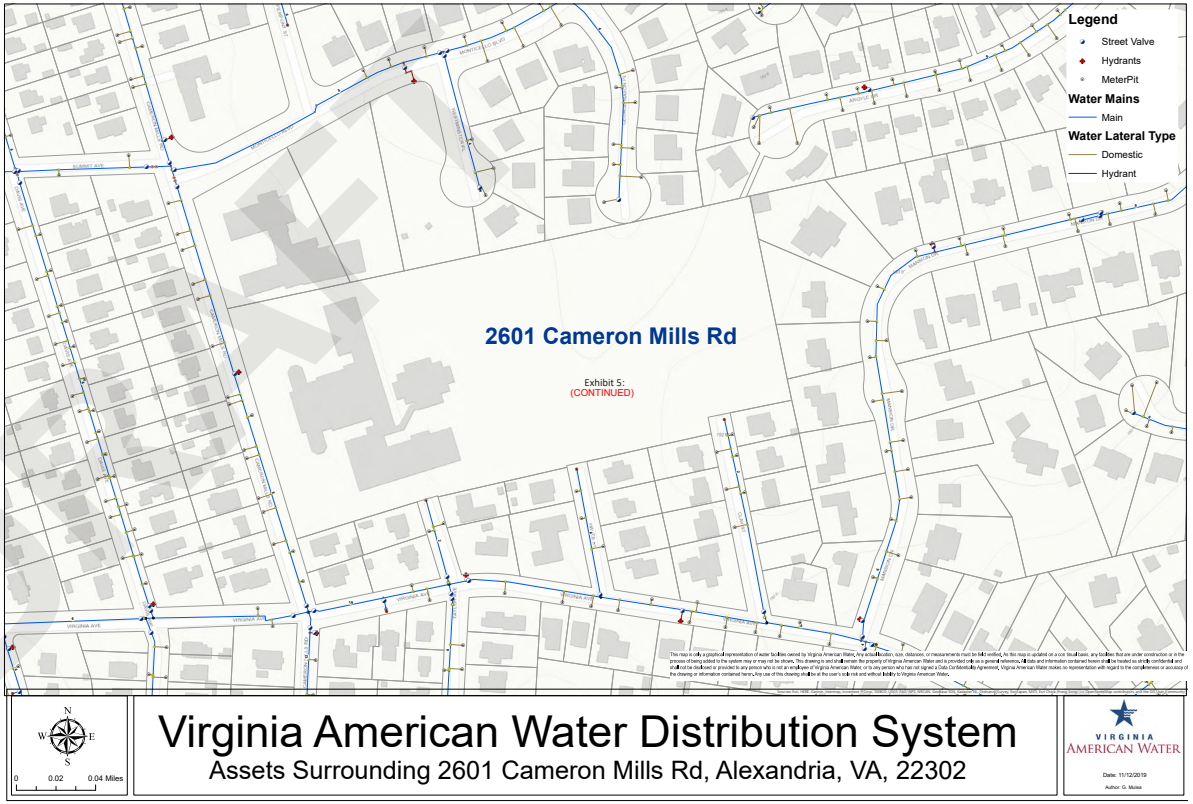
Exhibit 5c



Recommendations

- To reduce the requirements for BMP and SWM, changing the field and playground material from turf to grass will greatly help.
- Utilize the 72,000 Sq. Ft. excess capacity of the existing storm filter to minimize the number and size of BMP and SWM facilities. More research and discussions with the City are required to determine the feasibility of this approach.

Exhibit 5d



III. George Mason Master Plan and Technical Data

Cost Estimate - New Construction

EXECUTIVE SUMMARY

PROJECT:	**ACPS GEORGE MASON ES**
OWNER:	**ALEXANDRIA CITY PUBLIC SCHOOLS**
LOCATION:	**ALEXANDRIA, VA**
A / E:	**STUDIO 27 ARCHITECTS**
C/M:	**N/A**
PHASE:	**MASTER PLAN ESTIMATE**

February 4, 2020

EXECUTIVE SUMMARY

The project is to give Alexandria City Public Schools a new Elementary School with a proper program to support the children attend the school. The original school will be raised all but 10,300 sf of the building and a new Elementary School will be built in different location, as the existing school will not be raised until the new school is built. The new school will have a separate bus entrance for children drop off and a separate entrance for the cars to drop off the children at the school.

$ 61,068,512 is the current estimated total value of the project.

CLARIFICATIONS & ASSUMPTIONS

PROJECT:	ACPS GEORGE MASON ES
OWNER:	ALEXANDRIA CITY PUBLIC SCHOOLS
LOCATION:	ALEXANDRIA, VA
A / E:	STUDIO 27 ARCHITECTS
C/M:	N/A
PHASE:	MASTER PLAN ESTIMATE

February 4, 2020

CLARIFICATIONS & ASSUMPTIONS

BUILDING INFORMATION

- Building Type: EDUCATIONAL
- Project Type: NEW CONSTRUCTION
- Building GSF: 110,940 SF
- Stories: 2

MARK-UPS

- General Conditions: 10.0%
- Cm Fee: 5.0%
- Design Contingency: 15.0%
- Bonds & Insurance: 2.0%
- Escalation: EXCLUDED

DOCUMENTS

- Technical Site Study Assessment dated November 13, 2019 as issued by Studio 27 Architects

EXCLUSIONS

- A-E Fees
- Phasing
- Overtime
- Escalation
- Deep foundation systems
- Furniture and loose equipment
- Library shelving
- Lockers
- Photovoltaic systems
- Playground equipment
- Bleachers (exterior)
- Electronic score boards
- Trash compactors/bins
- Change order contingency
- Finance cost

QUALIFICATIONS

- Assume conventional concrete strip foundation systems
- Assume 12' floor to slab height for existing building
- Assume structural steel frame construction with concrete on metal deck slabs
- Structural steel framing assumed @ 12lbs/sf for the 1st level and 6.5lbs/sf for the 2nd level
- Assume typical floor to slab height of 14', double volume areas 25'
- Assume conventional built-up roof waterproofing system to 30% of overall roof area, green roof of 70% of roof area
- Assume 30lf of millwork per classroom
- Assume one (1) elevator with two (2) stops
- New school is assumed without a basement a slab on grade
- The existing building is assumed to maintain existing site utilities no upgrades

PROJECT SUMMARY

PROJECT:	ACPS GEORGE MASON ES
OWNER:	ALEXANDRIA CITY PUBLIC SCHOOLS
LOCATION:	ALEXANDRIA, VA
A / E:	STUDIO 27 ARCHITECTS
C/M:	N/A
PHASE:	MASTER PLAN ESTIMATE

February 4, 2020

DIVISION	DESCRIPTION	TOTAL *GROSS SF:* TOTAL	*110,940 SF* RATE/GSF	COMMENTS
DIVISION 01	GENERAL REQUIREMENTS	$ 78,000	$ 0.70	
DIVISION 02	EXISTING CONDITIONS	$ 1,678,593	$ 15.13	
DIVISION 03	CONCRETE	$ 2,097,220	$ 18.90	
DIVISION 04	MASONRY	$ 3,341,250	$ 30.12	
DIVISION 05	METALS	$ 2,857,927	$ 25.76	
DIVISION 06	WOODS & PLASTICS	$ 771,410	$ 6.95	
DIVISION 07	THERMAL AND MOISTURE PROTECTION	$ 2,540,029	$ 22.90	
DIVISION 08	OPENINGS	$ 2,360,775	$ 21.28	
DIVISION 09	FINISHES	$ 3,361,482	$ 30.30	
DIVISION 10	SPECIALTIES	$ 167,034	$ 1.51	
DIVISION 11	EQUIPMENT	$ 1,755,000	$ 15.82	
DIVISION 12	FURNISHINGS	$ 83,205	$ 0.75	
DIVISION 13	SPECIAL CONSTRUCTION	$ -	$ -	
DIVISION 14	CONVEYING EQUIPMENT	$ 110,000	$ 0.99	
DIVISION 21	FIRE SUPPRESSION	$ 676,734	$ 6.10	
DIVISION 22	PLUMBING	$ 1,664,100	$ 15.00	
DIVISION 23	HVAC	$ 8,875,200	$ 80.00	
DIVISION 25	INTEGRATED AUTOMATION	$ 1,664,100	$ 15.00	
DIVISION 26	ELECTRICAL	$ 3,993,840	$ 36.00	
DIVISION 27	COMMUNICATIONS	$ 1,020,648	$ 9.20	
DIVISION 28	ELECTRONIC SAFETY AND SECURITY	$ 887,520	$ 8.00	
DIVISION 31	EARTHWORK	$ 1,487,500	$ 13.41	
DIVISION 32	EXTERIOR IMPROVEMENTS	$ 3,168,600	$ 28.56	
DIVISION 33	UTILITIES	$ 435,000	$ 3.92	
	DIRECT COST TOTAL	$ *45,075,167*	$ *406.30*	
	GENERAL CONDITIONS: 10.0%	$ **4,507,517**	$ **40.63**	
	SUB TOTAL	$ *49,582,684*	$ *446.93*	
	CM FEE: 5.0%	$ **2,479,134**	$ **22.35**	
	SUB TOTAL	$ *52,061,818*	$ *469.28*	
	DESIGN CONTINGENCY: 15.0%	$ **7,809,273**	$ **70.39**	
	SUB TOTAL	$ *59,871,091*	$ *539.67*	
	BONDS & INSURANCE: 2.0%	$ **1,197,422**	$ **10.79**	
	SUB TOTAL	$ *61,068,512*	$ *550.46*	
	ESCALATION: EXCLUDED	$ -	$ -	
	TOTAL CONSTRUCTION COST	$ **61,068,512**	$ **550.46**	

ESTIMATE

PROJECT:	ACPS GEORGE MASON ES
OWNER:	ALEXANDRIA CITY PUBLIC SCHOOLS
LOCATION:	ALEXANDRIA, VA
A / E:	STUDIO 27 ARCHITECTS
C/M:	N/A
PHASE:	MASTER PLAN ESTIMATE — GROSS SF: 110,940 SF — *February 4, 2020*

DIVISION	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
01	**DIVISION 01 - GENERAL REQUIREMENTS**				
	Temporary construction fence	3,900	LF	$ 20.00	$ 78,000
					$ -
TOTAL FOR	**DIVISION 01 - GENERAL REQUIREMENTS**				$ 78,000
02	**DIVISION 02 - EXISTING CONDITIONS**				
	Demolish existing building	50,575	SF	$ 13.00	$ 657,475
	Allowance for removal of hazardous materials	50,575	SF	$ 13.00	$ 657,475
					$ -
	Gut interior of existing building front to remain (historical remain)	10,300	SF	$ 10.25	$ 105,575
	Allowance for removal of hazardous materials	10,300	SF	$ 18.00	$ 185,400
					$ -
	Remove existing roof remaining	5,200	SF	$ 2.75	$ 14,300
					$ -
	Existing building façade repair at demoed building	4,864	SF	$ 12.00	$ 58,368
					$ -
TOTAL FOR	**DIVISION 02 - EXISTING CONDITIONS**				$ 1,678,593
03	**DIVISION 03 - CONCRETE**				
	Concrete foundations for new building	100,640	GSF	$ 6.50	$ 654,160
					$ -
	Concrete slab-on-grade, including stone fill, damp proofing complete	50,320	SF	$ 10.25	$ 515,780
	Under slab drainage system	50,320	SF	$ 3.50	$ 176,120
					$ -
	Concrete on metal decking	50,320	SF	$ 13.00	$ 654,160
					$ -
	New concrete stairs and landings	6	FLIGHTS	$ 13,000.00	$ 78,000
					$ -
	Elevator pit complete	1	EA	$ 19,000.00	$ 19,000
					$ -
TOTAL FOR	**DIVISION 03 - CONCRETE**				$ 2,097,220
04	**DIVISION 04 - MASONRY**				
	Allowance for Brick veneer on back-up system, includes insulation, air barriers, damp proofing, etc. complete (assume 70% is brick veneer and 30% is glazed system) Excludes curtain wall systems	44,550	SF	$ 75.00	$ 3,341,250
					$ -
TOTAL FOR	**DIVISION 04 - MASONRY**				$ 3,341,250
05	**DIVISION 05 - METALS**				
	Structural steel framing at 1st level @ 12lbs/sf	302	TON	$ 5,500.00	$ 1,661,000
					$ -
	Structural steel framing 2nd floor @ 6.5lbs/sf	164	TON	$ 5,500.00	$ 902,000
	Structural steel framing for roof MEP and equipment screens (allow 20lbs/lf of screen area)	5	TON	$ 4,900.00	$ 24,500
					$ -

ESTIMATE

PROJECT:	ACPS GEORGE MASON ES
OWNER:	ALEXANDRIA CITY PUBLIC SCHOOLS
LOCATION:	ALEXANDRIA, VA
A / E:	STUDIO 27 ARCHITECTS
C/M:	N/A
PHASE:	MASTER PLAN ESTIMATE — GROSS SF: 110,940 SF — *February 4, 2020*

DIVISION	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
	Stair handrails	6	FLIGHTS	$ 4,300.00	$ 25,800
	Stair handrails to existing bldg.	4	FLIGHTS	$ 4,300.00	$ 17,200
					$ -
	Miscellaneous metals allowance	110,940	GSF	$ 2.05	$ 227,427
					$ -
TOTAL FOR	**DIVISION 05 - METALS**				$ 2,857,927
06	**DIVISION 06 - WOODS & PLASTICS**				
	Rough carpentry	110,940	GSF	$ 1.50	$ 166,410
	Allowance for millwork/casework	1	ALLOW	$ 605,000.00	$ 605,000
					$ -
TOTAL FOR	**DIVISION 06 - WOODS & PLASTICS**				$ 771,410
07	**DIVISION 07 - THERMAL AND MOISTURE PROTECTION**				
	Insulation, damp proofing, air barrier, etc. to brick veneer façade				*Incl. in Div. 4*
	Insulation to the interior face of the existing exterior walls				*Assume not required*
					$ -
	Roof waterproofing system 30% of total roof area (built-up roofing)	15,096	SF	$ 25.00	$ 377,400
	Roof waterproofing system with green roof 70% of roof total	35,224	SF	$ 51.00	$ 1,796,424
	New roofing at existing building (built-up roofing)	5,200	SF	$ 25.00	$ 130,000
					$ -
	Metal panels at roof screens assume 375lf at 8' high	3,000	SF	$ 51.00	$ 153,000
					$ -
	Allowance for joint sealants, fireproofing, etc.	110,940	GSF	$ 0.75	$ 83,205
					$ -
TOTAL FOR	**DIVISION 07 - THERMAL AND MOISTURE PROTECTION**				$ 2,540,029
08	**DIVISION 08 - OPENINGS**				
	Exterior glazing at new building 930% of total façade)	13,365	SF	$ 95.00	$ 1,269,675
	Replace existing windows of existing bldg.	10,300	SF	$ 12.00	$ 123,600
					$ -
	Skylights allowance	1,000	SF	$ 250.00	$ 250,000
					$ -
	Exterior double doors at main entrance	2	PAIR	$ 20,000.00	$ 40,000
	Secondary entrance double doors	6	PAIR	$ 15,000.00	$ 90,000
					$ -
	Existing main entrance doors	2	PAIR	$ 20,000.00	$ 40,000
	Existing secondary entrances	4	PAIR	$ 15,000.00	$ 60,000
					$ -
	Interior doors allowance	150	LEAFS	$ 2,500.00	$ 375,000
	Interior of existing doors	45	LEAFS	$ 2,500.00	$ 112,500
					$ -
TOTAL FOR	**DIVISION 08 - OPENINGS**				$ 2,360,775

ESTIMATE

PROJECT:	ACPS GEORGE MASON ES
OWNER:	ALEXANDRIA CITY PUBLIC SCHOOLS
LOCATION:	ALEXANDRIA, VA
A / E:	STUDIO 27 ARCHITECTS
C/M:	N/A
PHASE:	MASTER PLAN ESTIMATE — GROSS SF: 110,940 SF — *February 4, 2020*

DIVISION	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
09	**DIVISION 09 - FINISHES**				
	Interior wall construction (allowance includes all types of walls, including interior glazing)	110,940	GSF	$ 8.10	$ 898,614
					$ -
	Wall finishes, including tack boards, acoustical panels, paint, ceramic wall tile etc.	110,940	GSF	$ 6.50	$ 721,110
					$ -
	Floor finishes allowance	110,940	GSF	$ 8.75	$ 970,725
	Ceiling finish allowance	110,940	GSF	$ 6.95	$ 771,033
					$ -
					$ -
TOTAL FOR	**DIVISION 09 - FINISHES**				$ 3,361,482
10	**DIVISION 10 - SPECIALTIES**				
	Toilet partitions, accessories, mirrors and vanity counter tops	110,940	GSF	$ 1.10	$ 122,034
					$ -
	Interior signage/way finding allowance	1	ALLOW	$ 35,000.00	$ 35,000
	Interior signage/way finding allowance	1	ALLOW	$ 10,000.00	$ 10,000
					$ -
TOTAL FOR	**DIVISION 10 - SPECIALTIES**				$ 167,034
11	**DIVISION 11 - EQUIPMENT**				
	Food service equipment	1	ALLOW	$ 650,000.00	$ 650,000
					$ -
	Gymnasium equipment (bleachers, scoreboards, basketball hoops,	1	ALLOW	$ 205,000.00	$ 205,000
					$ -
	Audiovisual equipment - gymnasium	1	ALLOW	$ 150,000.00	$ 150,000
	Audiovisual equipment - cafeteria	1	ALLOW	$ 75,000.00	$ 75,000
	Audiovisual equipment - Music classroom	1	ALLOW	$ 75,000.00	$ 75,000
	Audiovisual equipment - classrooms, etc.	1	ALLOW	$ 475,000.00	$ 475,000
					$ -
	Dry eraser marker boards, etc.	1	ALLOW	$ 125,000.00	$ 125,000
					$ -
TOTAL FOR	**DIVISION 11 - EQUIPMENT**				$ 1,755,000
12	**DIVISION 12 - FURNISHINGS**				
	Window blinds @ exterior windows	110,940	GSF	$ 0.75	$ 83,205
					$ -
TOTAL FOR	**DIVISION 12 - FURNISHINGS**				$ 83,205
13	**DIVISION 13 - SPECIAL CONSTRUCTION**				
					N/A
					$ -
TOTAL FOR	**DIVISION 13 - SPECIAL CONSTRUCTION**				$ -

ESTIMATE

PROJECT:	ACPS GEORGE MASON ES
OWNER:	ALEXANDRIA CITY PUBLIC SCHOOLS
LOCATION:	ALEXANDRIA, VA
A / E:	STUDIO 27 ARCHITECTS
C/M:	N/A
PHASE:	MASTER PLAN ESTIMATE — GROSS SF: 110,940 SF — *February 4, 2020*

DIVISION	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
14	**DIVISION 14 - CONVEYING EQUIPMENT**				
	Elevator 2 stops	1	EA	$ 110,000.00	$ 110,000
					$ -
TOTAL FOR	**DIVISION 14 - CONVEYING EQUIPMENT**				$ 110,000
21	**DIVISION 21 - FIRE SUPPRESSION**				
	Fire sprinkler system	110,940	GSF	$ 6.10	$ 676,734
					$ -
TOTAL FOR	**DIVISION 21 - FIRE SUPPRESSION**				$ 676,734
22	**DIVISION 22 - PLUMBING**				
	Plumbing system allowance	110,940	GSF	$ 15.00	$ 1,664,100
					$ -
TOTAL FOR	**DIVISION 22 - PLUMBING**				$ 1,664,100
23	**DIVISION 23 - HVAC**				
	HVAC systems allowance	110,940	GSF	$ 80.00	$ 8,875,200
					$ -
TOTAL FOR	**DIVISION 23 - HVAC**				$ 8,875,200
25	**DIVISION 25 - INTEGRATED AUTOMATION**				
	HVAC systems controls allowance	110,940	GSF	$ 15.00	$ 1,664,100
					$ -
TOTAL FOR	**DIVISION 25 - INTEGRATED AUTOMATION**				$ 1,664,100
26	**DIVISION 26 - ELECTRICAL**				
	Electrical systems allowance	110,940	GSF	$ 36.00	$ 3,993,840
					$ -
TOTAL FOR	**DIVISION 26 - ELECTRICAL**				$ 3,993,840
27	**DIVISION 27 - COMMUNICATIONS**				
	Telecommunications, public address, clock and radio	110,940	GSF	$ 3.25	$ 360,555
	IT/Data systems	110,940	GSF	$ 5.20	$ 576,888
	A/V conduits and cabling	110,940	GSF	$ 0.75	$ 83,205
					$ -
					$ -
TOTAL FOR	**DIVISION 27 - COMMUNICATIONS**				$ 1,020,648

ESTIMATE

PROJECT:	**ACPS GEORGE MASON ES**
OWNER:	**ALEXANDRIA CITY PUBLIC SCHOOLS**
LOCATION:	**ALEXANDRIA, VA**
A / E:	**STUDIO 27 ARCHITECTS**
C/M:	**N/A**
PHASE:	**MASTER PLAN ESTIMATE** — **GROSS SF: 110,940 SF** — *February 4, 2020*

DIVISION	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
28	**DIVISION 28 - ELECTRONIC SAFETY AND SECURITY**				
	Access control and CCTV systems	110,940	GSF	$ 3.75	$ 416,025
	Fire alarm	110,940	GSF	$ 2.75	$ 305,085
	Intrusion detection system	110,940	GSF	$ 1.50	$ 166,410
					$ -
TOTAL FOR	**DIVISION 28 - ELECTRONIC SAFETY AND SECURITY**				$ 887,520
31	**DIVISION 31 - EARTHWORK**				
	Rough grading site	370,000	SF	$ 3.75	$ 1,387,500
					$ -
	Erosion and sediment control measures	1	ALLOW	$ 100,000.00	$ 100,000
					$ -
TOTAL FOR	**DIVISION 31 - EARTHWORK**				$ 1,487,500
32	**DIVISION 32 - EXTERIOR IMPROVEMENTS**				
	Clearing and grubbing site preparations	240,000	SF	$ 1.65	$ 396,000
					$ -
	Asphalt driveways and parking area	65,000	SF	$ 6.75	$ 438,750
	Concrete curbs	4,050	LF	$ 40.00	$ 162,000
					$ -
	Walkway allowance	4,000	SF	$ 22.00	$ 88,000
					$ -
	Site fencing allowance	2,500	LF	$ 90.00	$ 225,000
					$ -
	Landscaping allowance	1	ALLOW	$ 225,000.00	$ 225,000
					$ -
	Site lighting allowance	1	ALLOW	$ 150,000.00	$ 150,000
					$ -
	Baseball field backstop, bases, etc.	1	ALLOW	$ 35,000.00	$ 35,000
	Soccer field artificial turf	12,000	SF	$ 21.00	$ 252,000
	Goals	2	EA	$ 3,500.00	$ 7,000
	Field lighting	1	ALLOW	$ 360,000.00	$ 360,000
					$ -
	Courtyard for outdoor activities and views	12,330	SF	$ 45.00	$ 554,850
					$ -
	Stormwater bio-retention area	1	ALLOW	$ 275,000.00	$ 275,000
					$ -
					$ -
TOTAL FOR	**DIVISION 32 - EXTERIOR IMPROVEMENTS**				$ 3,168,600
33	**DIVISION 33 - UTILITIES**				
	Domestic water service	1	ALLOW	$ 100,000.00	$ 100,000
	Sanitary sewer service	1	ALLOW	$ 75,000.00	$ 75,000
	Strom water service	1	ALLOW	$ 75,000.00	$ 75,000
	Electrical service	1	ALLOW	$ 185,000.00	$ 185,000
					$ -
TOTAL FOR	**DIVISION 33 - UTILITIES**				$ 435,000

III. George Mason Master Plan and Technical Data

Cost Estimate - Renovation

Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
	Conceptual Construction Total Direct Cost (Renovation and New Construction)					**$35,807,469.62**
-	**Description**	**Qty**	**Unit**	**Unit Cost**	**Subtotal**	**Mark-up Total**
-	**Markups**					
	General Conditions	1	ALLOW	10%	*$3,580,747*	$39,388,217
	CM Fee	1	ALLOW	5.00%	*$1,969,411*	$41,357,627
	Design Contingency	1	ALLOW	15.00%	*$6,203,644*	$47,561,272
	Bonds & Insurance	1	ALLOW	2.00%	*$951,225*	$48,512,497
	Total Conceptual Construction Cost (Renovation and New Construction)					**$48,512,496.95**
	Cost / SF					**$481.20**
	Exclusions					
	Architectural Engineering Fees					
	Escalation					
	Fees and Permits					
	Phasing					
	Overtime					
	Deep foundation systems					
	Library Shelving					
	Photovoltaic Systems					
	Playground Equipment					
	Bleachers					
	Electronic Scoreboards					
	Trash compactors/bins					
	loose Furniture Fixtures and Equipment					
	Locker refurbishment					
	Site Utilities					
	change order contingency					
	Finance Costs					
	Qualifications					
	Assume conventional concrete strip foundation systems					
	Assume 12' floor to slab height for existing building					
	Assume structural steel frame construction with concrete on metal deck slabs					
	Structural steel framing assumed @ 12lbs/sf for the 1st level and 6.5lbs/sf for the 2nd level					
	Assume typical floor to slab height of 14', double volume areas 25'					
	Assume conventional built-up roof waterproofing system to 30% of overall roof area, green roof of 70% of roof area					
	Assume 30lf of millwork per classroom					
	Assume one (1) elevator with two (3) stops					
	New school is assumed without a basement a slab on grade					
	The existing building is assumed to maintain existing site utilities no upgrades					

Project	George Mason Elementary School					
Client	Alexandria City Public Schools					
Location	2601 Cameron Mills Road Alexandria, Virginia 22302					
	Construction and Renovation Area	**100,815**				
Division Code	**Description**	**Qty**	**Unit**	**Unit Cost**	**Subtotal**	**Division Total**
1.0	**General Requirements**					
	Temporary Construction Fence	3,900	LF	$20.00	$78,000.00	*$78,000.00*
		Division 1 Subtotal				**$78,000.00**
Division Code	**Description**	**Qty**	**Unit**	**Unit Cost**	**Subtotal**	**Division Total**
2.0	**Existing Conditions**					
	Shell interior of building	44,466	SF	$10.25	$455,776.50	*$455,776.50*
	Allowance for removal of hazardous material	44,466	SF	$18.00	$800,388.00	*$800,388.00*
		Division 2 Subtotal				**$1,256,164.50**
Division Code	**Description**	**Qty**	**Unit**	**Unit Cost**	**Subtotal**	**Division Total**
3.0	**Concrete**					
	Concrete foundation for new building	39,940	GSF	$6.50	$259,729.82	*$259,729.82*
	Concrete slab-on-grade	19,970	SF	$10.25	$204,692.50	*$204,692.50*
	Underslab drainage	19,970	SF	$3.50	$69,895.00	*$69,895.00*
	Concrete on metal decking	19,970	SF	$13.00	$259,610.00	*$259,610.00*
	New concrete stairs and landings	6	FLIGHTS	$13,000.00	$78,000.00	*$78,000.00*
	Elevator Pit	1	EA	$19,000.00	$19,000.00	*$19,000.00*
		Division 3 Subtotal				**$890,927.32**
Division Code	**Description**	**Qty**	**Unit**	**Unit Cost**	**Subtotal**	**Division Total**
4.0	**Masonry**					
	Brick Façade and assembly (air barrier, insulation etc.)	21,195	SF	$75.00	$1,589,625.00	*$1,589,625.00*
		Division 4 Subtotal				**$1,589,625.00**
Division Code	**Description**	**Qty**	**Unit**	**Unit Cost**	**Subtotal**	**Division Total**
5.0	**Metals**					
	Structural Steel Framing @ first level	120	TON	$5,500.00	$660,000.00	*$660,000.00*
	Structural Steel Framing @ Second Level	65	TON	$5,500.00	$357,500.00	*$357,500.00*
	Structural Steel Framing for roof MEP equipment and screens	5	TON	$4,900.00	$24,500.00	*$24,500.00*
	Stair handrails	6	FLIGHTS	$4,300.00	$25,800.00	*$25,800.00*
	Miscellaneous metals allowance	39,940	GSF	$2.05	$81,877.00	*$81,877.00*
		Division 5 Subtotal				**$1,149,677.00**
Division Code	**Description**	**Qty**	**Unit**	**Unit Cost**	**Subtotal**	**Division Total**
6.0	**Woods and Plastics**					
	Rough Carpentry	39,940	GSF	$1.50	$59,910.00	*$59,910.00*
	Allowance for millwork/casework	1	ALLOW	$605,000.00	$605,000.00	*$605,000.00*
		Division 6 Subtotal				**$664,910.00**

Continued on next page

Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
7.0	**Thermal and Moisture Protection**					
	Insulation and damp proofing incl. in Div 4					
	Built-up Roof waterproofing system 30% total roof area	5,991	SF	$25.00	$149,775.00	*$149,775.00*
	Green Roof water proofing system 70% total roof area	13,979	SF	$51.00	$712,929.00	*$712,929.00*
	New roofing at existing building	44,466	SF	$25.00	$1,111,650.00	*$1,111,650.00*
	Metal Panels at roof	3,000	SF	$51.00	$153,000.00	*$153,000.00*
	Allowance for joint sealers, fireproofing, etc.	64,436	GSF	$0.75	$48,327.00	*$48,327.00*
		Division 7 Subtotal				**$2,175,681.00**

Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
8.0	**Doors and Windows**					
	Exterior glazing at new building (30% of façade)	6,359	SF	$95.00	$604,057.50	*$604,057.50*
	Replace existing windows of existing bldg.	60,875	SF	$12.00	$730,500.00	*$730,500.00*
	Skylight allowance	1,000	SF	$250.00	$250,000.00	*$250,000.00*
	Exterior double doors at main entrance	2	PAIR	$20,000.00	$40,000.00	*$40,000.00*
	Secondary entrance double doors	6	PAIR	$15,000.00	$90,000.00	*$90,000.00*
	Existing main entrance doors	4	PAIR	$20,000.00	$80,000.00	*$80,000.00*
	Existing secondary entrances	5	PAIR	$15,000.00	$75,000.00	*$75,000.00*
	Interior doors allowance	54	LEAFS	$2,500.00	$135,000.00	*$135,000.00*
		Division 8 Subtotal				**$2,004,557.50**

Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
9.0	**Finishes**					
	New Construction Interior wall construction allowance (includes interior glazing)	39,940	GSF	$8.10	$323,514.00	*$323,514.00*
	New Construction Wall finishes (paints, tack boards, ceramic, etc.)	39,940	GSF	$6.50	$259,610.00	*$259,610.00*
	Floor Finishes	39,940	GSF	$8.75	$349,475.00	*$349,475.00*
	Existing Ceiling Finish	39,940	GSF	$6.95	$277,583.00	*$277,583.00*
	Existing Interior wall construction allowance (includes interior glazing)	44,466	GSF	$8.10	$360,174.60	*$360,174.60*
	Existing Interior wall construction allowance (includes interior glazing)	44,466	GSF	$6.50	$289,029.00	*$289,029.00*
	Existing Floor Finishes	44,466	GSF	$8.75	$389,077.50	*$389,077.50*
	Existing Ceiling Finish	44,466	GSF	$6.95	$309,038.70	*$309,038.70*
		Division 9 Subtotal				**$2,557,501.80**

Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
10.0	**Specialties**					
	Toilet Partitions, accessories, mirrors and vanity counter tops	39,940	SF	$1.10	$43,934.00	*$43,934.00*
	Interior signage way finding allowance	1	ALLOW	$35,000.00	$35,000.00	*$35,000.00*
		Division 10 Subtotal				**$78,934.00**

Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
11.0	**Equipment**					
	Gymnasium Equipment	1	ALLOW	$205,000.00	$205,000.00	*$205,000.00*
	Audiovisual equipment - gymnasium	1	ALLOW	$150,000.00	$150,000.00	*$150,000.00*
	Dry Eraser marker boards	1	ALLOW	$125,000.00	$125,000.00	*$125,000.00*
	Audiovisual equipment - Cafeteria	1	ALLOW	$75,000.00	$75,000.00	*$75,000.00*
	Audiovisual equipment - Music Classroom	1	ALLOW	$75,000.00	$75,000.00	*$75,000.00*
	Audiovisual equipment - Classrooms	1	ALLOW	$475,000.00	$475,000.00	*$475,000.00*
		Division 11 Subtotal				**$1,105,000.00**

Continued on next page

Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
Division Code	**Description**	**Qty**	**Unit**	**Unit Cost**	**Subtotal**	**Division Total**
12.0	**Furnishings**					
	New Construction Window blinds	39,940	GSF	$0.75	$29,955.00	*$29,955.00*
	Existing Construction window blinds	44,466	GSF	$0.75	$33,349.50	*$33,349.50*
		Division 12 Subtotal				**$63,304.50**
Division Code	**Description**	**Qty**	**Unit**	**Unit Cost**	**Subtotal**	**Division Total**
14.0	**Convey Systems**					
	Elevator 2 Stops	1	EA	$110,000.00	$110,000.00	*$110,000.00*
		Division 14 Subtotal				**$110,000.00**
Division Code	**Description**	**Qty**	**Unit**	**Unit Cost**	**Subtotal**	**Division Total**
21.0	**Fire Suppression**					
	New Sprinkler System (Existing and New Construction)	100,815	GSF	$6.10	$614,971.50	*$614,971.50*
		Division 21 Subtotal				**$614,971.50**
Division Code	**Description**	**Qty**	**Unit**	**Unit Cost**	**Subtotal**	**Division Total**
22.0	**Plumbing**					
	Plumbing System Allowance (Existing and New Construction)	100,815	GSF	$15.00	$1,512,225.00	*$1,512,225.00*
		Division 22 Subtotal				**$1,512,225.00**
Division Code	**Description**	**Qty**	**Unit**	**Unit Cost**	**Subtotal**	**Division Total**
23.0	**Mechanical**					
	HVAC System allowance (Existing and New Construction)	100,815	GSF	$80.00	$8,065,200.00	*$8,065,200.00*
		Division 23 Subtotal				**$8,065,200.00**
Division Code	**Description**	**Qty**	**Unit**	**Unit Cost**	**Subtotal**	**Division Total**
25.0	**Integrated Automation**					
	HVAC System controls allowance (Existing and New Construction)	100,815	GSF	$15.00	$1,512,225.00	*$1,512,225.00*
		Division 25 Subtotal				**$1,512,225.00**
Division Code	**Description**	**Qty**	**Unit**	**Unit Cost**	**Subtotal**	**Division Total**
26.0	**Electrical**					
	Electrical System allowance (Existing and New Construction)	100,815	GSF	$36.00	$3,629,340.00	*$3,629,340.00*
		Division 26 Subtotal				**$3,629,340.00**

Continued on next page

Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
27.0	**Communications**					
	Telecommunications, public address, clock and radio	100,815	GSF	$3.25	$327,648.75	*$327,648.75*
	IT/Data Systems	100,815	GSF	$5.20	$524,238.00	*$524,238.00*
	A/V Conduits and Cabling	100,815	GSF	$0.75	$75,611.25	*$75,611.25*
		Division 26 Subtotal				**$927,498.00**

Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
28.0	**Electronic Safety and Security**					
	Access control and CCTV systems	100,815	GSF	$3.75	$378,056.25	*$378,056.25*
	Fire Alarm	100,815	GSF	$2.75	$277,241.25	*$277,241.25*
	Intrusion detection system	100,815	GSF	$1.50	$151,222.50	*$151,222.50*
		Division 26 Subtotal				**$806,520.00**

Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
31.0	**Earthwork**					
	Rough grading site	349,762	SF	$3.75	$1,311,607.50	*$1,311,607.50*
	Erosion and Sediment Control	1	ALLOW	$100,000.00	$100,000.00	*$100,000.00*
		Division 26 Subtotal				**$1,411,607.50**

Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
32.0	**Exterior Improvements**					
	Clearing and grubbing site preparations	240,000	SF	$1.65	$396,000.00	*$396,000.00*
	Asphalt driveways and parking area	65,000	SF	$6.75	$438,750.00	*$438,750.00*
	Concrete curbs	4,050	LF	$40.00	$162,000.00	*$162,000.00*
	Walkway allowance	4,000	SF	$22.00	$88,000.00	*$88,000.00*
	Site Fencing allowance	2,500	LF	$90.00	$225,000.00	*$225,000.00*
	Landscaping allowance	1	ALLOW	$225,000.00	$225,000.00	*$225,000.00*
	Site lighting allowance	1	ALLOW	$150,000.00	$150,000.00	*$150,000.00*
	Baseball filed	1	ALLOW	$35,000.00	$35,000.00	*$35,000.00*
	Soccer Field	12,000	SF	$21.00	$252,000.00	*$252,000.00*
	Goals	2	EA	$3,500.00	$7,000.00	*$7,000.00*
	Field lighting	1	ALLOW	$360,000.00	$360,000.00	*$360,000.00*
	Outdoor activities and views	12,330	SF	$45.00	$554,850.00	*$554,850.00*
	Stormwater bio retention area	1	ALLOW	$275,000.00	$275,000.00	*$275,000.00*
		Division 26 Subtotal				**$3,168,600.00**

Division Code	Description	Qty	Unit	Unit Cost	Subtotal	Division Total
33.0	**Utilities**					
	Domestic water service	1	ALLOW	$100,000.00	$100,000.00	*$100,000.00*
	Sanitary sewer service	1	ALLOW	$75,000.00	$75,000.00	*$75,000.00*
	Storm water service	1	ALLOW	$75,000.00	$75,000.00	*$75,000.00*
	Electrical service	1	ALLOW	$185,000.00	$185,000.00	*$185,000.00*
		Division 26 Subtotal				**$435,000.00**
	Conceptual Construction Total Direct Cost (Renovation and New Construction)					**$35,807,469.62**

III. George Mason Master Plan and Technical Data

Program and Capacity

Table 5 Core Academic Program

		George Mason Existing Program			Ed Spec Student Model		
Jse	Program Space	# of spaces	Avg SF / Room	Total SF	# of Spaces	SF / Room	Total SF
Core Academic	Pre-K				*4*	*1,175*	*4,700*
	Kindergarten	4	983	3,930	*5*	*1,175*	*5,875*
	K2						
	1st Grade	4	881	3,525	*5*	*900*	*4,500*
	2nd Grade	4	710	2,840	*4*	*900*	*3,600*
	3rd Grade	4	795	3,180	*4*	*900*	*3,600*
	4th Grade	4	715	2,860	*4*	*900*	*3,600*
	4th+5th Grade	1	715	715			
	5th Grade	3	715	2,145	*4*	*900*	*3,600*
	Extended Learning Area				*5*	*600*	*3,000*
	Classroom Bathroom						
	Special Ed	1	350	350	*3*	*250*	*750*
	Resource Classroom (Other)				*2*	*250*	*500*
	TAG	1	715	715	*1*	*900*	*900*
	Student Project Storage						*150*
	Reading Specialist	5	316	1,580			
	ELL				*3*	*700*	*2,100*
	Student Services	1	275	275	*4*	*100*	*400*
	Counselor	1	340	340			
	Speech Language Provider (SLP)	1	270	270			
	Occupational Therapist (OT)				*1*	*400*	*400*
	Storage				*4*	*200*	*800*
	Teacher Collab Room				*5*	*250*	*1,250*
	Early Childhood Learning				*1*	*2,000*	*2,000*
	Early Childhood Storage				*1*	*200*	*200*
	Total			**22,725**			***41,925***

19,200 ***SF Deficiency*** ***45.80%*** **Deficiency**

Table 6 Shared Program

		George Mason Existing Program			Ed Spec Student Model				
Use	**Program Space**	**# of spaces**	**Avg SF / Room**	**Total SF**	**# of Spaces**	**SF / Room**	**Total SF**		
Visual Art / Music / Science	Art Lab	1	775	775	*1*	*1,200*	*1,200*		
	Kiln Room				*1*	*75*	*75*		
	General Music Room				*1*	*1,200*	*1,200*		
	Instrumental Music Room				*1*	*1,000*	*1,000*		
	General Music Storage				*1*	*150*	*150*		
	Instrument Storage				*1*	*250*	*250*		
	Orchestra/Music	3	varies	2,190					
	Total			**2,965**			***3,875***	***910* SF Deficiency**	***23.48%* Deficiency**
Media Center / Library	Reading / Learning / Circulation	1	2,925	2,925	*1*	*3,000*	*3,000*		
	Technical Processing Room				*1*	*200*	*200*		
	Combined Office / Workroom				*1*	*200*	*200*		
	Device / Changing Room				*1*	*150*	*150*		
	Storage				*1*	*200*	*200*		
	Small Group Room				*2*	*150*	*300*		
	Total			**2,925**			***4,050***	***1,125* SF Deficiency**	***27.78%* Deficiency**
Physical Education	Gymnasium				*1*	*6,500*	*6,500*		
	PE Office				*2*	*150*	*300*		
	PE Storage				*2*	*250*	*500*		
	Multipurpose	1	4,760	4,760	*1*	*1,500*	*1,500*		
	Total			**4,760**			***8,800***	***4,040* SF Deficiency**	***45.91%* Deficiency**
Student Dining and Food Services	Student Dining Area	1	5,355	5,355	*1*	*3,000*	*3,000*		
	Chair and Table Storage				*1*	*350*	*350*		
	Serving Area				*1*	*700*	*700*		
	Kitchen Suite	1	2,600	2,600	*1*	*2,150*	*2,150*		
	Stage with Storage				*1*	*1,100*	*1,100*		
	Total			**7,955**			***7,300***	***-655* SF (Excess)**	***-8.97%* (Increase)**

Table 7 Admin. Program

	George Mason Existing Program				Ed Spec Student Model				
Use	**Program Space**	**# of spaces**	**Avg SF / Room**	**Total SF**	**# of Spaces**	**SF / Room**	**Total SF**		
Administration	**Lobby**	1	355	355	*1*	*700*	*700*		
	Welcome Center	2	varies	1,005	*1*	*450*	*450*		
	Conference Room	1	425	425	*1*	*250*	*250*		
	Principals Office				*1*	*180*	*180*		
	Asst. Principals Office				*1*	*150*	*150*		
	Misc. Office	2	190	380					
	Administrators' Workroom	1	150	150	*1*	*200*	*200*		
	Teacher Lounge	1	550	550					
	Mail Room				*1*	*125*	*125*		
	Records Room				*1*	*150*	*150*		
	Family and Community Engagement				*1*	*470*	*470*		
	Staff Toilet				*1*	*50*	*50*		
	Student Services Office				*2*	*150*	*300*		
	Student Services Conference				*1*	*200*	*200*		
	Health Suite	1	305	305	*1*	*900*	*900*		
	Child and Family Network								
	After School Storage				*1*	*250*	*250*		
	Total			**3,170**			***4,375***	***1,205* SF Deficiency**	***27.54%* Deficiency**

Table 8 Support Program and Total

		George Mason Existing Program			Ed Spec Student Model				
Use	**Program Space**	**# of spaces**	**Avg SF / Room**	**Total SF**	**# of Spaces**	**SF / Room**	**Total SF**		
Maint./ Custodial Services	**Total**			**120**			*850*	***730* SF Deficiency**	***85.88%* Deficiency**
Building Services and Restrooms	Corridors			7,870			*13,400*		
	Other Services and Restrooms			4,865			*8,600*		
	Total			**12,735**			***22,000***	***9,265* SF Deficiency**	***42.11%* Deficiency**
Total Neta Area (SF)				**57,355**			*93,175*	***35,820* SF Deficiency**	***38.44%* Deficiency**
Total Gross Bldg. Area (sf)				**60,875**			*100,815*	***39,940* SF Deficiency**	***39.62%* Deficiency**

III. George Mason Master Plan and Technical Data

Scenario 1: Renovation and Addition

Narrative

The first scenario master plan study illustrates a condition where the existing school is kept in place with a full renovation of the existing school building and constructing a **new 39,940 sf addition** to the east of the existing school building.

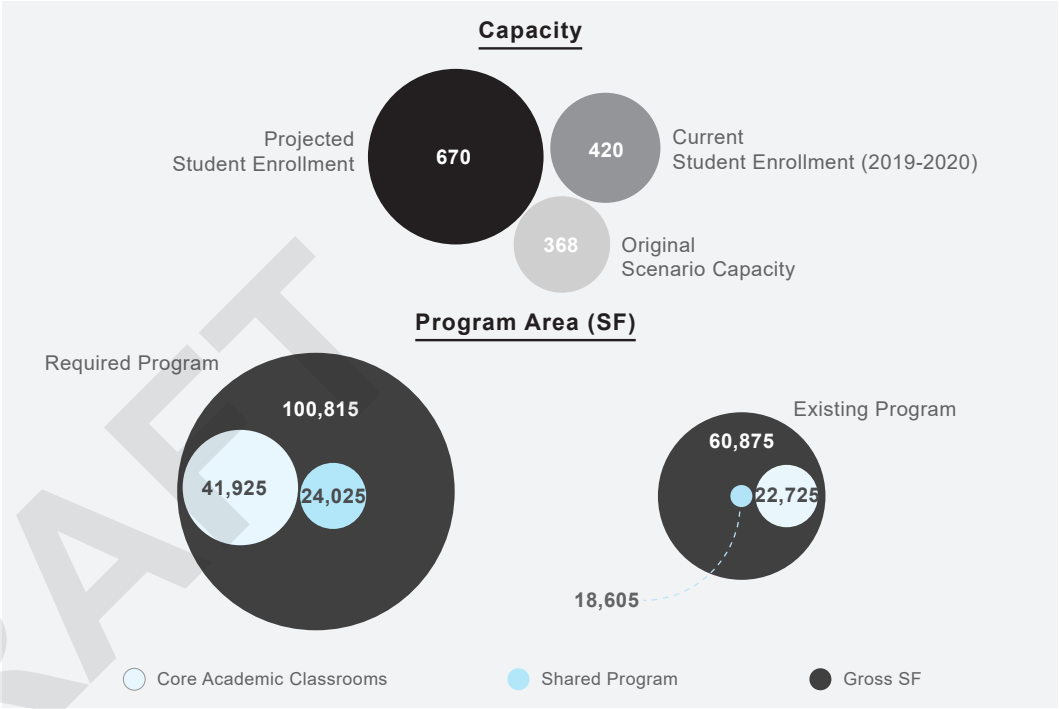
The addition may either be one or two stories but would encroach heavily into the existing George Mason Park, which belongs to the school parcel, per the field survey.

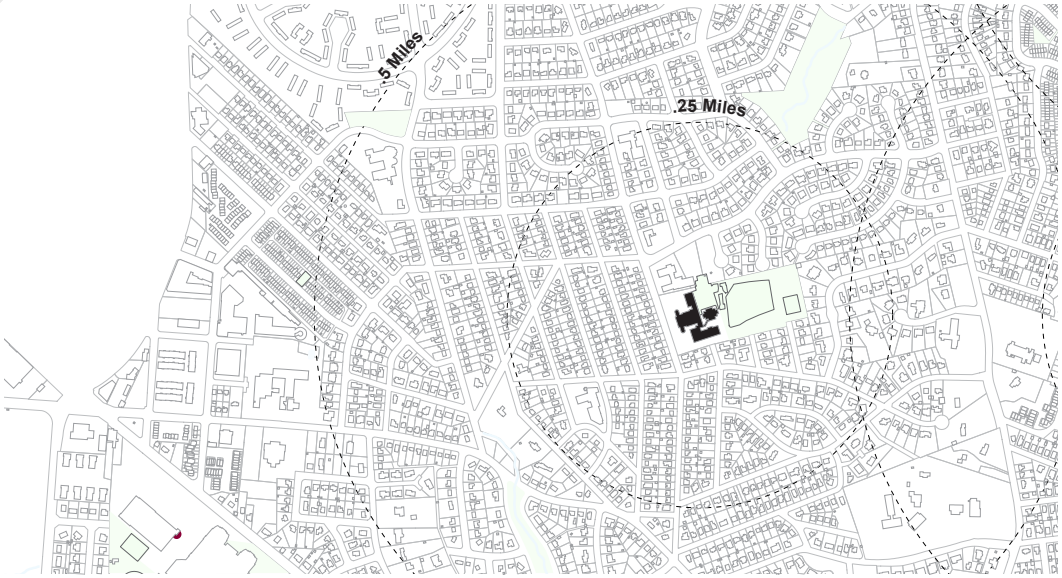
This is an approach that responds to immediate challenges but critically limits expandability and flexibility due to the existing site constraints. It also emphasizes the fragmented nature of George Mason and may further complicate the coordination of building systems if further additions are constructed.

Swing space and a co-location zone would need to be allocated in the city since the entire existing school building would need to be entirely shelled to meet MEP system and energy code (LEED and Net Zero) requirements. A renovated MEP system would cost approximately **$2,000,000 more** ($14.8-15.3M total renovated MEP cost) than a completely new MEP system in a new construction scenario.

Conceptual Cost

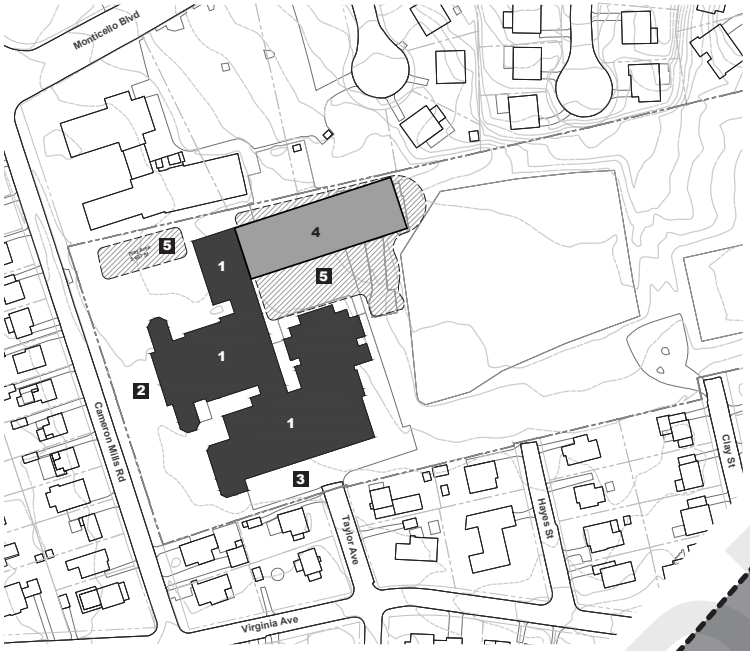
Concept Cost Renovation School:	$48M
New Building MEP:	$12.5-13.5M
Annual Savings:	$100,000
Renovated MEP:	$14.8-15.3M
Annual Savings:	$90,000

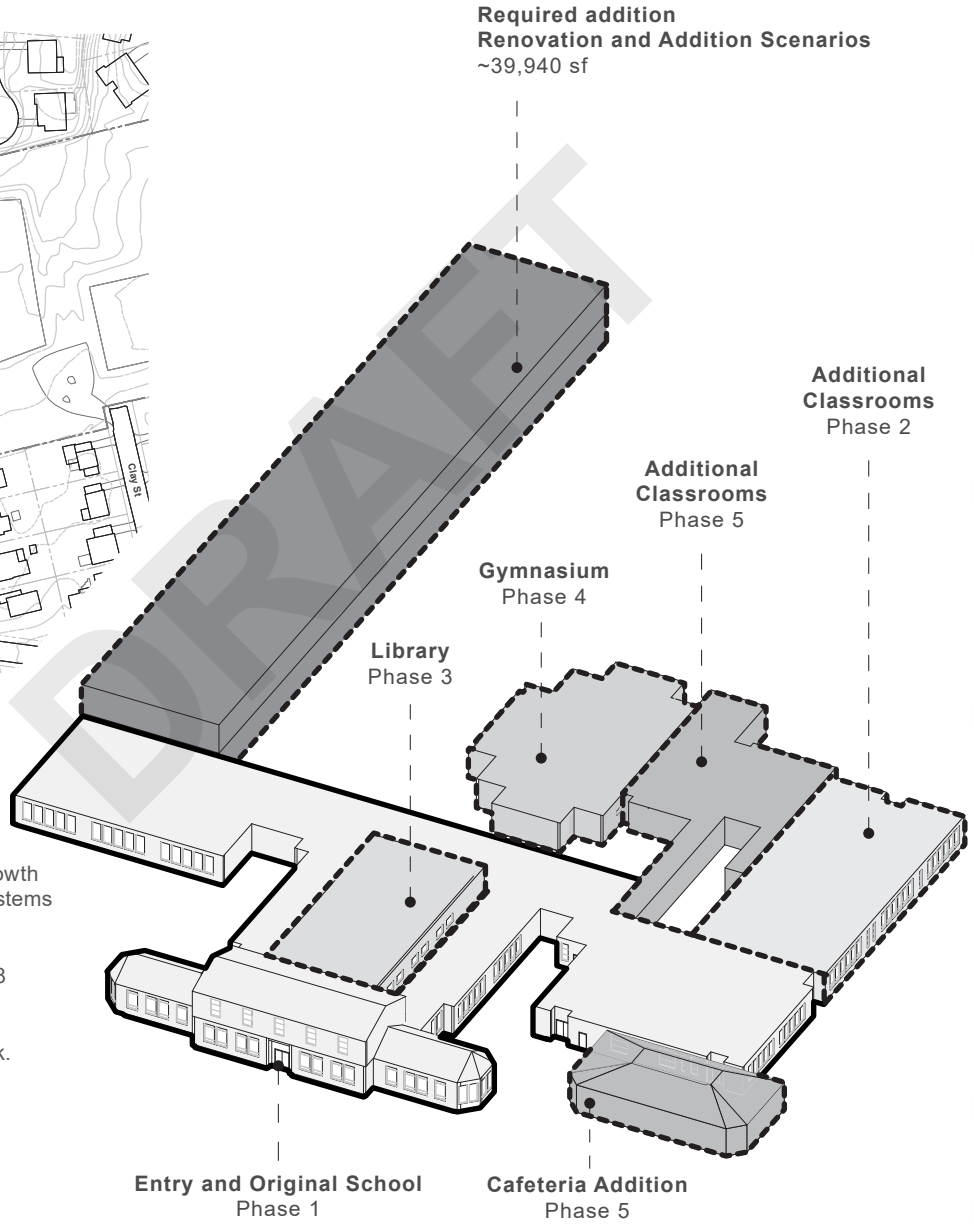




III. George Mason Master Plan and Technical Data

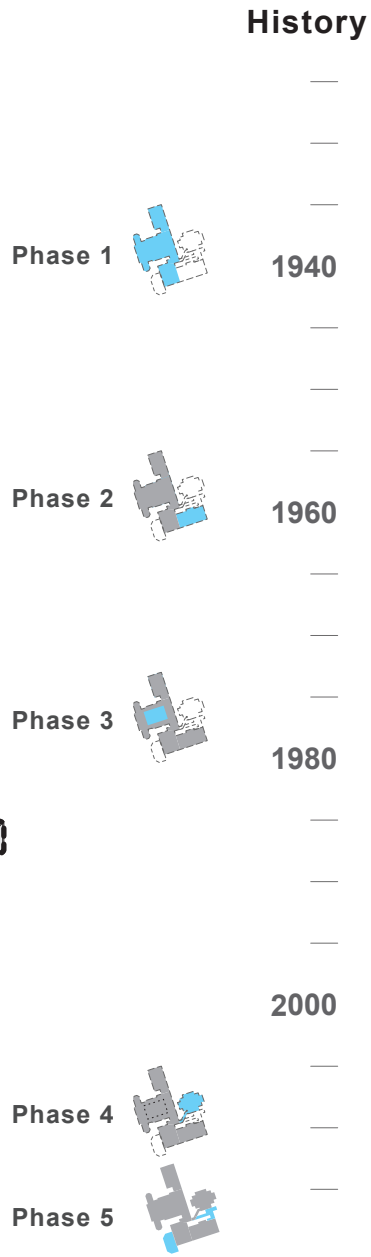
Scenario 1: Renovation and Addition





Site Plan

1. Existing School Building. Insufficient area for required growth Multiple additions built at different phases. All building systems need to be replaced.
2. No drop-off for cars and Buses, limited on-site parking.
3. Insufficient area for loading; limited turn-around space. 28 existing parking spaces.
4. 39,940sf Addition.
5. Limited exterior play space bound by George Mason Park.



III. George Mason Master Plan and Technical Data

Scenario 2: Replacement School with Historic Component

Narrative

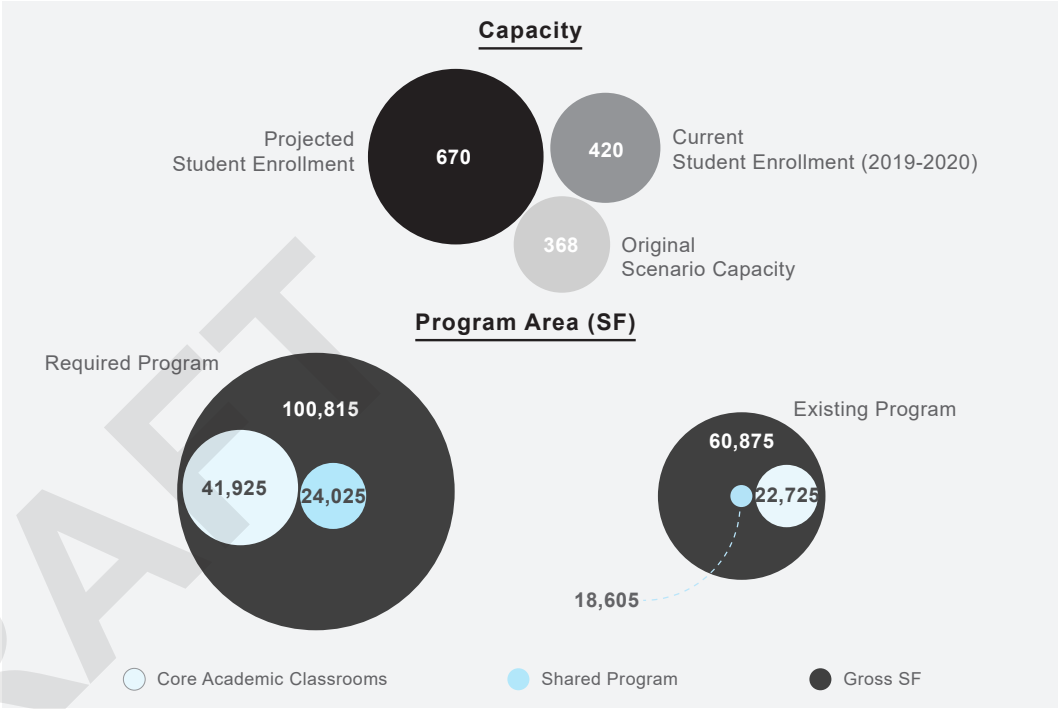
The second scenario master plan study illustrates a condition where the existing school is replaced and relocated to the eastern end of the lot. The baseball field and courts shift slightly west and additional open field space is provided between the historic frontage and relocated school. The historic frontage is maintained as a community space or an indoor recreational space for activities. This is an approach that responds to a long-term goal and supports expandability and flexibility for future capacity changes.

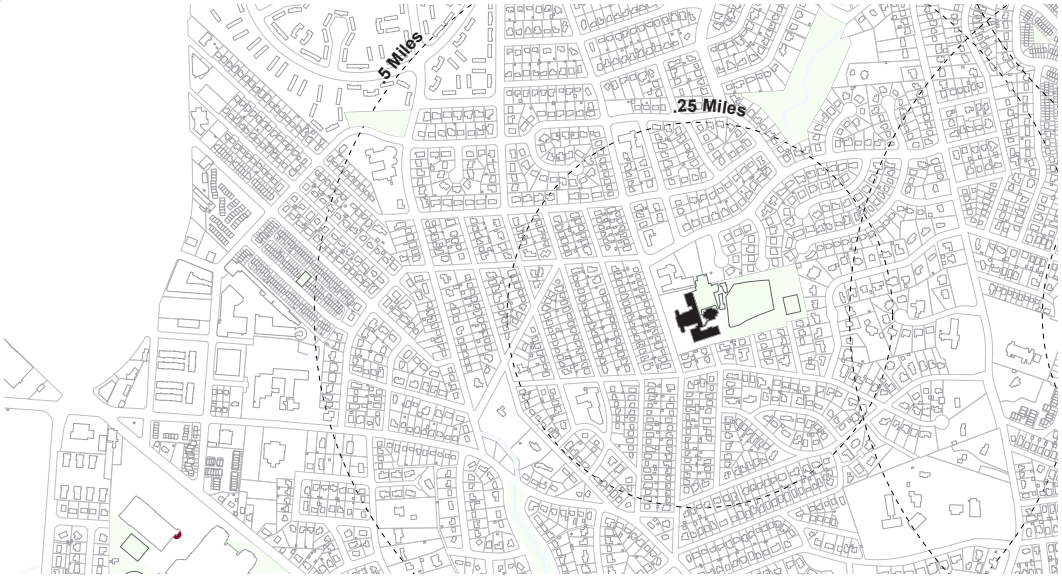
This master plan scenario allows for a dedicated entry, drop-off, and parking sequence for the school and completely separates any traffic (vehicular and pedestrian) between Cameron Mills Road and neighboring local streets. The dedicated parking and drop-off zones will avoid any kind of congestion on the local and arterial streets and will provide cleaner street frontage throughout the day.

Replacing and relocating the school would eliminate the need for swing space which would be a crucial cost and time savings. MEP system would cost approximately **$2,000,000 less** ($12.5-13.5M total New MEP cost) than a completely renovated MEP system in a renovation and addition scenario.

Conceptual Cost

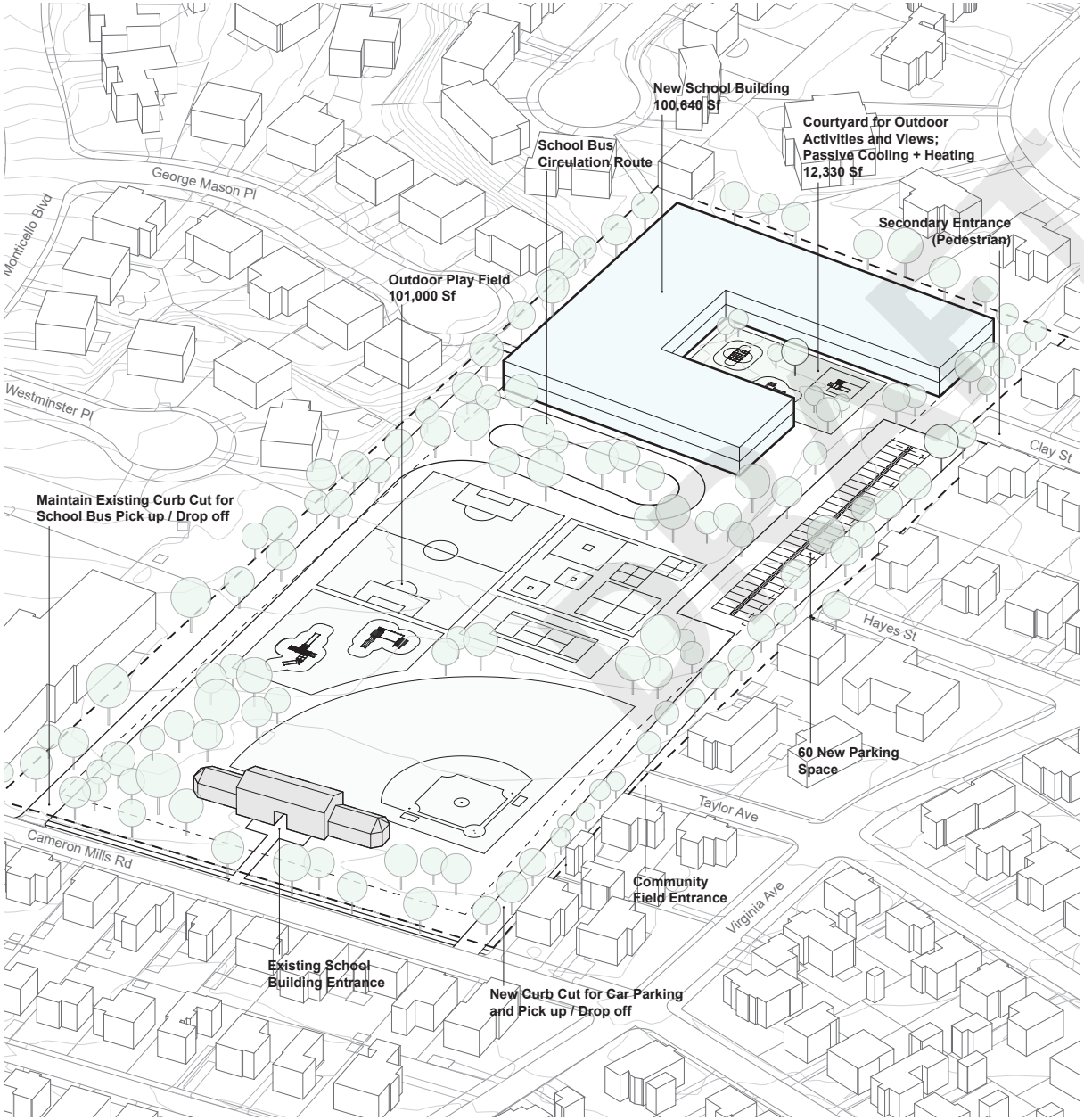
Concept Cost New School:	$61M
New Building MEP:	$12.5-13.5M
Annual Savings:	$100,000
Renovated MEP:	$14.8-15.3M
Annual Savings:	$90,000



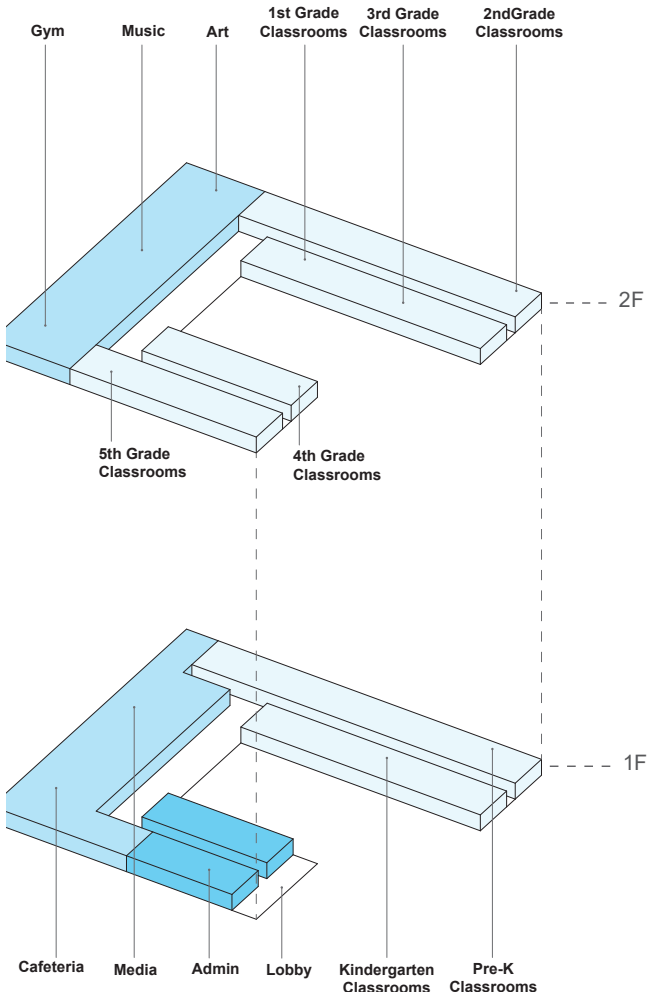


III. George Mason Master Plan and Technical Data

Scenario 2: Replacement School with Historic Component



Program Isometric



III. George Mason Master Plan and Technical Data

Scenario 3: Replacement School (in-place) with Historic Component

Narrative

The third scenario master plan study illustrates a condition where the existing school is replaced in place. The baseball field and courts shift east and additional open field space is provided. The historic frontage is maintained as the main entry and administration wing of the school. This is an approach that responds to long-term goals and supports expandability and flexibility for future capacity changes.

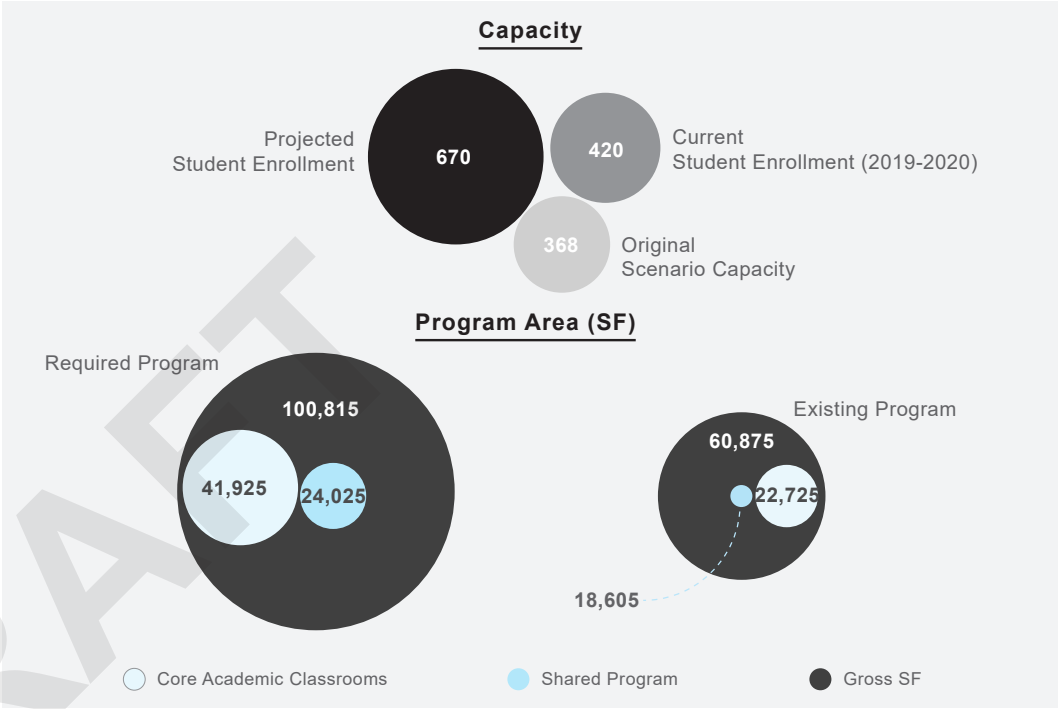
This master plan scenario allows for a dedicated entry, drop-off, and parking sequence for the school and completely separates any traffic (vehicular and pedestrian) between Cameron Mills Road and neighboring local streets. The dedicated parking and drop-off zones will avoid any kind of congestion on the local and arterial streets and will provide cleaner street frontage throughout the day.

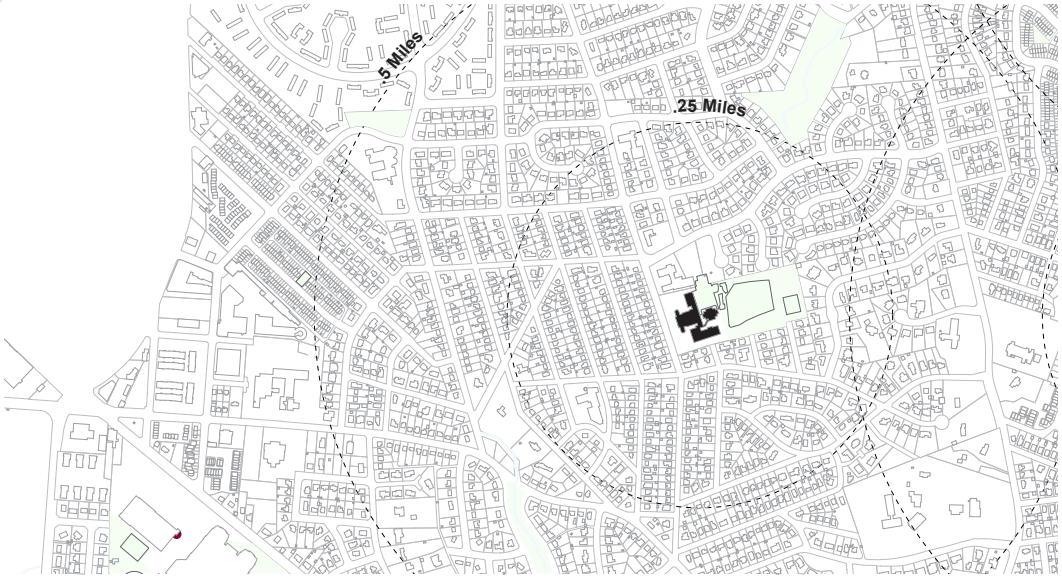
The courtyard configuration creates a private outdoor play area for the students, increases natural daylight into all occupiable rooms, and reinforces the sustainable goals of the county.

Replacing the school in place would require swing space. MEP system would cost approximately **$2,000,000 less** ($12.5-13.5M total New MEP cost) than a completely renovated MEP system in a renovation and addition scenario.

Conceptual Cost

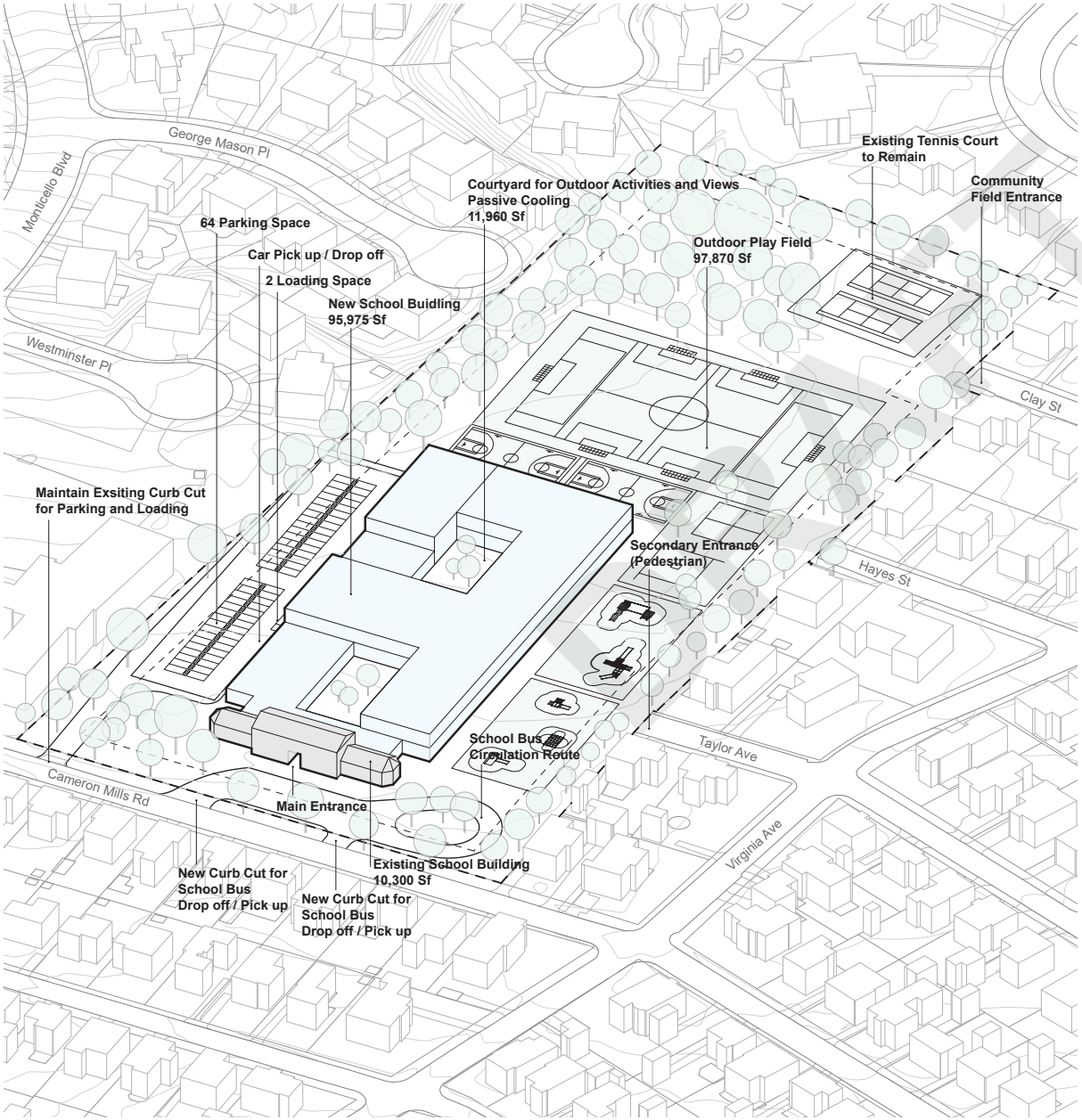
Concept Cost New School:	$61M
New Building MEP:	$12.5-13.5M
Annual Savings:	$100,000
Renovated MEP:	$14.8-15.3M
Annual Savings:	$90,000



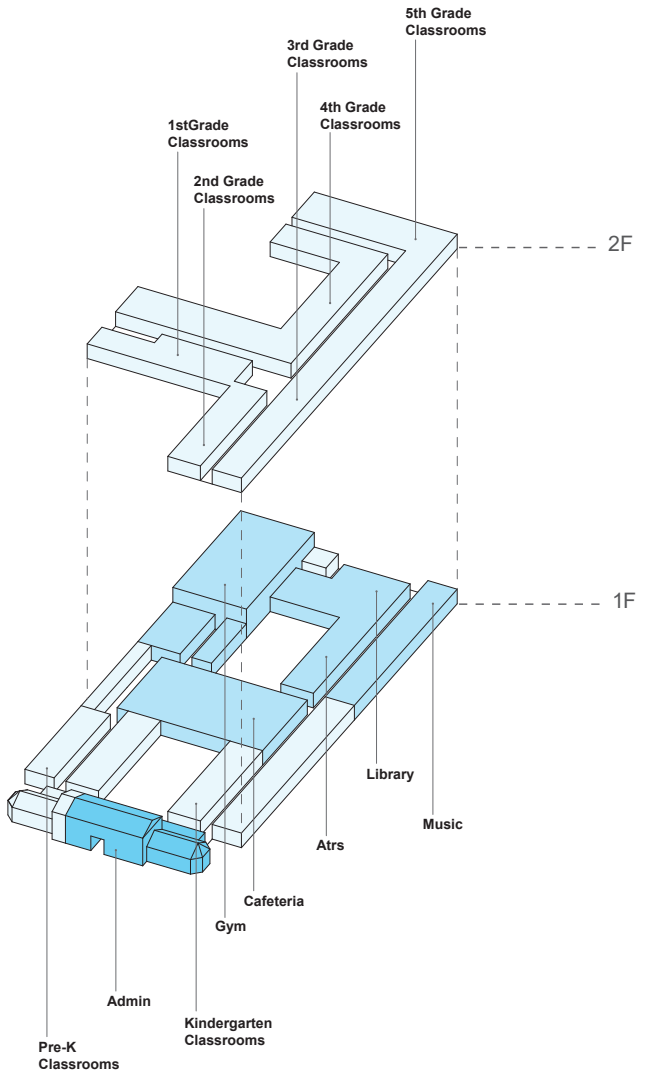


III. George Mason Master Plan and Technical Data

Scenario 3: Replacement School (in-place) and Existing Recreation Center



Program Isometric



IV. Conclusion

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IV. Conclusion

Cora Kelly Summary

Given the projected student capacity, the current site would exhibit a strain on on-site access for parking and drop-off, the shared recreation center gym would be over-utilized due to an increase in student population, and less open green space would be available. The master plan study provides possible scenarios in either relocating the school and site access which creates a stronger dialogue with the creek and Four Mile Run Park, which reinforces the academic nature of Cora Kelly (a STEM school), and establishing a clearer adjacency of recreational programs for the public. Other master plan studies explore the possible scenarios of replacing the school in place and sharing resources with the existing recreation center and public open space.

The RPA boundary is critical in understanding the limits and possibilities of future growth, whether it is an addition or replacement and reorientation of the school. Currently, zoning does not allow any new construction other than passive recreation on the RPA boundary. If Cora Kelly experiences a substantial growth of student capacity, the current site configuration will experience severe limitations with accommodating new addition while maintaining public open space.

Opportunities:

- Capitalize on the parcel and building's relationship with Four Mile Run and existing co-located Recreation Center.
- All project scenarios will accommodate future enrollment growth.
- The Replacement Scenarios would resolve the fragmented educational adjacencies of the school and reslove existing site constraints.
- The Replacment Project Scenarios include a gym for use by the school.
- Swing space would not be required in the Replacement Project Scenarios if rezoning of POS is permitted and safety, construction logistics, and community involvement are effectively coordinated.

Challenges:

- The RPA boundary and existing floodplain present budget and design challenges for any future development.
- The school currently sits on an undersized 4.5 acre lot. Any future development may require pursuing rezoning of the POS.

IV. Conclusion

Cora Kelly Master Plan Scenarios

Scenario 1: Renovation and Addition

Cora Kelly	Confirming the Priority	Replacement		Swing Space	
		Addition	Renovation	On-Site	Off-Site
Educational Program/Adequacy	Responds to immediate challenges. Critically limits expandability & flexibility	28,000 sf	Full renovation	No	Yes
Budget (Conceptual Cost)*	$48M	New MEP $12.5-13.5M	New MEP $14.8-15.3M	-	TBD
Schedule	18 - 24 months	-	-	-	TBD
Community Impact	Gymnasium & its associated program in the recreation center will also increase & may succumb to over-utilization	Encroach heavily into the POS, & nears the RPA boundary	Entire existing school building would need to be entirely shelled to meet MEP system and energy code (LEED and Net Zero)	-	Swing space would need to be allocated in the city

Scenario 2: Replacement School and Recreation Center (no swing space required)

Cora Kelly	Confirming the Priority	Replacement		Swing Space	
		Addition	Renovation	On-Site	Off-Site
Educational Program/Adequacy	This is an approach that responds to long-term goals & supports expandability & flexibility for future capacity changes	114,464 sf	None	Yes	No
Budget (Conceptual Cost)*	New School $68M New Rec Center $33M	-	-	Crucial cost savings	-
Schedule	18 - 24 months	-	-	Crucial time savings	-
Community Impact	Locating the school north & closer to the water, reinforces the STEM identity by celebrating the natural context & allowing students to explore the flora & fauna discovered along the creek & park, but within the immediate school boundaries	Encroach heavily into the POS & nears the RPA boundary	The recreation center and fields receive their dedicated parking	Relocating the school would eliminate the need	-

Scenario 3: Replacement School (in-place) and Existing Recreation Center

Cora Kelly	Confirming the Priority	Replacement		Swing Space	
		Addition	Renovation	On-Site	Off-Site
Educational Program/Adequacy	This is an approach that responds to long-term goals & supports expandability & flexibility for future capacity changes	-	Replaced in-place	No	Yes
Budget (Conceptual Cost)*	68M	New MEP $12.5-13.5M	New MEP $14.8-15.3M	-	TBD
Schedule	18 - 24 months	-	-	-	TBD
Community Impact	The recreation center would not be shared since this scenario considers a separate gymnasium within the school	Establishes a dialogue with the Four Mile Run Park and creek	Courtyard configuration creates a private outdoor play area for the students, increases natural daylight into all occupiable rooms	-	Swing space would need to be allocated in the city

Scenario 4: Replacement School (in-place) and Existing Recreation Center

Cora Kelly	Confirming the Priority	Replacement		Swing Space	
		Addition	Renovation	On-Site	Off-Site
Educational Program/Adequacy	This is an approach that responds to long-term goals & supports expandability & flexibility for future capacity changes	-	Replaced in-place	No	Yes
Budget (Conceptual Cost)*	68M	New MEP $12.5-13.5M	New MEP $14.8-15.3M	-	TBD
Schedule	18 - 24 months	-	-	-	TBD
Community Impact	Recreation center is shared. New school orientation on-site allow for future expansion for dedicated gymnasium	Establishes a dialogue with the Four Mile Run Park and creek	Courtyard configuration creates a private outdoor play area for the students, increases natural daylight into all occupiable rooms	-	Swing space would need to be allocated in the city

*Note: Budget and Conceptual Cost does not include costs of on-site or off-site swing space.

IV. Conclusion

George Mason Summary

Given the projected student capacity, the current site would exhibit a strain on on-site access for parking and drop-off, the playground space will over-utilized due to an increase in student population, and less open green space would be available. George Mason is situated in a residential context with a historic fabric that requires careful attention to site access without disrupting the character of the neighborhood. In both masterplan scenario studies, the historic frontage would be maintained and clear site access has been established on Cameron Mills Road. The master plan study provides possible scenarios in either relocating the school to the east end of the site and maintaining the historic frontage as a community building. The recreational and open green space would be shared between the community and the school. These scenarios would not require swing space or co-location. The other master plan study explores the possible scenarios of replacing the school in place and maintaining the historic frontage for the community.

The George Mason Park and street access entry are critical in understanding the limits and possibilities of future growth, whether it is an addition or replacement and reorientation of the school. Currently, George Mason park is limiting the school's expansion to the east, although the park is within the parcel of the school. The current site access will be critical if the student capacity grows. The school is located in a dense residential neighborhood, and an increase in vehicular movement within the neighborhood may cause unintentional disruption to the neighborhood. If George Mason experiences a substantial growth of student capacity, the current site configuration will experience severe limitations with accommodating a new addition while maintaining public open space and easing site access.

Opportunities:

- All Project Scenarios maintain the Historic frontage of the school.
- The Replacement Scenarios would resolve the fragmented educational adjacencies of the school and reslove existing site constraints such as the current deficit of on-site parking.
- Swing space would not be required in the Replacement Project Scenarios if safety, construction logistics, and community involvement are effectively coordinated.

Challenges:

- Site access will need to be designed to minimize disruption of vehicular and pedestrian movement within the neighborhood.
- George Mason park is located on the same parcel of the school; however, it is not located in a POS zoning district. To address over-capacity at the school, future development may encorach on the overall open space acreage.

IV. Conclusion

George Mason Master Plan Scenarios

Scenario 1: Renovation and Addition

George Mason	Confirming the Priority	Replacement		Swing Space	
		Addition	Renovation	On-Site	Off-Site
Educational Program/Adequacy	Responds to immediate challenges. Critically limits expandability & flexibility	39,940 sf	Full renovation	No	Yes
Budget (Conceptual Cost)*	$48M	New MEP $12.5-13.5M	New MEP $14.8-15.3M	-	TBD
Schedule	18 - 24 months	-	-	-	TBD
Community Impact	Addition of one or two stories would encroach heavily into the existing George Mason Park, which belongs to the school parcel, per the field survey	Emphasizes the fragmented nature of George Mason & may further complicate the coordination of building systems if further additions are constructed	Entire existing school building would need to be entirely shelled to meet MEP system and energy code (LEED and Net Zero)	-	Swing space would need to be allocated in the city

Scenario 2: Replacement School with Historic Component

George Mason	Confirming the Priority	Replacement		Swing Space	
		Addition	Renovation	On-Site	Off-Site
Educational Program/Adequacy	Responds to a long-term goal & supports expandability & flexibility for future capacity changes	Replaced & relocated	-	Yes	No
Budget (Conceptual Cost)*	$61M	New MEP $12.5-13.5M	New MEP $14.8-15.3M	Crucial cost savings	-
Schedule	18 - 24 months	-	-	Crucial time savings	-
Community Impact	Historic frontage is maintained as a community space or an indoor recreational space for activities	Dedicated parking & drop-off zones will avoid any kind of congestion on the local & arterial streets & will provide cleaner street frontage throughout the day	-	Relocating the school would eliminate the need	-

Scenario 3: Replacement School (in-place) with Historic Component

George Mason	Confirming the Priority	Replacement		Swing Space	
		Addition	Renovation	On-Site	Off-Site
Educational Program/Adequacy	Responds to a long-term goal & supports expandability & flexibility for future capacity changes	-	Replaced in-place	No	Yes
Budget (Conceptual Cost)*	$61M	New MEP $12.5-13.5M	New MEP $14.8-15.3M	-	TBD
Schedule	18 - 24 months	-	-	-	TBD
Community Impact	Historic frontage is maintained as the main entry & administration wing of the school	Dedicated parking & drop-off zones will avoid any kind of congestion on the local & arterial streets & will provide cleaner street frontage throughout the day	Courtyard configuration creates a private outdoor play area for the students, increases natural daylight into all occupiable room	-	Swing space would need to be allocated in the city

*Note: Budget and Conceptual Cost does not include costs of on-site or off-site swing space.

Appendices - ALTA Surveys

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Appendices - ALTA Survey

GENERAL NOTES

1. THE PROPERTY SHOWN IS IDENTIFIED ON THE CITY OF ALEXANDRIA, VIRGINIA GEOGRAPHIC INFORMATION SYSTEM AS MAP-BLOCK-LOT NUMBER: 015.02-09 AND IS ZONED RB (RESIDENTIAL MEDIUM) AND A PORTION OF THE SCHOOL BUILDING AND RELATED IMPROVEMENTS ARE LOCATED ON MAP-BLOCK-LOT NUMBER: 007.04-09-04 WHICH IS ZONED POS (PUBLIC OPEN SPACE).
2. THE PROPERTY SHOWN HEREON IS NOW IN THE NAME OF CITY OF ALEXANDRIA, VIRGINIA AND WAS ACQUIRED AT DEED BOOK 378 AT PAGE 24, AMONG THE LAND RECORDS OF THE CITY OF ALEXANDRIA, VA. A PORTION OF THE SCHOOL BUILDING AND RELATED IMPROVEMENTS ARE ALSO LOCATED ON ANOTHER PARCEL OF THE CITY OF ALEXANDRIA (007.04-09-04) WHICH WAS ACQUIRED IN DEED BOOK 200 AT PG 42.
3. THE HORIZONTAL DATUM SHOWN HEREON IS REFERENCED TO THE VIRGINIA COORDINATE SYSTEM (VCS,) 1983 – AS ESTABLISHED FROM A CURRENT GPS SURVEY.
4. DURING THE PROCESS OF OUR PHYSICAL SURVEY NO INDICATIONS OF A CEMETERY WERE FOUND. NO FURTHER INSPECTION OF THESE PROPERTIES HAVE BEEN MADE FOR POSSIBLE CEMETERIES.
5. THE PHYSICAL IMPROVEMENTS SHOWN HEREON ARE BASED UPON A FIELD SURVEY DONE BY THIS FIRM BETWEEN THE DATES OF NOVEMBER 27, 2019 AND DECEMBER 21, 2020.
6. NO GEOTECHNICAL, SUBSURFACE, FIELD REVIEWS, RESEARCH, AGENCY OR GOVERNMENTAL RECORD REVIEWS, OR OTHER INVESTIGATIONS HAVE BEEN MADE FOR THE PURPOSE OF LOCATING, OR DETERMINING THE EXISTENCE OF HAZARDOUS MATERIALS, OR OTHER ENVIRONMENTAL CONCERNS ON SITE IN THE PERFORMANCE OF CHRISTOPHER CONSULTANTS, LTD SERVICES FOR THE PROJECT AS SHOWN HEREON.
7. NO CERTIFICATION IS MADE AS TO THE LOCATIONS OF UNDERGROUND UTILITIES SUCH AS, BUT NOT LIMITED TO ELECTRIC, GAS, TELEPHONE, CATV, WATER, SANITARY AND STORM SEWERS.
8. ALL BUILDING DIMENSIONS ARE MEASURED AT THE OUTSIDE GROUND LEVEL OF BUILDING. OVERALL SQUARE FOOTAGE HAS BEEN DETERMINED BY EXTERIOR DIMENSIONS AT GROUND LEVEL.
9. WE RECEIVED AND EXAMINED A COPY OF A TITLE REPORT PREPARED BY AMERISEARCH, INC. DATED 10/20/2020 FOR A 60+ YEAR SEARCH. EASEMENTS LISTED IN THE TITLE REPORT ARE SHOWN ON THE SURVEY, TO THE EXTENT POSSIBLE AND AS LISTED BELOW:
   A) RESERVATION OF 0.28557 ACRES OF THE PROPERTY FOR THE EXTENSION OF REED AVENUE AS RECORDED IN DEED BOOK 378 AT PAGE 24. NO ADDITIONAL RIGHT OF WAY DEDICATION OR TAKING WAS IDENTIFIED DURING THE TITLE SEARCH. REED AVENUE IS SHOWN GOING THROUGH THE PROPERTY.
   B) VERIZON EASEMENT RECORDED IN DEED BOOK 409 AT PAGE 389 IS FOR A GUY WIRE AND AFFECTS THE PROPERTY BUT IS NOT SHOWN BECAUSE THE DESCRIPTION IS VAGUE.
   C) VERIZON EASEMENTS RECORDED IN DEED BOOK 725 AT PAGE 89 AND DEED BOOK 725 AT PAGE 574 ARE SHOWN APPROXIMATELY ON THE SURVEY.
   D) WASHINGTON GAS LIGHT CO. EASEMENT RECORDED IN DEED BOOK 1072 AT PAGE 644 IS NOT SHOWN BECAUSE THE DESCRIPTION IS VAGUE.
   E) EASEMENT TO THE CITY OF ALEXANDRIA SANITATION AUTHORITY RECORDED IN DEED BOOK 1386 PG 128 IS SHOWN ON THE SURVEY.
10. THE ACQUISITION DEED RECORDED IN DEED BOOK 378 AT PAGE 24 INCLUDES 0.28557 ACRES IN RESERVATION FOR THE FUTURE EXTENSION OF REED AVENUE. A PLAT SHOWING A RESERVATION FOR FUTURE STREET EXTENSION RECORDED IN DEED BOOK 293 PG 210 WAS FOUND AND IS SHOWN ON THIS PLAT; HOWEVER NO RECORDED PLAT OF DEDICATION WAS FOUND.
11. THE IMPROVEMENTS SHOWN ON THIS SURVEY ARE LIMITED TO THE BUILDING AND THOSE THAT ARE AT OR NEAR PROPERTY LINE CROSSINGS. ALL IMPROVEMENTS ARE NOT SHOWN.

FLOOD ZONE NOTE

THE PROPERTY SHOWN HEREON IS LOCATED ON THE FLOOD INSURANCE RATE MAP (FIRM), COMMUNITY PANEL NO. 5155M0033E, EFFECTIVE JUNE 16, 2011.

BY GRAPHICALLY DEPICTION ONLY, THE PROPERTY SHOWN HEREON IS SHOWN IN:

FLOOD ZONE "AE" – BASE FLOOD ELEVATIONS DETERMINED
FLOOD ZONE "SHADED X", 0.2% ANNUAL CHANCE FLOOD HAZARD, AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN 1 SQUARE MILE, PROTECTED BY LEVEES FROM 100-YEAR FLOOD.

A FIELD SURVEY WAS NOT PERFORMED TO DETERMINE THE FLOOD ZONES LISTED HEREON. AN ELEVATION CERTIFICATE MAY BE NEEDED TO VERIFY THIS DETERMINATION OR APPLY FOR A VARIANCE FROM THE FEDERAL EMERGENCY MANAGEMENT AGENCY.

LEGEND

Utilities – Electric
- LIGHT POLE
- UTILITY POLE
- VAULT
- ELECTRIC BOX
- LAMP POST
- GUY WIRE
- ELECTRIC METER
- ELECTRIC MANHOLE
- COMMUNICATION PEDESTAL
- TELEPHONE MANHOLE
- TELEPHONE PEDESTAL
- TELEPHONE MANHOLE
- CABLE TELEVISION BOX
- AIR CONDITIONER

Utilities – Storm
- STORM MANHOLE
- STORM DRAIN INLET

Utilities – Sanitary
- SANITARY MANHOLE
- SANITARY CLEAN-OUT

Utilities – Water
- WATER VALVE
- WATER METER
- FIRE HYDRANT

Utilities – Gas
- GAS VALVE
- GAS METER

Misc. Structures
- SIGN

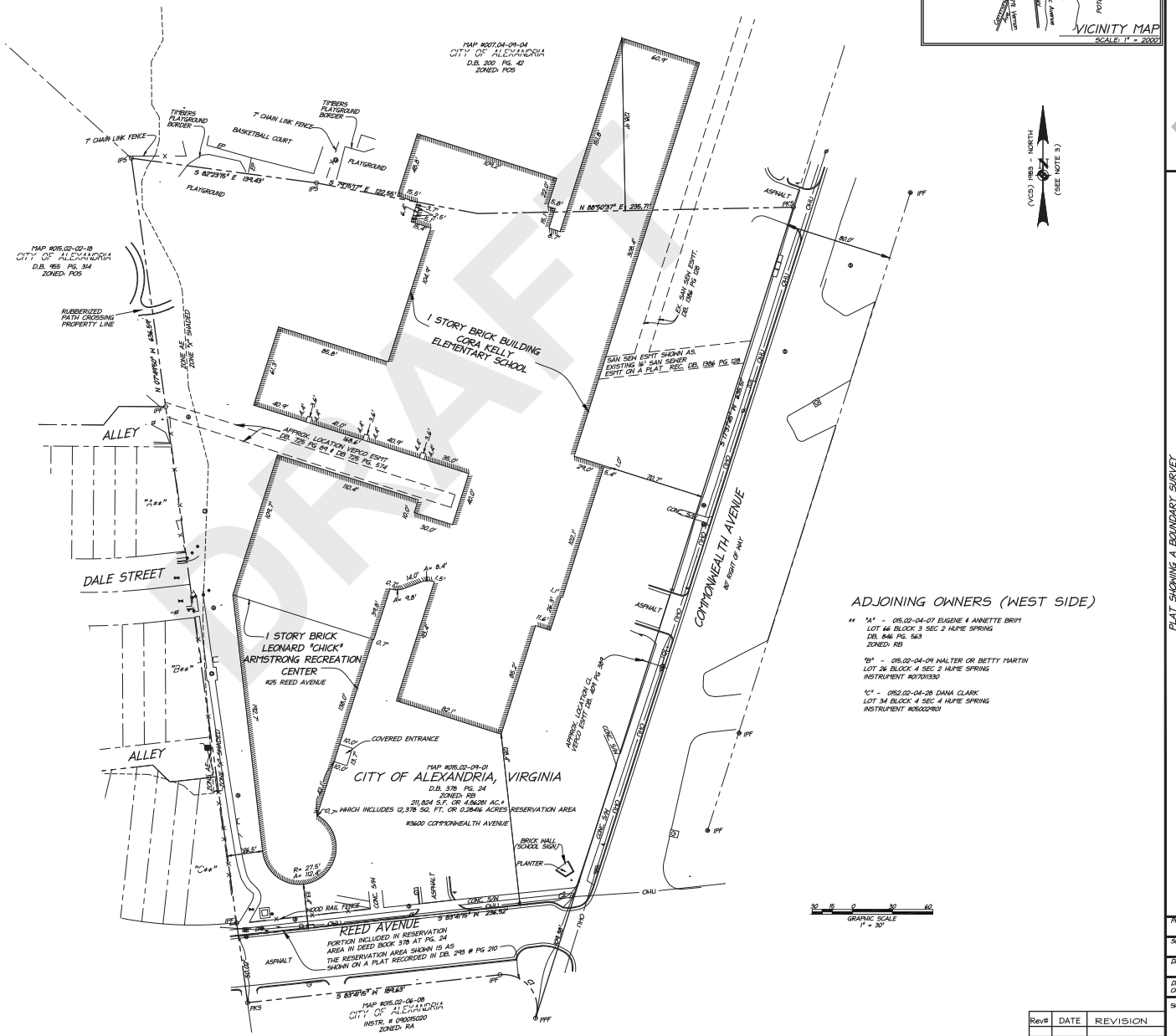
PKS	NAIL SET	IPF	IRON PIPE FOUND
A/C	AIR CONDITIONER	IPS	IRON PIPE SET
ASH	ASPHALT SIDEWALK	PPF	PINCH PIPE FOUND
CO	SANITARY CLEANOUT	TBS	TO BE SET
RTW	RETAINING WALL		
C/L	CENTERLINE		
C&G	CURB AND GUTTER		
CSW	CONCRETE SIDEWALK		
CLF	CHAIN LINK FENCE		

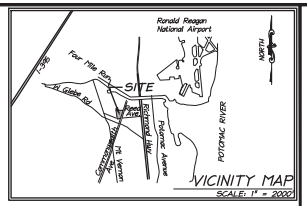
Linetypes
- FENCE
- OVERHEAD UTILITY WIRE
- GUARD RAIL
- PROPERTY LINE
- ADJOINER LINE
- ROAD CENTERLINE

SURVEYOR'S CERTIFICATE

THIS BOUNDARY SURVEY ON THE PROPERTY OF THE CITY OF ALEXANDRIA, VIRGINIA WAS COMPLETED UNDER THE DIRECT AND RESPONSIBLE CHARGE OF LONNY D. STURGEON, BASED ON FIELD WORK COMPLETED IN DECEMBER OF 2020. THE SURVEY AND PLAT IN WHICH THE SURVEY IS BASED MEET THE MINIMUM STANDARDS FOR LAND BOUNDARY SURVEYS AS ESTABLISHED BY THE COMMONWEALTH OF VIRGINIA.

LONNY D. STURGEON
Lic. No. 1504
12/30/2020





(VCS) 1983 – NORTH (SEE NOTE 3)

ADJOINING OWNERS (WEST SIDE)

** "A" – 015.02-04-07 EUGENE & ANNETTE BRIM
LOT 46 BLOCK 3 SEC 2 HUME SPRING
DB. 846 PG. 563
ZONED: RB

"B" – 015.02-04-09 WALTER OR BETTY MARTIN
LOT 26 BLOCK 4 SEC 2 HUME SPRING
INSTRUMENT #070011330

"C" – 0152.02-04-28 DANA CLARK
LOT 34 BLOCK 4 SEC 4 HUME SPRING
INSTRUMENT #050029801

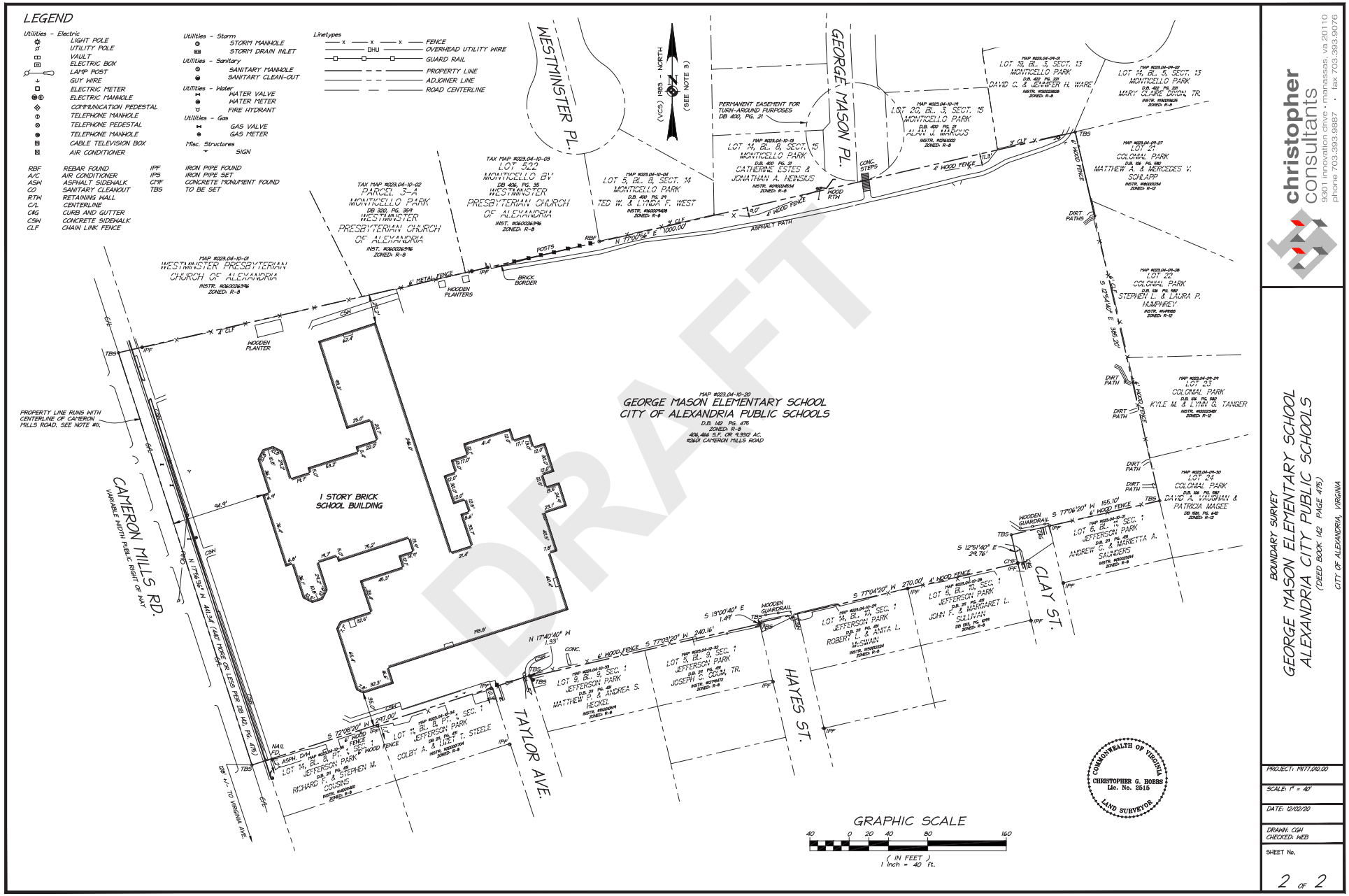
GRAPHIC SCALE
1" = 30'

christopher consultants
9301 innovation drive (suite 150) · manassas, va 20110
phone 703.393.9997 · fax 703.273.9820

PLAT SHOWING A BOUNDARY SURVEY
OF THE PROPERTY OF
THE CITY OF ALEXANDRIA, VIRGINIA
(DB. 378 AT PG. 24)
CITY OF ALEXANDRIA, VIRGINIA

Rev#	DATE	REVISION

PROJECT: 19177.001.00
SCALE: 1" = 30'
DATE: 12/29/20
DRAWN: LDS
CHECKED: NEB
SHEET No.
1 OF 1



christopher consultants
9301 innovation drive • manassas, va 20110
phone 703.393.9887 • fax 703.393.9076

BOUNDARY SURVEY
GEORGE MASON ELEMENTARY SCHOOL
ALEXANDRIA CITY PUBLIC SCHOOLS
(DEED BOOK 162 PAGE 475)
CITY OF ALEXANDRIA, VIRGINIA

PROJECT: 19177.010.00
SCALE: 1" = 40'
DATE: 12/02/20
DRAWN: CGH
CHECKED: WEB
SHEET No. 2 OF 2

Appendices - Geotechnical Reports

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Geothermal Test Well Report

CORA KELLY SCHOOL FOR MATH, SCIENCE AND TECHNOLOGY
ALEXANDRIA, VA

Prepared for:
Allied Well Drilling
8213 Brock Bridge Road
Laurel, MD 20724

Prepared by:
GeoPotential Consulting LLC
43676 Trade Center Place, Suite 235
Sterling, Virginia 20166

GPC Project Number GPC GT2104
March 01, 2021

GeoPotential Consulting

March 01, 2021

Allied Well Drilling
8213 Brock Bridge Road
Laurel, MD 20724

Attention: Mr. Brett Sweeney (Allied Well Drilling, Client Representative)

Re: Geothermal Test Well Report
Cora Kelly School for Math, Science and Technology
3600 Commonwealth Avenue
Alexandria, VA 22305
GPC Project No.: GPC GT2104

Dear Mr. Sweeney:

GeoPotential Consulting, LLC (GPC) has completed the geothermal test well engineering services for the above-referenced Cora Kelly School project. These services were performed in general accordance with our contract with Allied Well Drilling and information provided by Allied Well Drilling.

This report presents the geothermal (ground source) test well results for project design and construction. The test well was drilled to 300 ft below existing grades and a 1 ¼ HDPE SDR-11 geothermal loop was installed and grouted with a bentonite grout mix of 0.4 Btu/hr-ft-degF (information provided by Allied Well Drilling). Groundwater was not reported during drilling and installation of the geothermal loop.

To obtain the thermal properties of the subsurface soils and rock, the American Society of heating, Refrigeration, and Air-conditioning Engineers (2011 ASHRAE Handbook HVAC Applications, Chapter 34) recommended guidelines for performing formation thermal conductivity tests for geothermal applications was utilized for this project.

The thermal conductivity is a measure of the capacity of the soils and rock to conduct heat. A higher soil conductivity allows heat to be exchanged within the soils/rock faster for a configuration of the ground loop. The diffusivity of the system defines the heat flow rate.

After a setting period, the Formation Thermal Conductivity tests were performed at each well by IGSHPA and NATE Certified Geothermal Professionals. A GeoCube thermal conductivity tester was used to perform the thermal conductivity tests.

A snapshot of the tests performed is as follows:

Description	Method of Performance
Test Duration	Actual tests were conducted for 48+ hours
Power Quality	The standard deviation of the power was less than 1.5% of the average power, with maximum power variation of less than or equal to 10% of the average power
Heat flux rate per foot of borehole depth	15 Watts/ft to 25 Watts/ft (maintained approx. 21.3 Watts/ft)
Undisturbed Formation Temperature Measurement	Measured during the first ten minutes of the test, prior to the interference of pump heat input
Installation Procedures for Test Loops	Borehole diameter of 5.25" with bore annulus uniformly grouted from the bottom to the top utilizing a tremie pipe to avoid bridging and voids.
Time Between Loop Installation and Testing	>5 days
Test Well Flow Rate (GPM)	9.03 GPM
Grout Thermal Conductivity	0.4 Btu/hr-ft-degF

During the test, water is heated at a uniform rate and circulated through the ground loop. Heat is rejected (heat of rejection) to the ground to simulate full cooling load operations. The water temperatures to and from the loop, water flow rate, and electrical power consumption (equal to heating rate) are measured and recorded prior to heating and throughout the test duration. The results are presented in Appendix A. Please note that the Temperature vs Time chart depicts the increase in temperature from start of test, at the EWT and LWT within the loop.

The thermal diffusivity is calculated by the ratio of the computed formation thermal conductivity and the estimated heat capacity. The Borehole Thermal Resistivity calculated from the test data was 0.23 hr.ft.°F/btu.

The formation thermal conductivity, the undisturbed formation temperature, and the BTR provides the thermal performance of the test wells for conditions approximating the test conditions. Based on this test well, the recommended BTR for loop field sizing is given below:

Recommended Average BTR: 0.23 ft.°F.hr/btu

We suggest that GPC be retained to review the final design plans and specifications, so comments can be made regarding interpretation and implementation of our test well results in the design and specifications. We suggest that GPC's qualified, experienced and certified professionals be retained to provide observation and testing services during installation of the geothermal production wells.

The analysis and recommendations presented in this report are based upon the data obtained from the drillers and laboratory tests performed by others at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between drilling, across the site. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified, so that further evaluation and supplemental recommendations can be provided.

The scope of services for this report does not include either specifically or by implication any environmental or biological assessment of the site or identification or prevention of pollutants, hazardous materials, or conditions.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and prepared in accordance with generally accepted engineering practices. No warranties, either express or implied, are intended or made. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless GPC reviews the changes and either verifies or modifies the conclusions of this report in writing.

We appreciate the opportunity to be of service to you on this project. Please contact us if you have any questions concerning this report, or if we may be of further service.

Sincerely,
GPC

Muthu Arigovindan, P.E., LEED AP BD+C, CGD, CGI
President

APPENDIX A
FIELD TEST RESULTS

Ground Loop Design

Thermal Conductivity Report - 3/3/2021

GLD Software Gaia Geothermal

Project Name:	Cora Kelly School		
Project Address:	3600 Commonwealth Avenue		
City:	Alexandria	**State:** VA	**Zip:** 22305
Prepared By:	Geopotential Consulting LLC		
Email:	MArigovi@Geopotentialllc.com	**Phone:**	571-237-4345
Drill Date	2/17/2021		
TC Test Date(s)	2/24/2021	>>	2/26/2021
Client Name:	Allied Well Drilling		
Address Line 1:	8213 Brock Bridge Road		
Address Line 2:			
City:	Laurel	**Phone:**	443-336-5665
State:	MD	**Fax:**	
Zip:	20724	**Email:**	BrettSweeney@Alliedwells.com

Calculation Results

Thermal Conductivity (Btu/(h*ft*°F)) :	1.33
Thermal Diffusivity (est.) (ft^2/day) :	1.05
Average Heat Flux (W/ft) :	21.3
BH Thermal Resist (BTR) (h*ft*°F/Btu) :	0.23
Average Flow Rate (gpm) :	9.03
Test Duration (hr) :	36
Calculation Interval :	1.0 - 37.0 Hours

Borehole Input Parameters

Undisturbed Ground Temperature (°F) :	57.0	(User-Estimated)
Depth (ft) :	308	
Borehole Diameter (in) :	5.25	
Pipe Size:	1 1/4 in. (32 mm)	
Grout Thermal Conductivity (Btu/(h*ft*°F)) :	0.40	
Drilling Method :	Standard	
Drilling Time (hr) :	15.0	

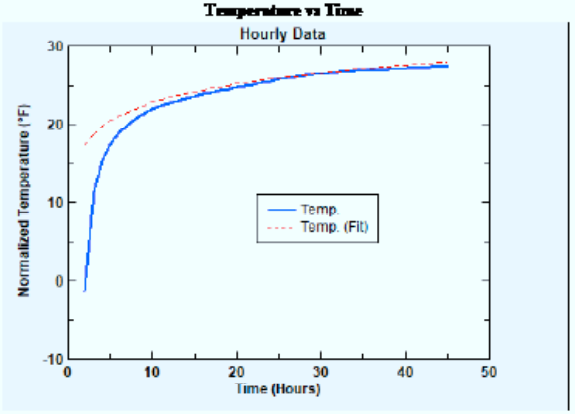
Diffusivity Input Parameters

Soil/Rock Specific Heat - Dry (Btu/(°F*lbm)) :	0.200
Soil/Rock Density - Dry (lb/ft^3) :	108.0
Moisture (0-100) (%) :	15.0

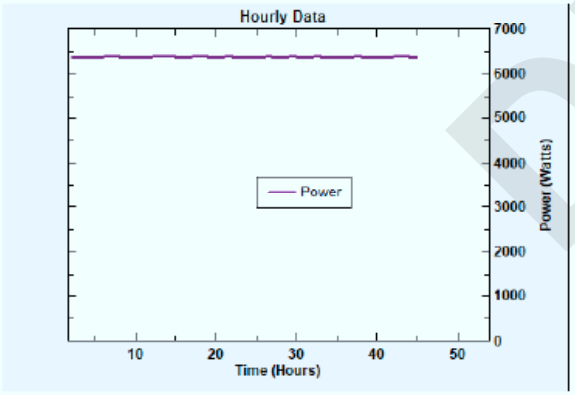
Flow Rate Input Parameters

TC Unit Model Name	GeoCube Standard

Temperature vs Time

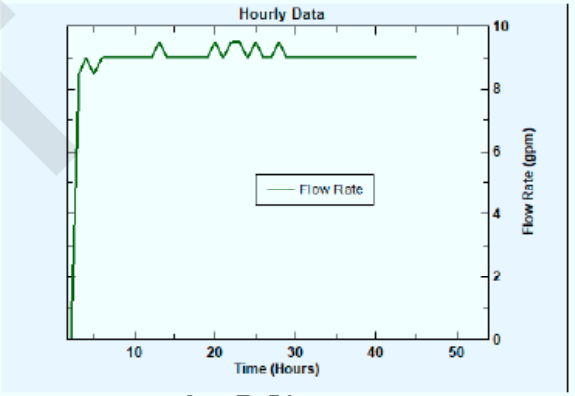


Power vs Time



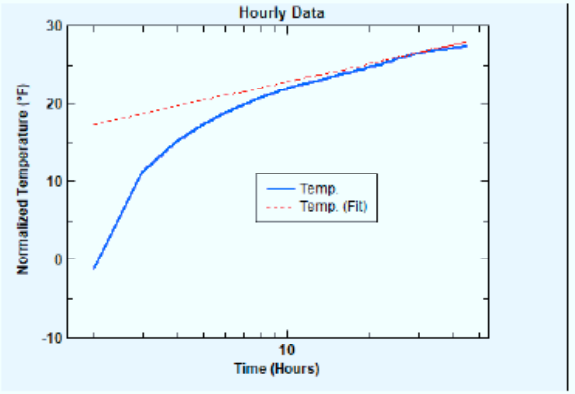
Average Power 6777.3 Watts

Flow Rate vs Time



Average Flow Rate 9.03

Temperature vs ln(Time)



Slope : 4.35
Calculation Interval : 1.0 - 37.0 Hours

Data Quality

		Threshold			Threshold
Power Standard Deviation :	Pass	1.50 %	Flow Rate :	Pass	5.00 %
Power Variation :	Pass	10.00 %	Slope Stability :	Pass	25.00 %
Temperature :	Pass	5.00 %	Water Flow Test :	Pass	20.00 %

Comments

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Geothermal Test Well Report

GEORGE MASON ELEMENTARY SCHOOL

ALEXANDRIA, VA

Prepared for:
Allied Well Drilling
8213 Brock Bridge Road
Laurel, MD 20724

Prepared by:
GeoPotential Consulting LLC
43676 Trade Center Place, Suite 235
Sterling, Virginia 20166

GPC Project Number GPC GT2105
February 25, 2021

GeoPotential Consulting

February 25, 2021

Allied Well Drilling
8213 Brock Bridge Road
Laurel, MD 20724

Attention: Mr. Brett Sweeney (Allied Well Drilling, Client Representative)

Re: Geothermal Test Well Report
George Mason Elementary School
2601 Cameron Mills Road
Alexandria, VA 22302
GPC Project No.: GPC GT2105

Dear Mr. Sweeney:

GeoPotential Consulting, LLC (GPC) has completed the geothermal test well engineering services for the above-referenced George Mason Elementary School project. These services were performed in general accordance with our contract with Allied Well Drilling and information provided by Allied Well Drilling.

This report presents the geothermal (ground source) test well results for project design and construction. The test well was drilled to 300 ft below existing grades and a 1 ¼ HDPE SDR-11 geothermal loop was installed and grouted with a bentonite grout mix of 0.4 Btu/hr-ft-degF (information provided by Allied Well Drilling). Groundwater was not reported during drilling and installation of the geothermal loop.

To obtain the thermal properties of the subsurface soils and rock, the American Society of heating, Refrigeration, and Air-conditioning Engineers (2011 ASHRAE Handbook HVAC Applications, Chapter 34) recommended guidelines for performing formation thermal conductivity tests for geothermal applications was utilized for this project.

The thermal conductivity is a measure of the capacity of the soils and rock to conduct heat. A higher soil conductivity allows heat to be exchanged within the soils/rock faster for a configuration of the ground loop. The diffusivity of the system defines the heat flow rate.

After a setting period, the Formation Thermal Conductivity tests were performed at each well by IGSHPA and NATE Certified Geothermal Professionals. A GeoCube thermal conductivity tester was used to perform the thermal conductivity tests.

A snapshot of the tests performed is as follows:

Description	Method of Performance
Test Duration	Actual tests were conducted for 48+ hours
Power Quality	The standard deviation of the power was less than 1.5% of the average power, with maximum power variation of less than or equal to 10% of the average power
Heat flux rate per foot of borehole depth	15 Watts/ft to 25 Watts/ft (maintained approx. 21.3 Watts/ft)
Undisturbed Formation Temperature Measurement	Measured during the first ten minutes of the test, prior to the interference of pump heat input
Installation Procedures for Test Loops	Borehole diameter of 5.25" with bore annulus uniformly grouted from the bottom to the top utilizing a tremie pipe to avoid bridging and voids.
Time Between Loop Installation and Testing	>5 days
Test Well Flow Rate (GPM)	9.68 GPM
Grout Thermal Conductivity	0.4 Btu/hr-ft-degF

During the test, water is heated at a uniform rate and circulated through the ground loop. Heat is rejected (heat of rejection) to the ground to simulate full cooling load operations. The water temperatures to and from the loop, water flow rate, and electrical power consumption (equal to heating rate) are measured and recorded prior to heating and throughout the test duration. The results are presented in Appendix A. Please note that the Temperature vs Time chart depicts the increase in temperature from start of test, at the EWT and LWT within the loop.

The thermal diffusivity is calculated by the ratio of the computed formation thermal conductivity and the estimated heat capacity. The Borehole Thermal Resistivity calculated from the test data was 0.12 hr.ft.°F/btu.

The formation thermal conductivity, the undisturbed formation temperature, and the BTR provides the thermal performance of the test wells for conditions approximating the test conditions. Based on this test well, the recommended BTR for loop field sizing is given below:

Recommended Average BTR: 0.12 ft.°F.hr/btu

We suggest that GPC be retained to review the final design plans and specifications, so comments can be made regarding interpretation and implementation of our test well results in the design and specifications. We suggest that GPC's qualified, experienced and certified professionals be retained to provide observation and testing services during installation of the geothermal production wells.

The analysis and recommendations presented in this report are based upon the data obtained from the drillers and laboratory tests performed by others at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between drilling, across the site. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified, so that further evaluation and supplemental recommendations can be provided.

The scope of services for this report does not include either specifically or by implication any environmental or biological assessment of the site or identification or prevention of pollutants, hazardous materials, or conditions.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and prepared in accordance with generally accepted engineering practices. No warranties, either express or implied, are intended or made. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless GPC reviews the changes and either verifies or modifies the conclusions of this report in writing.

We appreciate the opportunity to be of service to you on this project. Please contact us if you have any questions concerning this report, or if we may be of further service.

Sincerely,
GPC

Muthu Arigovindan, P.E., LEED AP BD+C, CGD, CGI
President

APPENDIX A
FIELD TEST RESULTS

Ground Loop Design
Thermal Conductivity Report - 2/25/2021

GLD Software Gaia Geothermal

Project Name:	George Mason Elementary School		
Project Address:	2601 Cameron Mills Road		
City:	Alexandria	**State:** VA	**Zip:** 22302
Prepared By:	Geopotential Consulting LLC		
Email:	MArigovi@Geopotentialllc.com	**Phone:**	571-237-4345
Drill Date	2/15/2021		
TC Test Date(s)	2/22/2021	>>	2/24/2021
Client Name:	Allied Well Drilling		
Address Line 1:	8213 Brock Bridge Road		
Address Line 2:			
City:	Laurel	**Phone:**	443-336-5665
State:	MD	**Fax:**	
Zip:	20724	**Email:**	BrettSweeney@Alliedwells.com

Calculation Results

Thermal Conductivity (Btu/(h*ft*°F)) :	1.30
Thermal Diffusivity (est.) (ft^2/day) :	1.56
Average Heat Flux (W/ft) :	21.3
BH Thermal Resist (BTR) (h*ft*°F/Btu) :	0.12
Average Flow Rate (gpm) :	9.68
Test Duration (hr) :	36
Calculation Interval :	1.0 - 37.0 Hours

Borehole Input Parameters

Undisturbed Ground Temperature (°F) :	**57.0**	**(User-Estimated)**
Depth (ft) :	**300**	
Borehole Diameter (in) :	**5.25**	
Pipe Size:	**1 1/4 in. (32 mm)**	
Grout Thermal Conductivity (Btu/(h*ft*°F)) :	**0.4**	
Drilling Method :	**Standard**	
Drilling Time (hr) :	**15.0**	

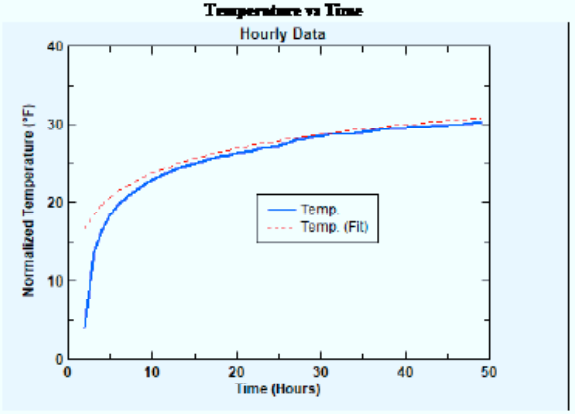
Diffusivity Input Parameters

Soil/Rock Specific Heat - Dry (Btu/(°F*lbm)) :	**0.200**
Soil/Rock Density - Dry (lb/ft^3) :	**100.0**
Moisture (0-100) (%) :	**0.0**

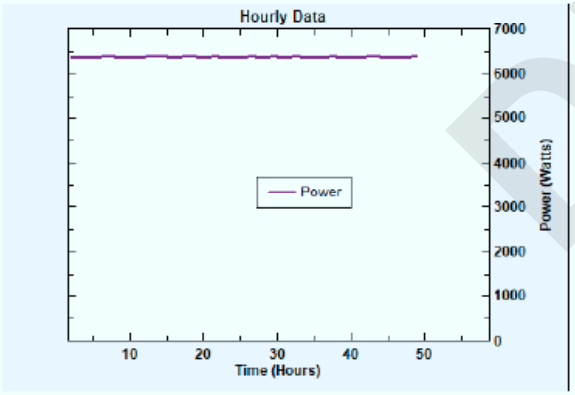
Flow Rate Input Parameters

TC Unit Model Name	**GeoCube Standard**

Temperature vs Time

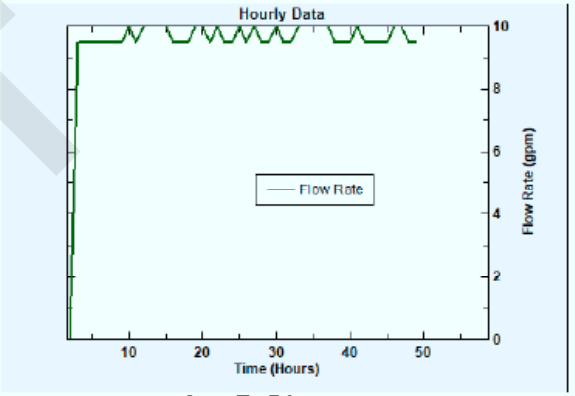


Power vs Time



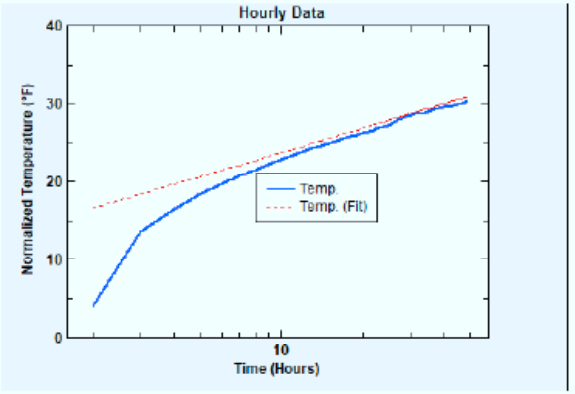
Average Power 6777.3 Watts

Flow Rate vs Time



Average Flow Rate 9.68

Temperature vs ln(Time)



Slope : 4.45
Calculation Interval : 1.0 - 37.0 Hours

Data Quality

		Threshold			Threshold
Power Standard Deviation :	Pass	1.50 %	Flow Rate :	Pass	5.00 %
Power Variation :	Pass	10.00 %	Slope Stability :	Pass	25.00 %
Temperature :	Pass	5.00 %	Water Flow Test :	Pass	20.00 %

Comments

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