DCAM-18-AE-0124

Attachment B- Feasibility Study
Part 1

DISTRICT OF COLUMBIA PUBLIC SCHOOLS

ARCHITECTURAL PLANNING PROVIDED TO THE DISTRICT BY

R. MCGHEE & ASSOCIATES
IN ASSOCIATION WITH
HUSKA CONSULTING, LLC | SYMBIOSIS, INC | ENGENIUM GROUP | SIMPSON GUMPERTZ & HEGER | VJ ASSOCIATES

SIMPSON GUMPERTZ & HEGER

VJ ASSOCIATES

DISTRICT OF COLUMBIA PUBLIC SCHOOLS
JOHN EATON ELEMENTARY SCHOOL MODERNIZATION
FEASIBILITY ASSESSMENT AND CONCEPTUAL DESIGN
JULY 3, 2018

JOHN EATON ELEMENTARY SCHOOL MODERNIZATION FEASIBILITY ASSESSMENT
District of Columbia Public Schools

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

R. MCGHEE & ASSOCIATES, IN ASSOCIATION WITH OUR CONSULTANT TEAM, WISH TO ACKNOWLEDGE THE ASSISTANCE OF THE GOVERNMENT OF THE DISTRICT OF COLUMBIA DEPARTMENT OF GENERAL SERVICES, DISTRICT OF COLUMBIA PUBLIC SCHOOLS AND THE JOHN EATON CAMPUS STAFF IN THE PREPARATION OF THIS REPORT.

JOHN EATON ELEMENTARY SCHOOL MODERNIZATION FEASIBILITY ASSESSMENT
District of Columbia Public Schools

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

MODERNIZATION OF THE JOHN EATON ELEMENTARY SCHOOL

The District of Columbia Public Schools (DCPS) selected R. McGhee & Associates (RMc) to assess the existing conditions and potential for modernization of the John Eaton Elementary School. The schemes contained herein are designed to create EdSpec compliant, exceptional learning environments for students and staff of the Eaton School.

The John Eaton Elementary School is located at 3301 Lowell St. NW, Washington, DC.

R. McGhee & Associates investigated the history and culture of the surrounding community over time, as well as the historical development of the facility. The current school consists of several sequentially constructed buildings. The first two buildings have achieved D.C. Landmark status and third, (1930) center building is considered a "contributing" historic building to the Cleveland Park Historic District.

The Architecture of the original school from 1910 embodies the Adolf Cluss 'pinwheel' design of four classrooms and associated cloak rooms around common areas, leading to stairs. This arrangement was repeated in the addition built in 1922. As the population grew, additional spaces were added at different times for different activities.

- In 1910, (*Appleton Clark, Architect*) an eight-room school house was built at the current location, now known as the intersection of Lowell Street NW and 34th Street NW.
- In 1922, (*Arthur Heath, Architect*) a similar facility was erected to the east of the school built in 1910. The two were connected by a corridor. The corridor floor level aligned with the above school, whereas the new pavilion floors were set approximately five feet lower
- Around 1930, an addition to the connected pavilions was built to the north of the connecting corridor that expanded the width pf the hallway and provided additional enclosed area at a level approximately three feet lower than the corridor and original school pavilion.
- Around 1980, (*Cooper Lecky, Architects*) another addition, facing Lowell Street, was constructed adjacent to the connecting corridor to the south that houses the library.

The RMc Design Team together with DGS and DCPS developed and examined multiple schemes in response to EdSpec requirements and DCPS/SIT Team guidance. Our final recommendations center on Schemes '**A**', '**B**', '**C**' and '**C.1**'. We include Scheme B for the purpose of documenting one version of a previous investigation. In order to meet all the goals for the Modernization of the John Eaton Elementary School. It seems the most fitting way of addressing the gap between the needs of the students and the opportunities embodied by the current school involves new construction. Scheme B was thought to be a way to provide sufficient outdoor space, while providing a contemporary learning environment that respected the massing and symmetry of the Architecture from previous generations. Subsequent discussion highlighted the value of the existing center portion, which was the location of the proposed new construction. After discussion regarding the significance of this feature, R McGhee & Associates focused on other ideas for the location of new construction that did not involve razing a significant feature. Schemes A, C & C.1 embody three different feasible interpretations of the provided guidance. A description and summary of the selected proposals follows.

FEASIBILITY STUDY APPROACH

The overall feasibility approach was investigative and evaluative. The RMc Team conducted a site observation tour with building facility staff and collected observable data. Included with this investigation was the review of obtainable documents, a non-destructive visual survey of the grounds, preliminary zoning analysis, and examination of available hazardous environmental conditions and documentation. The analysis of the existing building and site are included herein.

The Design Team used the August 2017 DCPS Eaton Educational Specifications (Ed Spec), along with informal revisions to the requirements, meetings with school staff and the SIT to assess and compare existing functional spaces with the proposed space requirements. Using this assessment and comparison, we were able to identify both shortages and overages in net usable space. Each scheme includes a tabulation of proposed areas compared with Ed Spec square footage requirements.

Secondly, we created criteria to evaluate the pros and cons for each design scheme, developing several possible options, of which four were selected as the most responsive to the program, site design, and budgetary considerations.

The original plan is inherently inefficient due to multiple level changes between buildings and the large amount of unassigned circulation space resulting from the historic 'pinwheel' classroom design. The existing core education spaces, all built before 1925, do not meet the general recommended adjacencies of assigned rooms, and do not meet the Ed Spec minimum for area within an acceptable variance from the requirements, meaning many were greater than 15% smaller than the required area. The multipurpose room, which was built around 1930, acts as the cafeteria, gymnasium and assembly area. Scheduling student activities in this space has proven a tremendous challenge for the staff. There are also existing building structural constraints, such as column, bearing and non-bearing wall locations that impact space usage. All schemes presented involve relocation of existing non-bearing interior clay tile walls to achieve optimal spaces in the proposed schemes. Opportunities exist to create high performing educational spaces in the Eaton environment that exceed the EdSpec recommendations using a combination of existing building and new additions spaces. In such cases we indicate exceptions that differ from the educational specifications.

ARCHITECTURAL ANALYSIS

The primary focus of all design strategies for the architectural, structural, mechanical, and electrical systems is to modernize the existing building and ensure a safe, high performing functionally adequate educational program, in an aesthetically pleasing and energy efficient environment.

The architectural design strategies essentially focus on creating separate grade level academic clusters that contain modernized classrooms with supporting resource spaces and teacher's support spaces. A major design goal is to admit more daylight and transparency into the building envelope and interior spaces to enhance the interiors and create a delightful, warm, and welcoming environment.

DESIGN STRATEGIES

All schemes include the following elements.

- Core Academic spaces to comply with DCPS Educational Specification guidance
- Selected support spaces will remain EdSpec non-compliant in the unaltered existing buildings scheme
- Increased daylighting, improved layout efficiency, ease of travel/circulation with more coherent adjacencies
- A building configuration that maintains and supports the family-friendly, student-friendly Eaton culture
- Replacement and upgrades of all major systems, including utilities, mechanical, electrical, plumbing, and AV/IT, in the existing buildings to remain.
- Maximized interior and exterior open play or learning spaces
- Provide additional and/or flexible classroom spaces for future expansion
- Provide additional collaboration spaces throughout to promote innovative teaching strategies and flexible pedagogies
- Full service cooking kitchen equipment as opposed to a warming kitchen
- A full size elementary school gymnasium to accommodate basketball, volleyball, etc. and restrooms.
- A welcome center, identifiable main entrance, better clustered administration area, larger library
- Organization of grade levels by floor and by pavilion keeps children of similar age together and provides separation between the early childhood students and upper elementary students.
- The historic east and west buildings are retained in all schemes.
- ADA access to all building and site areas
- Removal of existing hardscape barriers and obstructions in the play areas to create responsive, open and contiguous play spaces
- Provide exciting, curriculum-responsive outdoor learning spaces and play areas
- Curb managed parking is recommended in all schemes. Some schemes show potential on-site surface parking.
- All Schemes include offsite swing space for the whole school
- Each scheme includes significant restoration and repair activity

SCHEME DESCRIPTIONS – KEY ELEMENTS

Scheme A posits the restoration and modernization of the existing school with no additional new construction area. Significant gaps in program capability became apparent. Most core educational areas (classrooms) would all be undersized and selected program areas would have to be omitted or drastically reduced in size to accommodate the reduced scope of Scheme A. We do not advocate for Scheme A, but include this as an option in the event of a reduced anticipated enrollment and / or sever budget limitations. Scheme A would require EdSpec modification to ensure Eaton School educational goals are met. Schemes B, C, and C.1 all have new construction and restoration to varying degrees and meet the requirements in different ways and with different levels of risk in terms of liberties required to be completed successfully.`

SCHEME A

- Proposes the restoration of the existing facility with no new construction but with substantial interior modifications.
- Provides Scheme requiring the least time and smallest cost
- Provides the greatest amount of unencumbered open space
- Low risk of agency disapproval - restores historic landmark and contributing structures emblematic of the period without additional adjacent construction
- Includes new retaining walls at the boundary of the site to recapture additional outdoor area
- Retaining wall could incorporate plantings and other landscape features as a 'green wall'
- Basic construction and rehabilitation – other than retaining wall, no special engineering attention required.
- Does not accommodate all program elements
- Several program elements are undersized by up to 15% of Education Specifications
- Includes re-grading of green spaces that could easily include required storm water management elements
- Existing site does not provide on-site parking
- Parking requirements can be met with "curb management" plans pending DDOT review
- Upgraded environmental management systems likely to reach LEED Gold requirements
- Does not meet expected population increase
- Modernized existing multipurpose room reused as the auditorium, cafeteria, and gymnasium
- Generally meets all zoning and lot occupancy restrictions, except parking.

SCHEME B

- Proposes restoration for most of the original existing facility with substantial interior modifications.
- Proposes demolition of the existing historically contributing multipurpose area with new construction at the same location to meet program requirements.
- Higher cost and duration of construction than A, less than C & C.1
- More open play space than C & C.1, less than A
- Greatest chance of agency approval risk of disapproval - restores historic landmark but demolishes contributing structures emblematic of the period.
- Demolition may invoke time-consuming approval procedures and could generate significant delays to the project schedule.
- Includes a new retaining wall at a boundary of the site to recapture additional outdoor area
- Retaining wall could incorporate plantings and other landscape features as a 'green wall'
- Basic construction
- Accommodates all program elements
- Most program elements meet Education Specifications
- Selected core program elements are undersized by up to 15% of Education Specifications
- Does not provide on-site parking
- Parking requirements can be met with "curb management" plans pending DDOT review
- Upgraded environmental management systems likely to reach LEED Gold requirements
- Meets expected population increase
- New construction multipurpose room accommodates auditorium, cafeteria, and gymnasium.
- Library is centralized

SCHEME C

- Proposes the restoration of the existing facility with substantial interior modifications as well as new construction to meet program requirements
- Potentially higher cost and duration of construction than A & B, less than C.1
- Least amount of open play space
- Slightly higher agency approval risk of disapproval - restores historic landmark and contributing structures emblematic of the period, but includes major, contrasting but potentially compatible, new construction
- Includes a new retaining wall at a boundary of the site to recapture additional outdoor area
- Retaining wall could incorporate plantings and other landscape features as a 'green wall'
- Deep footing structure, long-span structural and retaining wall foundation engineering required
- Accommodates all program elements
- Selected program elements exceed Education Specifications
- Selected core program elements are undersized by up to 15% of Education Specifications
- Does not provide on-site parking
- Parking requirements can be met with "curb management" plans pending DDOT review
- Upgraded environmental management systems likely to reach LEED Gold requirements
- Meets expected population increase
- New construction multipurpose room accommodates auditorium, cafeteria, and full-size gymnasium
- Library is centralized, located in rehabilitated former multipurpose room

SCHEME C.1

- Proposed as a variation of Scheme C including separate physical education, dining and library spaces.
- Proposes the restoration of the existing facility with substantial interior modifications as well as new construction to meet program requirements
- Potential higher cost and longer duration of construction than A, B & C
- More open play space than C, less than A & B
- Greater risk of disapproval - restores historic landmark and contributing structures emblematic of the period, but includes contrasting but potentially compatible new construction
- Deep footing structure, long-span structural and retaining wall foundation engineering required
- Accommodates all program elements
- Selected program elements exceed Education Specifications
- Selected core program elements are undersized by up to 85% of Education Specifications
- Includes a new retaining wall at a boundary of the site to recapture additional outdoor area
- Retaining wall could incorporate plantings and other landscape features as a 'green wall'
- Does not provide on-site parking
- Parking requirements can be met with "curb management" plans pending DDOT review
- Upgraded environmental management systems likely to reach LEED Gold requirements
- Meets expected population increase
- Provides, new construction, separate gymnasium
- Provides, new construction, separate library
- Includes a rehabilitated existing multipurpose room accommodates cafeteria and auditorium functions

Scheme Name	No. of Classrooms	No. of Students in Projected Enrollment	Outdoor Space (SF)	Outdoor Space per Student (SF)	Total Gross Building Area (SF)
A	18	440	31,020	70	52,560
B	24	490	29.188	59	80,879
C	24	490	20,840	38	85,027
C.1	24	490	22,825	42	88,755

Note: Projected Enrollment numbers are variances from 2017 or changes made in 2018 to the EdSpec.

DESIGN ISSUES - CONCERNS

Installing the required EdSpec compliant additional core and support areas with required adjacencies, significantly reduces the available outdoor play space. The facility configuration, existing site size and topology create a significant challenge: how to best provide an accessible, sustainable, welcoming and learning-conducive campus for young, active students. The design direction pursued involved leaving the site unencumbered with parking or loading functions and installing more vertically oriented new construction forms, compatible in massing and scale with the landmarked existing structures on the site.

Meetings with the School Improvement Team (SIT) demonstrated a significant concern for the lack of parking in the neighborhood. Parking and increased play space were the top issues requested for investigation by the community. As a result, several onsite and below grade parking solutions were examined. The Project Team determined that relocation/reconfiguration the retaining wall, and pursuing a public space oriented "curb management" scheme would cost effectively increase the play areas and alleviate some of the school generated parking pressures on the neighborhood. Note: Both the retaining wall re-design and the curb management schemes will require significant public and DCDOT engagement to be successful.

The overall feasibility assessment, with consultant's commentary follows. Our research and design proposals reflect topics as discussed with Eaton staff, DCPS representatives, and members of the SIT over several meetings beginning on 26 February 2018, and again on 16 April 2018, 24 April 2018 and finally on 1 June 2018. Coordination and discussion between DCPS and R. McGhee & Associates had been close throughout. The schemes included also involved coordination with both the Commission of Fine Arts (CFA) and Historic Preservation Office (HPO) for The District of Columbia.

HISTORIC PRESERVATION

In instances where the design team pursued new construction, we advocate maintaining a 'light touch' in connecting to the existing historic structures. We show approximately 20 feet of separation between the masses of the existing and new construction. The DC HPO has commented on previous design schemes, and iterations of Scheme B, indicating that the current multipurpose room is a valuable portion of the Architectural fabric, while they support removal of the addition from the 1980s housing the current library.

Scheme B

Citing the possible lack of historic integrity in the 1930's addition, the Design Team explored and initially advocated for the removal of the current multipurpose room, replacing it with new construction throughout early stages. Subsequent to these investigations, DCPS and the Design Team were informed that the 1930's addition was indeed a contributing element to the Eaton School. Removal of this element would most likely NOT be eligible for approval by the HPRB and potentially would require a Mayor's Agent Hearing to allow for its full demolition. Locating significant mass at this location could result in an EdSpec compliant, centralized addition that could be deemed compatible by the HPRB, dependent upon the result of a Mayor's Agent ruling on the demolition proposal. Coordination with the CFA is assumed as a key component of these actions. CFA explicitly stated to DCPS and R McGhee & Associates that no portion of the multipurpose room could be demolished without intervention or evidence of a demonstrably unstable structure.

Pursuing this design scheme might add months to the overall development arc, as it would involve review by HPO, the Historic Preservation Review Board, and time for a potentially contested Mayor's Agent Hearing, and has the greatest risk of being incompatible or causing delays.

The Design Team is also recommending repairing and/or reinstalling the lantern and oculus element (the light well in the roof above the main hall at the third floor at one or both of the original historic buildings). This would add much needed natural light to the upper floors of the original school buildings. Staff accessed the 1910 building oculus, covered by wood framing in the attic. It is assumed the 1920 building may have a similar element that can be restored.

Preservation-Rehabilitation Approach

As a singular historic resource, the circa 1910, 1922 and 1930 buildings will require a complete exterior and interior historic assessment at the Conceptual Design Phase, prior to identifying proposed restoration or rehabilitation activities.

The Eaton School modernization project will include significant exterior repair work included in the planned rehabilitation.

Achieving Compatibility between the Existing Structures and the New Addition

The proposed main addition (Schemes C and C.1) element is a three-story building with a partially submerged lower story (either a Gym or Multipurpose Room) to allow the new classroom building level (first floor) to match the Eastern Building's floor level elevation of 319. Due to the site's shape and arrangement the addition will be along the east side of the property along 33rd Place. This addition will connect to the existing building on the northern face of the 1910 (east) classroom wing. This allows for a connection directly to the existing central corridor while allowing the new building mass to be separated by 15-20 feet from the existing building. An area between the central (auditorium) and new eastern addition that is currently open will be enclosed as a central circulation spine, accessing the new wing and the old multipurpose room, as well as the new gymnasium on the lower level and the play fields at its northern terminus. One or more of the walls areas below arched punched opening windows in the existing multipurpose room (level 321.0) could be removed to act as doorways to the circulation spine.

The proposed height of the three story addition would be below the cornice line of the existing buildings, allowing them to retain primacy on the site. The side elevations show a general height reduction as the addition flows north. The hyphen like connection would be a "light" touch connection to the 1910 building and could be masonry or an open, glassy connection. An added element proposed is the third floor connection between the two existing buildings. Careful installation of this element will be required to both leave the existing cornice work un-disturbed, and not be visible from the street. We feel the addition can have similar materials and masonry detailing as the original building but in a contemporary language. The addition should be primarily brick with an articulated brick and/or stone base. Some flexibility in the windows design should be available, or they can be punched openings at the classrooms similar to the original design. The non-classroom areas such as corridors and gathering spaces can present as glass curtain walls and/or panelized metal wall systems. Compatibility here is the key not matching the original construction. Note: DC Historic Preservation regulations state that additions should be "**not incompatible**" – not "**compatible**."

The existing exterior building elements (masonry, cupola, roof elements, trim cornice work, original doors, and the like) should be repaired and/or restored. The work will include replacement of the current windows, and non-original doors. The existing windows have been mostly replaced and new windows can be contemporary (metal) type, with a profile, geometry and type acceptable to the HPO. Installation and creation of new openings in the existing walls should be carefully composed and coordinated with the DC HPO. New work includes repaired and completely new finishes, HVAC, AV and IT systems. Original wood interior ornamentation such as door surrounds and cornices should be repaired and missing elements replaced. The cupola above the multipurpose room, and chimney - both prominent features of the Eaton School complex - need examination to determine the level of repair and/or restoration activity required. The interiors will be modified to accommodate the modern use of the building but the original central corridors of the classroom wings and the connecting corridor will be maintained. One stairwell in the 1910 (west) building is shown as replaced (infilled) to allow for additional required program area. The primary interior elements of the Old Gym-Multipurpose Space stage will probably need to remain. The ornamental plaster at the ceiling and stage should be repaired and or restored.

The 1980's front entry element is to be removed. Initial HPO direction indicates acceptance of a two-story addition at this area. The massing shown in schemes C and C.1 indicate a reasonably compatible setback from the existing buildings and a more compatible, symmetrical massing configuration. A handsome open glassy front entry element could be composed here, although HPO would probably prefer a more solid and background element not in competition for visual primacy with the existing East and West historic buildings.

ZONING

Preliminary analysis of the 2016 D.C. Zoning Code indicates the site to be zoned R-1-B. Guidance and requirements for Public Schools in this zone are found under Title 11 Subtitle C, Chapter 16 and Title 11 Subtitle D, [Various Chapters]. Zoning requirements for a Public School in Zone R-1-B include: a 60% Lot Occupancy limitation, 60-foot height limitation, a rear yard requirement of 25 feet, pervious surface requirement of 50% and an FAR limitation of .09. The FAR limitation will most likely require any significant addition to seek a BZA Special Exception as described under Subtitle X, Chapter 9. The additional time required for this action must be included in any overall project schedule created for the Eaton School modernization.

Note: Parking requirements for the site will require negotiation with the **Zoning Administrator (ZA)**. The current site has no formal parking and based on current school size (52, 555 Gross Square Feet) and constitutes an unsupplied requirement for an estimated 13 spaces. The projected EdSpec required school size is approximately 85,400 GSF generating an estimated 21 required parking spaces. If the ZA allows for a reduction of the total required spaces based on the "grandfathered" current number of required spaces, the total number of spaces required to meet the EdSpec indicated school size is 8 spaces. (2016 Zoning Regulations, Table C, Article 701.5)

Note: Due to the steep change in grade from the south to the north, installation of a street accessible parking element this area would be left partly exposed. All versions of the proposed on-site parking, whether below-grade or on the surface would occupy or modify outdoor space currently in use by the students as outdoor play areas and learning environments.

Existing Zoning / Floor Area Ratio Analysis	
Lot Area	65,150 sq. ft.
Current FAR	0.9
Facility footprint	21,711sq. ft.
Current Lot Occupancy	33%
Maximum permitted impervious surface	50%
Total Gross Floor Area suggested by Ed Spec Prototype	77,830 sq. ft. (New construction proposes 85,500 sq.)
Total Gross Floor Area of Existing Facility	52,555 sq. ft.
Total Gross Floor Area allowed by Zoning	59, 535 sq. ft.
Difference between Ed Spec and existing area	25, 275 sq. ft.
Difference between Ed Spec and Zoning	18, 295 sq. ft.
FAR required to accommodate Ed Spec Prototype	1.18
Difference between current and minimum required FAR	0.28

LEED CERTIFICATION

Schools in the District of Columbia are required to achieve LEED Gold certification. It is fully believed that each of the schemes presented can achieve LEED Gold Certification. LEED certification advocates meeting or reducing the need for automobile trips and seeks to at a maximum, meet or be below the zoning required number of spaces on site.

Inherent in LEED certification and the Green Building Requirements that govern the site, is a reduction in impervious ground cover. The rehabilitation and modernization of the of the Eaton School Modernization to meet LEED standards will most likely involve advocating for reduction of vehicular access through ride-sharing, reducing the installed parking to (approximately) 8 spaces and reducing the amount of impervious hardscape.

Schemes A and C.1 utilize the existing curb cut to provide access for loading to the site. All Schemes utilize the proposed a curb management configuration where selected spaces for staff are provided in the public space for designated times during the day and week, returning the spaces to public use at all other times. A curb loading area is provided adjacent to the proposed cafeteria in scheme C to allow on-street loading at designated times. Removing both parking and delivery from the site increases site safety by reducing the pedestrian-vehicular interaction and the potential for accidents.

The cost-benefit ration of building below-grade on-site parking for the zoning designated 8 possible spaces seems low. In light of these concerns, we advocate for DOT coordinated curb-managed parking and loading solution for the site. Proposed curb management schemes are for all Schemes. Note: The SIT requested a full traffic and parking analysis for Phase Two of the Modernization effort to support the analysis of the site.

EDUCATIONAL SPECIFICATION COMPLIANCE AND EXCEPTIONS

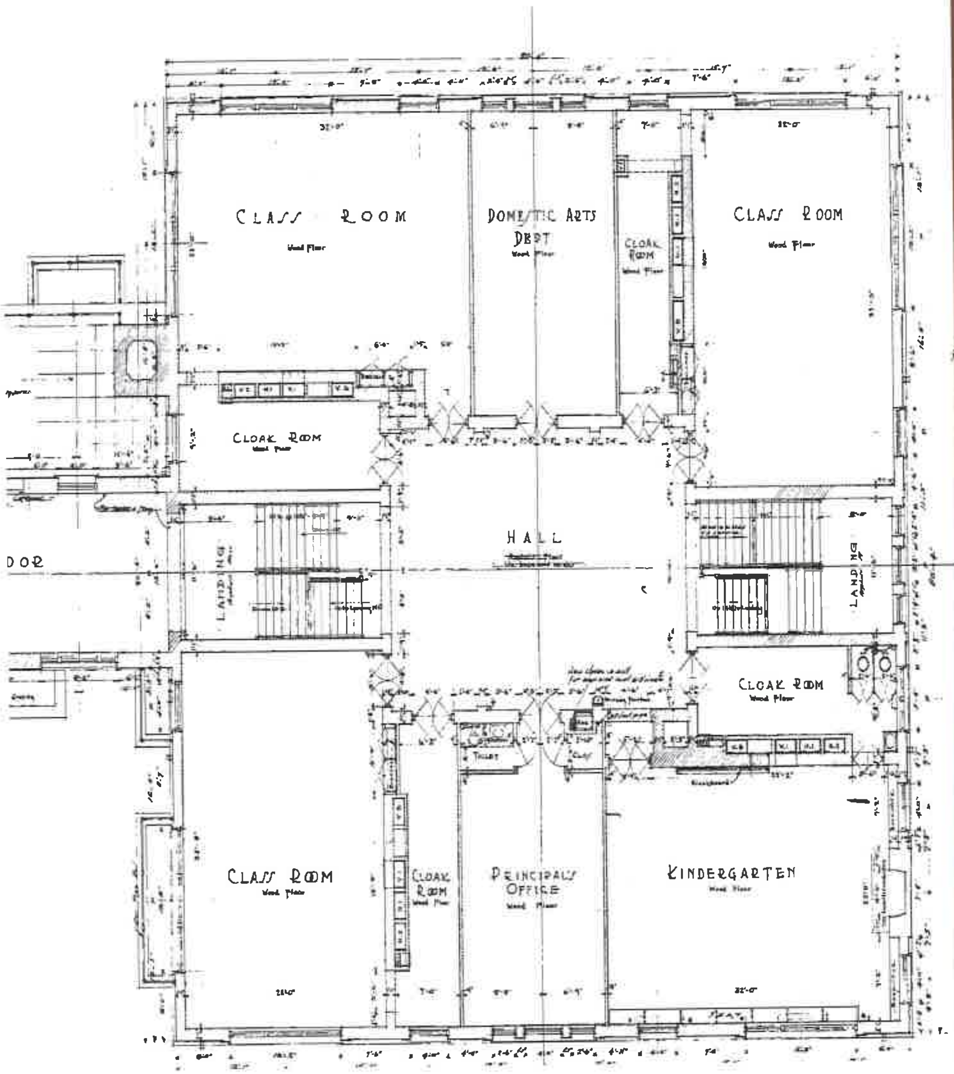
During the course of the feasibility study, which included a test fit of proposed programmed space with existing available area, we discovered variances, both overages and shortages. In those situations where shortages were due to existing square footages or if spaces required reconfiguring and resulted in creating a perceived programmatic disconnect, we requested exceptions in lieu of full compliance. Additionally, and where applicable, we complied with ensuring rooms were within the 15% tolerance of Ed Spec required square footage.

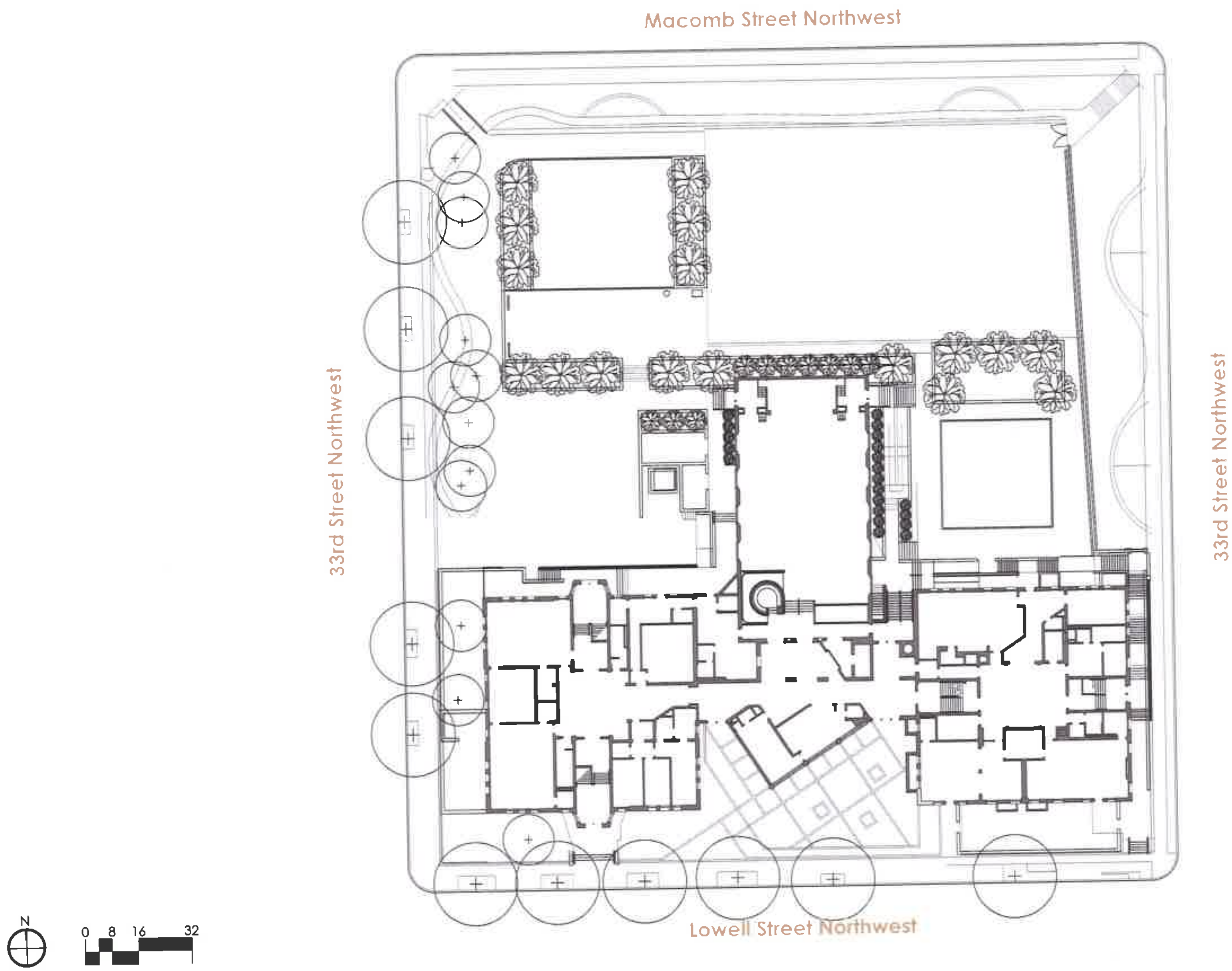
The installation of a full gymnasium adds square footage beyond that required in the current EdSpec, however in discussion with DCPS it was deemed appropriate for this modernization effort and school size, and since meeting the classroom requirements with an accessible, efficient and economical new facility mass would result in additional space below. The current EdSpec includes a Library size that exceeds that of other comparable elementary schools and warrants further review at the second Phase of the modernization process.

VICINITY AERIAL VIEW

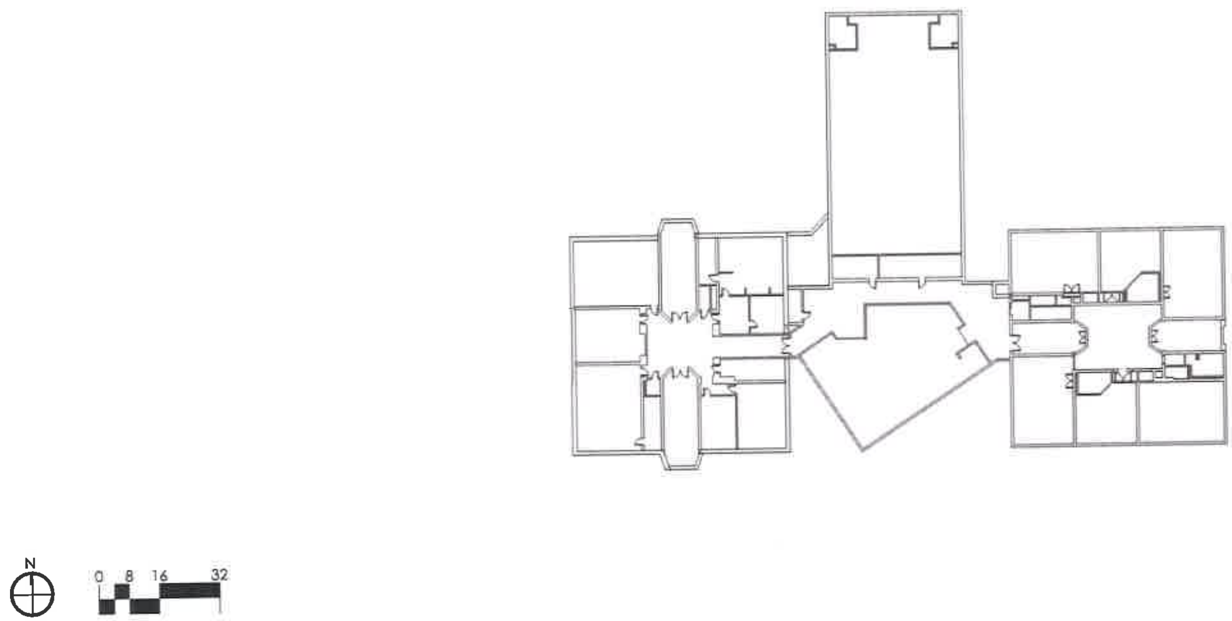
SITE AERIAL VIEW

EXISTING PLANS

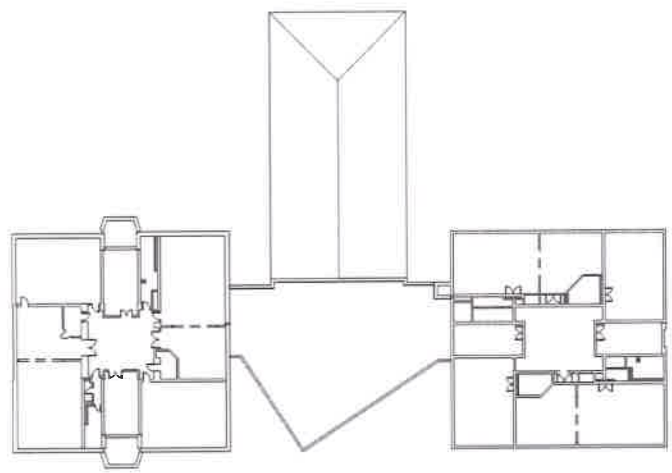



Macomb Street Northwest
33rd Street Northwest
33rd Street Northwest
Lowell Street Northwest
N
0 8 16 32

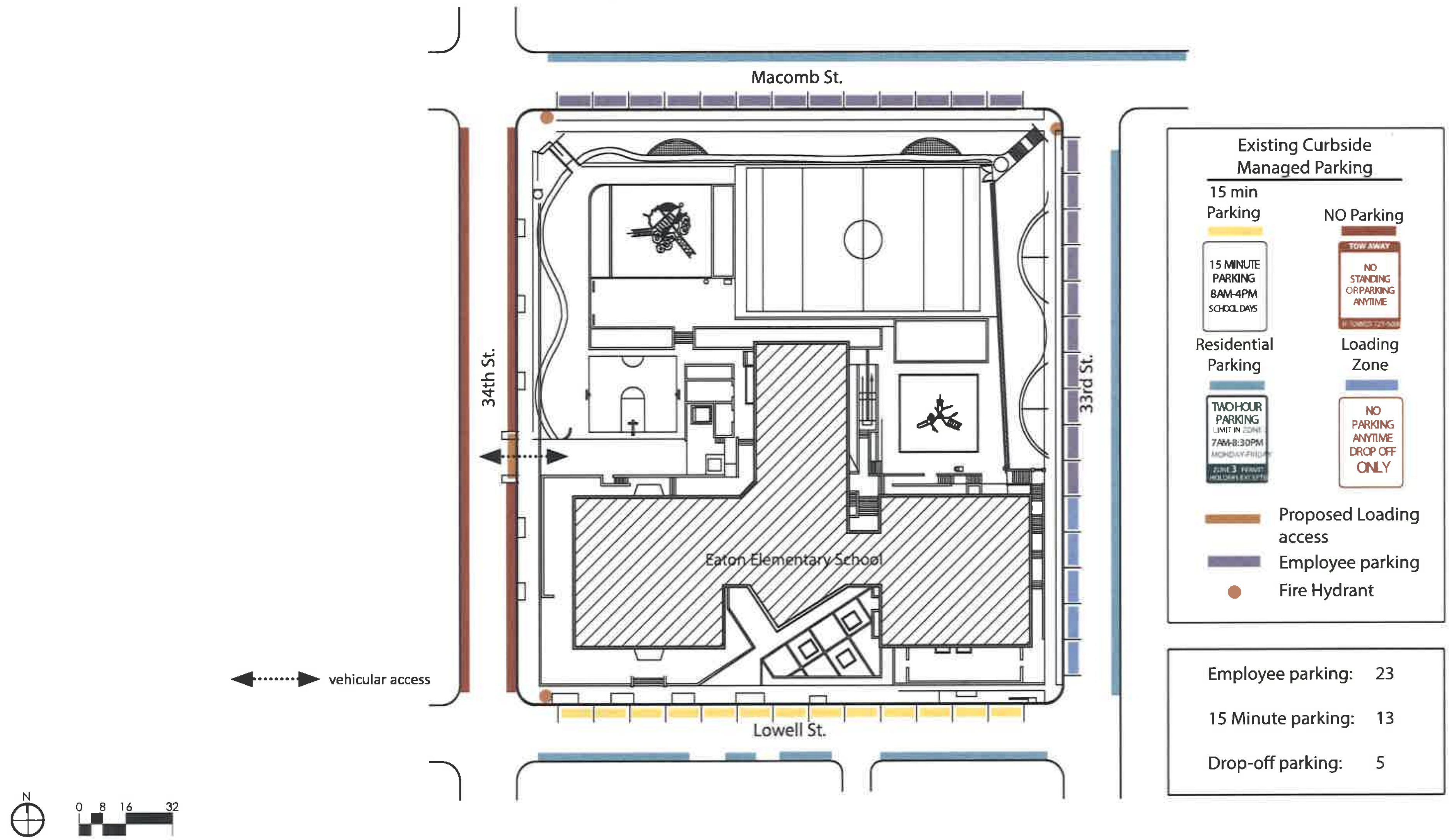
FIRST FLOOR



SECOND FLOOR



THIRD FLOOR



Employee parking:	23
15 Minute parking:	13
Drop-off parking:	5

EXISTING CURBSIDE MANAGED PARKING

JOHN EATON ELEMENTARY SCHOOL MODERNIZATION FEASIBILITY ASSESSMENT
District of Columbia Public Schools

EXISTING FACILITY CONDITION ASSESSMENTS & FEASIBILITY RECOMMENDATIONS

Civil
Landscape
Structural
Mechanical
Plumbing
Electrical

SITE CIVIL ASSESSMENT

GENERAL SITE CONDITIONS

Generally, and with some limited exceptions, the site appears to be in good condition.

Regarding the northern rear playground area, the hardscape is in good condition. The soccer field and rubber surface of the playground were installed fairly recently and show only occasional, minor signs of deterioration.

The rear pedestrian ramp in the vicinity of the vehicular entrance from 34th Street, NW was reported during the site visit to be very old. Moderate cracks and spalling were observed.

The perimeter sidewalk and hardscape around the site within public space is in good condition, with only occasional, minor cracking and spalling. The retaining walls around the perimeter of the site are in good condition.

The front entrance along Lowell Street, NW is in good condition, with only isolated, minor repairs needed.

Although the site around the perimeter has several significant slopes, no site stability issues or erosion was observed. The slopes are well maintained and stabilized by minimizing surface runoff on the slopes, and providing ample vegetation, hardscaping, and mulch.

No local low spots or ponding on site was observed or reported during the site visit. Excluding the existing structure, the majority of the site drains via overland flow.

The rear, northeast portion of the site where a playground and soccer field are gently slope to the north and outfalls to a concrete gutter along Macomb Street which then drains to an existing catch basin. No information is available as to where this catch basin ties in to the existing sewer system, but the Engineer assumes an approximately 6" storm sewer line runs east and ties in to the sewer main along 33rd Place.

The rear, northwest portion of the site where the playground for older children and a half basketball court are is served by catch basins and trench drains. The trench drains are badly clogged.

The towers structures in the southwest and southeast corner of the site have sloped, gabled roofs which drain to perimeter gutters. The gutters have downspouts at regular intervals throughout the entire perimeter which thankfully do not daylight to the surface, but instead go underground where they tie-in to an existing storm sewer lateral system which has wye connections to connect the various downspouts and ultimately ties in to the adjacent public sewer main at multiple points.

The flat roof of the portion of the structure which connects the two towers is in bad condition. The roof visibly has cracks and was reported to badly leak during the site visit. The flat roof has area drains which tie-in to a sewer lateral inside the building.

PEDESTRIAN ACCESSIBILITY

Only the entrances at the front entrance and along Lowell Street NW appear to be ADA accessible. ADA accessibility is limited in and around the site. The rear entrance to the building adjacent to the vehicular driveway from 34th Street and the playground is not accessible; only stairs are provided. Other entrances along the north and east face of the building similarly are only accessible by stairs.

Non-ADA pedestrian circulation is blocked by the significant grade change and retaining walls along the north and northeast portions of the site.

VEHICULAR ACCESSIBILITY

Vehicular circulation on the site is limited. Currently there are two obvious means of accessing the site by vehicle: parking in the street around the perimeter of the site and especially along Lowell Street, NW near the front entrance, and limited, gated access off 34th Street to driveway which dead ends with no turnaround or hammer head.

Currently, there is no off-street parking available on site.

UTILITIES

There appear to be two sanitary sewer laterals which serve the school. The first runs from the south face of the southwest tower structure to an existing main along Lowell Street. The lateral is a 6" diameter line per records. The second sanitary sewer lateral runs from the north face of the southeast tower structure and turns east to tie in to an existing main along 33rd Place. The depth, slope, material, and condition of the laterals are unknown. However, no problems or intermittent backups were reported during the site visit.

Domestic water service is supplied by a 3" diameter line from runs from the front entrance along Lowell Street south to an existing water main. The building is currently not sprinklered, so there is no existing fire service water lateral. Fire hydrants are abundant; they're adjacent to the site in the southwest, northeast, and northwest corners.

Overhead electrical and telecommunication lines can be seen outside from the street along the perimeter of the building. No direct overhead electric or telecommunication connection was observed, and so both are assumed to run underground from a nearby utility pole to the building. No underground dry utility vaults were observed, and so the pole mounted transformer along 33rd Place is assumed to service the school.

Natural gas appears to be fed from 33rd place to the east face of the portion of the building housing the auditorium.

EXISTING CONDITIONS SITE SUMMARY

The site has generally been well maintained and has had several improvements over the years. The adjacent public space is similarly in good condition and has been well maintained. Although some minor areas of needed repair were observed, these were isolated and relatively minor in frequency and scope. The exception is the rear stair entrance which, although not yet a structural issue which significantly affects the intended function, is visually apparent.

Information pertaining to the existing site conditions is limited, particularly regarding the underground utilities. Most of the information presented herein was per site visit observations and by talking with school staff familiar with the site and its maintenance issues.

GENERAL SITE RECOMMENDATIONS

A topographic and utility survey of the property should be conducted. This would allow for a more thorough analysis of the existing conditions.

Given that the school is currently utilized beyond its intended capacity, and that the student load is projected to increase in the future, considerable work should be considered to the site to maximize and gain useable space by the students. Pushing the retaining wall along 33rd Place to the property line would increase useable space, for example. Eliminating the knee-high masonry walls around landscaping islands in the playground area would also open up the site and maximize utilization of the limited space available.

For site drainage, a revised grading plan could take advantage of the plentiful amount of vertical fall in the northern portion of the property to create long, gentle slopes to the perimeter of the property prior to the vertical falls to the adjacent streets. Concrete curb and gutter and catch basins could then catch the stormwater runoff before overflowing down the steep portions of the site to prevent erosion. This approach would also be advantageous from a maintenance perspective by minimizing the storm sewer infrastructure onsite.

Site drainage which remains such as trench drains at the top of steps should be replaced with systems that are easily maintained. Cleanouts should be installed at regular intervals along all existing laterals to further ease long-term maintenance.

There are several possibilities to provide stormwater management in and around the site but is highly subject to the proposed development which has not yet been fully determined.

The engineer recommends that the flat roof which is in poor condition and leaks be replaced with an intensive green roof. The gabled roofs of the two adjacent tower structures are several feet higher than the flat roof, and so could be redirected via new gutters and downspouts to the prospective green roof. Since the green roof will be treating an area much larger than itself, visually appealing, lush vegetation can be considered. This could thus be a nice place for an outdoor classroom.

Bioretention facilities should be installed along the north, east, and west perimeters of the site to catch, treat, and retain runoff from the rear of the property.

If significant plumbing work is to take place regardless, the design team may want to consider integrating a rain water cistern. The cistern could be possibly fed from almost anywhere on site since it will likely be in the basement, and so ample vertical fall will be provided. The cistern could be used for irrigation purposes of the aforementioned green roof, but the best application from a stormwater management perspective will be toilet flushing. In this way, the required treatment of the rainwater will be minimized due to the low risk of ingestion and exposure from the students and staff, and a large, steady demand of rainwater will be present while school is in session. However, if the school is not used during the summer, the stormwater credits earned by the cistern will consequently be reduced.

PEDESTRIAN ACCESSIBILITY RECOMMENDATIONS

Ideally, the ADA accessibility of the site should be dramatically improved so that each entrance, or at least almost all exits, are ADA compliant. However, the vertical elevation differences which must be made up at some entrances are several feet. Moreover, the site is already undersized for its projected student load, and the number of new ramps would take up valuable space. The Architect and Civil Engineer should coordinate closely to determine how the school can be made as ADA friendly and accessible as possible while minimizing the need for large, cumbersome ramps.

Non-ADA access to the site is generally good but could be improved. Site stairs could be provided near the north east corner of the site near the intersection of Macomb and 33rd Place.

VEHICULAR ACCESSIBILITY RECOMMENDATIONS

Providing vehicular circulation onsite will be challenging, especially for buses, given the existing conditions. Still, ideally the school should have an area where cars and buses can drop off and pick up children. These pick up and drop off points should be close to the main, front entrance of the school and morning assembly areas. There should also be a means where cars and ideally school buses can pull into the site, turn around, and leave the site without having to reverse into the street. A three-point hammer head is better, though a full internal looped configuration would be best but would also take up a lot of space.

Parking will be a significant challenge for this site. Providing the required number of parking spaces per code in a surface lot would require a very large portion of the already under-sized site and would thus exacerbate the lack of useable outdoor space by the students.

Vehicular entrances are curb cuts are desired by DDOT to be minimized.

For the reasons stated above, Engineer highly recommends that an underground parking facility be considered.

Rear hardscaping in playground area in good condition

Rear pedestrian stairs and ramp showing cracking and deterioration

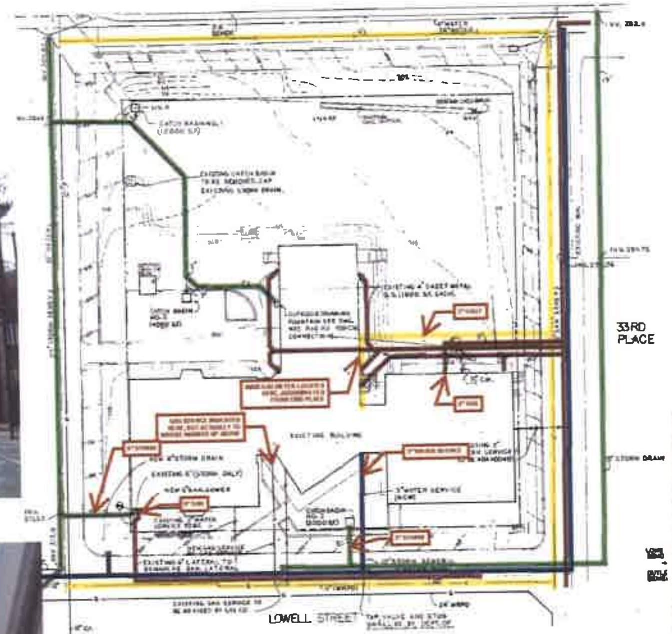
Perimeter public space hardscape in good condition

Minor, isolated exception to perimeter hardscape being in good condition

Rear pedestrian stamps and ramp showing cracking and deterioration

Main entrance along Lowell Street NW in good condition.

Typical perimeter downspouts



Limited information pertaining to onsite utilities

Flat roof is in very poor condition

Badly clogged trench drain at top of site stairs

Hardscape taking up limited space in playground area

Northeast corner of site with no pedestrian access

LANDSCAPE DESIGN RECOMMENDATIONS

GENERAL OVERVIEW

R. McGhee & Associates engaged Simpson Symbiosis DC (SYM) to review the landscape design for the modernization and feasibility study related to the John Eaton Elementary School.

We performed the following tasks:

- Visit the school for a landscape feature survey to generate report of observations regarding the conditions of existing facility and probable future modernization configurations.
- Met with R. McGhee and Associates to review the recommended renovation and new construction
- Provided feedback regarding essential programmatic landscape components required by Educational Specifications by DCPS.
- Reviewed proposed modifications to better understand the corresponding site requirements with regard to anticipated outdoor program activities.
- Discussed test fit solutions and provide analysis of pros and cons of each scheme.
- Provide rough probable cost projection with regard to test fit schemes.

SYM reviewed proposed building modernization design considerations developed by R. McGhee & Associates for specific areas of the proposed site designs, gave feedback as to indoor/outdoor program relationships, and develop the site schemes jointly with R. McGhee & Associates.

PROPOSED DESIGN REVIEW

SYM reviewed the various design and renovation schemes produced by R. McGhee & Associate throughout the process of addressing program requirements after the initial assessment. The final recommendations involve three schemes labeled A, B, C and C.1.

Scheme A does not propose any new construction, the existing building envelop remains and therefore the existing indoor/outdoor relationship remains the same. Both schemes labeled 'C' and 'C.1' show new construction at the north east part of the campus and impact 33rd Place NW and Macomb Street, NW frontages.

The portion to be rehabilitated in all schemes include:

- Eight Room School Building, No. 160, Lowell & 34th Streets NW. Date unknown: approximately 1890.
- John Eaton School No. 160. Date unknown: approximately 1911.
- Building Addition to John Eaton School dated January 1930.

The portion to be rehabilitated in Scheme A only includes

- John Eaton Elementary School addition during 1980.

New construction for Scheme C consists of a new classroom facility at the northeast corner of the site, at 33rd & Macomb Streets NW.

New construction for Scheme C.1 consists of a new classroom facility at the northeast corner of the site, at 33rd & Macomb Streets NW as well.

EXISTING SCHOOL CAMPUS DESCRIPTION

The John Eaton Elementary School is comprised of four main buildings:

- 1890's masonry bearing wall structure (southwest building).
- 1911 masonry bearing wall structure (southeast building).
- 1930's masonry bearing wall auditorium structure (north building), and
- 1980's connector / library building (central south building).

The 1980's section of the connector building consists of a slab on grade at the floor entrance. The first floor main entry ar an elevated plaza, separated from street and sidewalk by grade and retaining wall. Accessible connection to sidewalk the western end of the entry court.

The school has limited outdoor activity space. The south half of the campus is occupied by buildings. In the north part o campus, there is a small sports field, half basketball court, 2-5 and 5-12 separate play areas. Grade changes withir property are addressed by various retaining walls, steps, and ramps. There are planters in strategic locations as the resu grade change solution and activity separation. Overall school accessibility needs to be improved. Outdoor green sp and planting is minimal due to the space constraint.

There are significant retaining walls at the north and east edge of the campus. The northeast corner of the site is more 15' above the corner grade of 33rd Place and Macomb Street intersection.

EXISTING CONDITION ASSESSMENT OBSERVATIONS AND RECOMMENDAITONS

We summarize the observations and present recommendations to address these conditions below.

The school site has been developed over the years. The improvements were piecemealed to address the needs at certain point of time. It suffered from this approach. With the opportunity of renovation and modernization, a holistic loo the entire site is appropriate to make sure the new improvements can properly respond to future needs.

1. The school is separated from the neighborhood by grade difference and barrier as walls and steep slopes. The s of isolation is apparent. Main entry court into the school building on Lowell Street should be improved as a more welcor and open experience.

2. There is no good pickup and dropoff area. Reconfiguration of the arrival/entry experience from the surroun streets and better circulation patterning is needed. There is very limited parking on site available for faculties, paren visitors. Creative way of parking accommodation such as new parking structure taking advantage of the grade differe along 33rd Place should be taken into consideration in the modernization planning.

3. Fitting EdSpec space allotments for outdoor learning spaces, assembly spaces, sports fields and support space be challenging due to the limited site space, especially with building envelope expansion possibility. However, out classrooms and learning alcoves should be fitted wherever possible to facilitate informal learning.

4. North east edge of the school property outside of the existing retaining wall along 33rd Place is currently a st vegetated bank. Taking advantage of this piece of property and incorporating it into the building envelop configurati a valid consideration to gain the valuable space for the limited site.

5. Steep slope at the north edge of school property in the public space along Macomb Street limits the use of periph space.

6. Due to the site space constraint, space/program sharing and flexible multifunctional spaces is highly desirable.

7. Bringing outdoor components to ADA compliance will be challenging due to space constraint.

8. Rooftop use should be considered to accommodate outdoor programmed spaces.

9. Wherever possible, indoor and outdoor connection should be encouraged.

10. Play areas need to achieve more versatile play value and flexibility.

11. Flexible outdoor seating and quiet-time opportunity should be provided as much as possible.

12. Limit the extent of rigidly defined hardscape to provide greater flexibility of outdoor multipurpose areas.

Figure 1 - Aerial view, Lowell Street

Figure 3 - Aerial view, Macomb Street

Figure 2 - -Aerial view, 33rd Street

Figure 4 - Aerial view, 34th Street


Figure 1 - Separation and isolation, Lowell Street wall


Figure 3 - Separation and isolation, 33rd Street wall


Figure 2 - -Separation and isolation, Lowell Street and 33rd Street walls


Figure 4 - Separation and isolation, 33rd Street and Macomb Street walls


Figure 1 - Steep grade and retaining wall, 34th street


Figure 3 - Steep grade and retaining wall, 33rd Street


Figure 2 - -Steep grade and retain wall, 33rd Street


Figure 4 - Steep grade and retaining wall, Macomb Street

Figure 1 - limited functional space, school front entrance

Figure 3 - Limited functional space, half basketball court, currently used for morning assembly

Figure 2 - -Limited and under utilized space, roof

Figure 4 - Limited functional space, undersized sports field, currently used for morning assembly

Figure 1 - Excessive and harsh hardscape, planter walls along 5-12 yr. play area

Figure 3 - Utility and storage cluster that can be organized better

Figure 2 - -Excessive and harsh hardscape, planter walls along basketball court

Figure 4 - Excessive and harsh hardscape, planter wall along sports field and north wall of gym


Figure 1 - Perimeter uses, Lowell and 34th Street


Figure 3 - Perimeter uses, Macomb Street


Figure 2 - Perimeter uses, Lowell Street


Figure 4 - Perimeter uses, 33rd Street

Figure 1 - Expansion towards property line

Figure 2 - Expansion towards property line

Figure 3 - Expansion towards property

Figure 4 - Expansion towards property line and possibility of an expanded sports field above

Figure 1 - Existing synthetic turf undersized sports field

Figure 3 - Existing 5-12 play equipment on rubber surfacing

Figure 2 -Existing half size basketball court

Figure 4 - Existing 2-5 play equipment on PIP rubber surfacing and adjacent floor games on blacktop

Figure ˉ - Outdoor classroom possibility, rooftop space

Figure 3 - Outdoor classroom possibility, area between program spaces

Figure 2 - Outdoor classroom possibility, Lowell Street terrace

STRUCTURAL CONDITION ASSESSMENT AND FEASIBILITY

R. McGhee & Associates engaged Simpson Gumpertz & Heger Inc. (SGH) to perform a structural condition assessment and feasibility study related to the renovation of John Eaton Elementary School.

We performed the following tasks:

- Conduct a visual survey of the existing buildings comprising John Eaton Elementary School,
- Review available building documentation provided to us by R. McGhee & Associates,
- Provide conceptual repair recommendations for observed deficiencies, and
- Provide conceptual recommendations for further structural assessment and repairs necessary to support the proposed renovation options as part of the feasibility study developed by R. McGhee & Associates.

The John Eaton Elementary School is located at 3301 Lowell St. NW, Washington, DC.

Representatives from the District of Columbia Public Schools (DCPS) and R. McGhee & Associates design team, including SGH, conducted a collaborated site visit at the John Eaton Elementary School on Monday, 22 January 2018. SGH conducted an interior and exterior visual survey of the existing 1890, 1911, 1930, and 1980 building structures comprising Eaton Elementary School.

SGH did not perform or observe exploratory probes (e.g. removal of finishes at select locations), extract samples or perform materials testing in our scope of structural condition assessment work. SGH photographed existing conditions and readily visible areas of concern and documented our observations in field notes for the John Eaton Elementary School.

The observations, findings, and recommendations herein are based on SGH's visual observations during our site assessment and our experience with similar buildings.

EXISTING DOCUMENT REVIEW

To enhance SGH's understanding of the existing building structures, we reviewed relevant portions of the following documents:

- Eight Room School Building, No. 160, Cleveland Park Corner Lowell & 34th Streets drawings by architects Snowden Ashford and Appleton P. Clark Jr. Date unknown: approximate 1890.
- John Eaton School No. 160 by architects Albert L. Harris and Arthur B. Heaton. Date unknown: approximately 1911.
- Building Addition to John Eaton School drawings. The name of the design architect is indecipherable on the existing drawings. The drawings are dated 16 January 1930.
- John Eaton Elementary School drawings by Dewberry, Nealon & Davis Structural Engineers. The drawings are dated 16 April 1980.

EXISTING BUILDING DESCRIPTION

The John Eaton Elementary School is comprised of four main buildings:

- 1890's masonry bearing wall structure (southwest building),
- 1911 masonry bearing wall structure (southeast building),
- 1930's masonry bearing wall auditorium structure (north building), and
- 1980's connector / library building (central south building).

The original building is located at the southwest corner of the property at the intersection of Lowell and 34th Streets. The structure is believed to date to approximately 1890.

The structure consists of a basement level with elevated first, second, and attic floors above. The structure is a masonry bearing wall system with exterior and interior brick masonry bearing walls. The mansard roof structure is framed by timber elements supported on the exterior and interior brick masonry bearing walls. The first and second floors are framed with a Johnson System floor structure. The Johnson System is comprised of flat hollow terracotta tile arches supported on steel beams and brick masonry bearing walls. The system includes enclosure of the steel beams and girders with terracotta tiles to fire proof the floor system. Cinder fill with timber sleepers is located on top of the terracotta tiles to create a level floor surface for floor finishes. Original drawings do not provide design live loads or bearing pressures.

The 1911 classroom building consists of a concrete slab on grade first floor with elevated second, third, and attic floors above. The structure is a masonry bearing wall system with exterior and interior brick masonry bearing walls. The mansard roof is framed by timber elements supported on the exterior and interior brick masonry bearing walls. The elevated second and third floors are one-way reinforced concrete slabs supported on reinforced concrete beams. A connector building with north and south masonry bearing walls was constructed simultaneously with the new classroom building to provide access to the 1890's existing structure. The connector consists of a below grade maintenance floor with a reinforced slab on grade. The below grade structure extends partway under the new classroom building into the west central stairwell. The first and second floors of the connector building do not align with the floor elevations of the new structure. Access to the various floor levels is provided by the new classroom building's west central stairwell. The first and second floors of the connector building are framed with one-way reinforced concrete floor spanning between reinforced concrete beams supported on the north and south masonry bearing walls. The original roof construction of the connector building is unclear from the original drawings. Original drawings do not provide design live loads or bearing pressures.

The 1930's auditorium building consists of below grade concrete walls on continuous spread footings. The perimeter slab around the auditorium space is an elevated reinforced concrete slab to frame a pipe tunnel and mechanical space below. The auditorium floor is a concrete slab on grade. Perimeter walls above grade are brick masonry bearing walls supporting the roof and isolated second floor structure above. An isolated second floor structure for storage and exhibition space is located south of the auditorium and is framed with a reinforced concrete slab supported on steel beams and brick masonry bearing walls. The auditorium roof structure is framed with steel trusses spanning east to west and steel purlins supporting a reinforced concrete roof slab. The exhibition space roof is framed with steel beams, posts and girders supported on brick masonry bearing walls. Original drawings do not provide design live loads or bearing pressures.

The 1980's section of the connector building consists of a slab on grade at the floor entrance. The first and second floor structures are elevated concrete slabs supported on a grid of reinforced concrete beams. The beams are supported at existing interior masonry bearing walls (exterior south walls of the original connector) and perimeter concrete columns. The 1980's roof structure encompasses the then-new triangular administration area and extends north to the south face of the existing auditorium building. The roof is framed with an elevated one-way concrete slab supported on a grid of reinforced concrete beams. The beams are supported at existing brick masonry bearing walls and at then-new circular concrete columns. The southeast roof beams and slab cantilever southward beyond the existing concrete columns. Existing drawings indicate an allowable soil bearing pressure of 3,500 psf (pounds per square foot) for the ground floor administration area. The roof structure was designed for 30 psf live load. New floors were designed for a 70 psf live load plus 20 psf partition load. Stairs were designed with a 100 psf live load.

EXISTING CONDITION ASSESSMENT OBSERVATIONS AND RECOMMENDAITONS

We observed several conditions warranting further assessment and potential future remediation during our site assessment. We summarize our observations, discuss each condition, and present conclusions and recommendations to address each of these conditions separately below.

Exterior: Brick Masonry

Observations
We observed diagonal cracks above isolated lintels over triple-ganged windows (Figure 1).

The underside of many existing lintels over masonry openings are corroded and scaling. The masonry is cracked at isolated lintel bearing locations where the lintels have visible rust scaling (Figure 2).

Exterior masonry parapets projecting above the 1980's building roof level are cracked and displaced at several locations (Figure 3). We did not observe flashings beneath the parapet copings at these locations.

Discussion
Mass brick masonry is a porous material that readily absorbs moisture and is subject to moisture and temperature-related movement. Brick masonry is typically kiln fired and at the time it leaves the kiln has a very low moisture content. After the brick is installed and exposed to the environment (e.g. temperature, humidity, rain, etc.), the brick absorbs moisture and grows over time. Restraint of masonry expansion and contraction can cause cracking. Over time, cracks and weathering and degradation of the brick and mortar allow additional moisture into the wall exposing embedded steel and wood elements to mois-ure-related deterioration.

Corrosion, in particular rust on structural steel, is a result of moisture infiltration. The rust byproduct is several times the original volume of steel and this expansion will create internal tensile forces which act on the surrounding media in a process called rust jacking. Rust jacking is often apparent at the bearing locations of steel lintels in exterior masonry bearing walls. The growth of the structural steel opens mortar joints in the brick masonry and if left unaddressed will cause cracking of the mortar joints and adjacent brick masonry. Cracks also lead to additional bulk water infiltration, accelerating the deterioration cycle. To decrease a steel element's susceptibility to moisture distress, steel elements are commonly protected with a corrosion resistant paint or galvanizing and covered with flashings to collect and direct water from the wall. Remedial flashing installation in coordination with maintenance of protective coatings are durable and reliable options to address minor lintel deterioration. Where lintels are deteriorated beyond repair, lintel repairs or replacement may be required.

Conclusions / Recommendations
We recommend additional assessment of the exterior masonry to identify the cause and extents of deterioration and develop recommended remedial repairs that address the cause. As part of the exterior masonry assessment hands-on survey and exploratory probes should be conducted at select locations. Locations may include but are not limited to:

- Lintel bearing where rust jacking is observed to determine condition of the existing lintels, masonry and flashings (if present).
- Interface at the top of the roof structure and masonry parapet above to review the condition of the concealed flashings and existing structural connections.

Exterior: Concrete Distress

Observations
We observed cracked, delaminated, and spalled concrete at exterior site elements including ramps and stairs (Figure 4). In at least one localized area, there is pattern cracking with efflorescence.

We saw spalls at the base of the 1980's circular concrete column where it intersects the exterior walking surface (Figure 5).

Discussion
Common concrete deterioration mechanisms include freeze/thaw deterioration, corrosion deterioration, and alkali-aggregate reactivity.

Freeze/thaw: Exposed reinforced concrete can also be vulnerable to cyclic freeze-thaw damage. Concrete saturated with water and exposed to freezing temperatures can be damaged by the pressure from freezing water, which produces bursting tensile stresses in the concrete. Even air entrained concrete is susceptible to this type of damage whe saturated.

Corrosion: Within a composite (reinforced) concrete section, concrete cover acts as a protective layer for the reinforcement. When cracks form in concrete, a failure of the protection system occurs. Cracks extending pa: cover, provide a conduit for moisture to reach the internal reinforcing steel. Corrosion, in particular rust on stru result of moisture infiltration and subsequent expansion as a result of a chemical reaction within the component. When corrosion of a structural steel element occurs, expansion of occurs creating internal tensil act on the surrounding concrete and in turn create delamination or spalling within the concrete.

Alkali-aggregate reactivity: Concrete durability can be compromised by a chemical process known as Alkali (ASR), which occurs when certain types of silica-containing reactive aggregates react with the hydroxyl and c concrete to form a silica gel. The gel absorbs significant quantities of water, causing it to swell and crack t and surrounding cement paste inside the concrete.

Concrete deterioration, depending on the types, extents and severity, may have significant effects on the structural integrity of a building. In the case of reinforced concrete, the structural element (slab, beam or colur such that tensile forces caused by bending are carried by the reinforcing steel while compression forces are the concrete media. Visible concrete spalling and delamination is an indication that internal reinforcement wire fabric, etc.) is in distress and possesses a reduced ability to carry design tension forces. The increasing transferred back into the concrete component and as a result continued cracking and spalling occurs, exc structural element's diminishing load carrying capacity. If left unaddressed, deterioration can accelerate ar the need for substantial repairs to maintain code compliance. Any repair and protection approach should adc of the deterioration.

Further investigation is recommended to determine whether visible cracking in exterior concrete is related to cc thaw, ASR or some combination of these mechanisms. Identifying the cause is fundamental in determining a a suitable repair approach.

Conclusions / Recommendations
SGH recommends further investigation by a structural engineer be conducted of the exterior concrete element etc.) to determine the cause and better understand the extents of deterioration. The investigation recommended repairs which may include but are not limited to:

- Protections that address the source of moisture ingress,
- Isolated partial or full-depth concrete repairs to address existing deterioration, and
- Any modifications necessary to achieve suitable code compliant loads.

Exterior: Storm Water Management System

Observations
The protective coating at the 1930's building roof appears to be weathered and is permitting corrosion of the metal roofing (Figure 6).

An existing gutter was observed to have displaced away from the roof line as a result of impact damage anchorage (Figure 7).

Downspouts extend below grade. We do not have information about their functionality. At least one locati efflorescence in the pavers around the base of the downspout.

Discussion
If unaddressed, the displaced gutter will allow storm water runoff to flow down the face of the building whi staining of the brick masonry and increased exposure to moisture infiltration. Deterioration of the wood fac similar elements may occur.

It is important for a building to have a functional and appropriately sized storm water management system.

Conclusions / Recommendations
SGH recommends a review of the rain water conveyance system (e.g. gutters, downspouts, etc.) be conducted to ensure functional capacity and adequacy to carry runoff into the storm water drainage system.

Interior: Moisture Infiltration

Observations
We observed moisture staining at select locations throughout the buildings.

Figure 8 depicts moisture staining and potential wood-framing deterioration at the underside of the roof within the 1890's building attic. Similar staining was observed in the 1911 building's attic. The timber framing is pocketed into the masonry at this location.

Figure 9 shows moisture staining at the underside of the stairwell located in the 1930's building. Concrete distress and exposed rebar is also apparent in the picture.

The acoustical ceiling tiles are water stained at the underside of the second-floor roof within the 1930's building (Figure 10).

Peeling paint was observed throughout the 1930's basement space (Figure 11).

Discussion
The signs of staining on timber framing and masonry in the 1890's and 1911 building's attic, the staining, peeling paint, and concrete deterioration in the 1930s building, and the concrete distress observed in the 1980's building stairwell are all signs of chronic leakage in these three buildings. Access to the 1930's building attic was not available at the time of SGH's site visit.

As previously noted, exterior brick masonry walls readily absorb moisture exposing embedded elements to moisture-related deterioration. Rot and section loss is common in timber elements with prolonged exposure to moisture, particularly when pocketed into masonry like the roof rafters. If left unaddressed, continued deterioration will cause loss of structural capacity and instability of the timber elements and the unreinforced masonry elements they laterally brace. Moisture related deterioration of timber pocketed in masonry cannot be identified by visual survey alone and requires additional investigation that can include masonry removals and/or resistance drilling.

Historic building practices often include applying an asphaltic coating to ends of timber elements pocketed in exterior masonry walls to provide a barrier against moisture infiltration. These coatings are typically impermeable and can therefore trap moisture in the wood promoting deterioration. Modern building practices use vapor-permeable building paper to provide a similar barrier in combination with pressure treated wood elements or elements/species with a high resistance to moisture.

In addition to repairing leakage-related deterioration, the source of leakage should be identified and addressed to help protect the interior and the structure.

Conclusions / Recommendations
SGH recommends further investigation by a structural engineer and building enclosure consultant in all four building structures of the John Eaton Elementary School be conducted to identify leakage paths and the types and extents of leakage-related deterioration in order to develop suitable repair approaches. We recommend exploratory work include but not be limited to the following building components. We also recommend coordinating exploratory work and investigations of building structural components with any proposed building renovation work.

- Visual survey, masonry exploratory openings, and timber resistance drilling within the attic space of the existing 1890 and 1911 buildings to assess the integrity of the existing timber framing and masonry bearing walls.
- Exploratory removals in the 1930's building ballasted roof at drains and rising walls (parapets).
- Exploratory removals in slate roof and underlying roofing assembly (1890's and 1911 buildings).
- Visual survey and sounding of interior reinforced concrete in areas with signs of chronic leakage to document the extent of cracked, delaminated, and spalled concrete.
- 1930's building roof.

As part of the investigation, removal of all ceiling finishes is required. Where existing plaster is of a sensitive historic nature, select probes may be conducted as specified by the structural engineer to minimize impact of the historic fabric. The investigation shall establish recommended repairs which may include but are not limited to:

- Roofing repair and/or replacement.
- Repairs to moisture-damaged masonry.
- Repairs to moisture-damaged timber framing.
- Isolated partial or full-depth concrete repairs.
- Repair at existing terracotta floor tiles (if damage is noted during the investigation); and
- Repairs to any other building element damaged by water infiltration as identified during the investigation.

FEASIBILITY STUDY: SCHEME A

Scope
Option A will involve repurposing of existing building spaces within the current building footprint to achieve the architectural program requirements and does not include expansion. The room layouts proposed in this option would require limited demolition of several masonry bearing walls in the 1890 and 1911 buildings. Major bearing wall removal or relocation would be required to accommodate full EdSpec compliant rooms in Scheme A. Limited or no use of the existing attic is anticipated in this option, aside from locating smaller mechanical units as required.

Discussion
Terra cotta arch floor systems typically have large inherent live load capacities that likely are sufficient to support anticipated occupancy loads for schools. The steel framing often controls the capacity for the floor system. Further investigation by a structural engineer is recommended to confirm capacity of the existing structure for anticipated loads, especially heavy storage or library loads.

The existing masonry bearing walls support the roof and floors in their respective buildings. If major wall relocation is desired, transfer of these loadings to other load-carrying elements is critical prior to demolition of these walls. Carefully planned and engineered temporary shoring must be in place to avoid sudden loss of load-carrying capacity or excessive movement and damage to the remaining structure. New beams and columns or partial bearing walls that replace the existing bearing walls must carry the loads down through the structure to the foundations. New framing does not need to coincide (match) the locations of the existing walls; however, if they do not, then floor framing elements need to be evaluated for the new support locations. In addition to gravity loads, the existing walls also make up part of the building lateral force resisting systems. Redistribution of lateral loads to other building framing elements must be considered in the structural modifications.

If the affected existing foundations do not have sufficient capacity to support the redistributed loads or new framing elements do not coincide with existing foundations, then the existing foundations need to be augmented, or new foundations must be constructed. Foundation construction inside of existing buildings is very disruptive to the building lower levels. Because the design bearing capacity of the soil is unknown, it is recommended that a comprehensive geotechnical investigation be conducted of the sub-surface within the building footprint and foundation influence zones.

Conclusions / Recommendations
This option would require extensive construction work if major wall relocation is desired. Significant additional costs would be incurred due to the costs and time needed for temporary shoring and demolition of existing bearing walls. Existing bearing walls can be replaced by either structural steel framing or cast-in-place reinforced concrete framing; however, both systems are challenging to install in an existing building. Replacement of walls with columns will provide greater architectural flexibility, although added beams at the floor levels may pose challenges to architectural finishes and layout of mechanical and plumbing systems in the ceiling spaces. Addition of new floor space or equipment in the attic would require wide-ranging reinforcement of the existing attic floor framing and may require reframing of portions of the existing roof. Substantial field verification and testing to verify the material strengths and load-carrying capabilities of the existing structural elements would be required to properly implement the renovation work.

Scope
Scheme C will involve modernizing and repurposing of existing building spaces within the 1890 and 1911 buildings, new construction in the location of the 1980 building, and adjoining new construction north of the existing eastern building to achieve the architectural program requirements. Variations of the building program and site layout schemes affect the volume of new construction. Although the majority of changes and space upgrades would be located in the new building spaces, the room layouts within existing spaces may require partial or total demolition of some masonry bearing walls.

Discussion
Foundations: A geotechnical investigation is recommended to establish the allowable bearing capacity.

Superstructure:

- It is anticipated that the primary structural system will consist of structural steel columns supported on shallow spread footing foundations (pending Geotechnical investigation). Reinforced concrete may be a viable option; however, structural steel construction is faster to erect and is often better suited to achieve the architectural objectives.
- Wide-flange structural steel beams and girders will span between steel columns to create a grid of structural bays. Where possible, the columns and interior bearing walls will follow classroom and corridor building layouts.
- The elevated second and third floor structures will consist of a minimum 2½-inch thick normal-weight concrete slab over 2-inch deep 20-gauge metal deck (minimum total depth of 4½-inches) spanning above the floor spaces and supported on the structural steel floor framing. The vibration performance of the floor framing systems will be evaluated to ensure that they fall within standard norms for school buildings. Welded wire mesh will be used to reinforce the concrete slab with supplemental rebar reinforcing over beams and girders.
- The depth of the elevated floor framing system is subject to floor occupancy, vibration, and acoustical requirements.
- To be verified by the architect, the superstructure framing will likely require sprayed-on fire-proofing to achieve floor system fire rating requirements. The thickness of the concrete on top of the metal deck will be selected so that the fire rating can be achieved with unprotected deck.
- The roof will typically be framed with metal deck on structural steel framing. In penthouse areas or green roof spaces, the roof structure will consist of a minimum 2-inch thick normal-weight concrete slab over 1½-deep 20-gauge metal deck (minimum total depth of 3½-inches) spanning above the floor spaces and supported on the structural steel framing. The concrete thickness and steel weight per foot will be affected by the weight of equipment and curbs and by the makeup of the green roof system, where designed. Additional structural steel wide-flange beams will be required at the roof to support mechanical units and accommodate architectural elements such as solar panels and skylights.
- The lateral force resisting systems in the new steel-framed building spaces may consist of steel braces or moment frames. The lateral systems will be coordinated with architectural room layouts and exterior glazing.
  1. Braced Frames:
     - Pros:
       - Diagonal braces can be concealed within exterior walls and interior partitions.
       - Smaller size (weight) of structural steel framing
       - Connections are less expensive and labor intensive than moment frame connections.
     - Cons:
       - Diagonal braces can be incompatible with open spaces and/or exterior glazing.
  2. Moment Frames:
     - Pros:
       - Less disruptive to architectural space planning and exterior glazing layout.
     - Cons:
       - Column and beam framing sizes are significantly heavier per linear foot than required for braced frames.
       - Ceiling heights may need to be lowered to accommodate deeper girders.
       - Connections are more expensive and labor intensive.

Non- Structural Elements:

- Exterior walls are expected to consist of cold-formed steel (metal stud) framing with punched windows and some larger glazing elements.
- New mechanical units are anticipated on the roofs of the new construction.
- Brick cladding to be similar to existing buildings. Cladding will be supported over windows and glazing elements on hot dip galvanized structural steel lintels within the brick wythe. Cladding with heights greater than two floors will be supported on galvanized structural steel angles anchored to the floor framing.
- No building expansion joints are anticipated.

This option would pose several challenges related to new construction adjacent to existing structures but is potentially a more feasible option than Scheme A because the extensive shoring and demolition within the 1890 and 1911 buildings would be avoided. Structural steel construction is very common in Washington, DC, and there are several building contractors with expertise in this industry. The site is easily accessible on all four sides, which would facilitate site access and excavation for shallow foundations.

In the new building areas, moment frames and/or braced frames will be located at select classroom dividing walls in both the transverse and longitudinal directions and oriented to allow doors for classroom access. In the existing building areas, field verification and testing to verify the material strengths and load-carrying capabilities of the existing structural elements should be undertaken to properly implement the renovation work.

Scope
Similar to Scheme C, Scheme C.1 will involve modernizing and repurposing of existing building spaces within the 1890 and 1911 buildings, new construction in the location of the 1980 building, and adjoining new construction on the north part of the site. The footprint of new construction is approximately the same as for Scheme C, but program elements are situated differently within, which would prompt different Architectural considerations for restoration efforts.

Discussion
Foundations: A geotechnical investigation is recommended to establish the allowable bearing capacity.

Superstructure:

- It is anticipated that the primary structural system will consist of structural steel columns supported on shallow spread footing foundations (pending Geotechnical investigation). Reinforced concrete may be a viable option; however, structural steel construction is faster to erect and is often better suited to achieve the architectural objectives.
- Wide-flange structural steel beams and girders will span between steel columns to create a grid of structural bays. Where possible, the columns and interior bearing walls will follow classroom and corridor building layouts.
- The elevated second and third floor structures will consist of a minimum 2½-inch thick normal-weight concrete slab over 2-inch deep 20-gauge metal deck (minimum total depth of 4½-inches) spanning above the floor spaces and supported on the structural steel floor framing. The vibration performance of the floor framing systems will be evaluated to ensure that they fall within standard norms for school buildings. Welded wire mesh will be used to reinforce the concrete slab with supplemental rebar reinforcing over beams and girders.
- The depth of the elevated floor framing system is subject to floor occupancy, vibration, and acoustical requirements.
- To be verified by the architect, the superstructure framing will likely require sprayed-on fire-proofing to achieve floor system fire rating requirements. The thickness of the concrete on top of the metal deck will be selected so that the fire rating can be achieved with unprotected deck.
- The roof will typically be framed with metal deck on structural steel framing. In penthouse areas or green roof spaces, the roof structure will consist of a minimum 2-inch thick normal-weight concrete slab over 1½-deep 20-gauge metal deck (minimum total depth of 3½-inches) spanning above the floor spaces and supported on the structural steel framing. The concrete thickness and steel weight per foot will be affected by the weight of equipment and curbs and by the makeup of the green roof system. Additional structural steel wide-flange beams will be required at the roof to support mechanical units and accommodate architectural elements such as solar panels and skylights.
- The lateral force resisting systems in the new steel-framed building spaces may consist of steel braces or moment frames. The lateral systems will be coordinated with architectural room layouts and exterior glazing.
  1. Braced Frames:
     - Pros:
       - Diagonal braces can be concealed within exterior walls and interior partitions.
       - Smaller size (weight) of structural steel framing
       - Connections are less expensive and labor intensive than moment frame connections.
     - Cons:
       - Diagonal braces can be incompatible with open spaces and/or exterior glazing.
  2. Moment Frames:
     - Pros:
       - Less disruptive to architectural space planning and exterior glazing layout.
     - Cons:
       - Column and beam framing sizes are significantly heavier per linear foot than required for braced frames.
       - Ceiling heights may need to be lowered to accommodate deeper girders.
       - Connections are more expensive and labor intensive.

Non- Structural Elements:

- Exterior walls are expected to consist of cold-formed steel (metal stud) framing with punched windows and some larger glazing elements.
- New mechanical units are anticipated on the roofs of the new construction.
- Brick cladding to be similar to existing buildings. Cladding will be supported over windows and glazing elements on hot dip galvanized structural steel lintels within the brick wythe. Cladding with heights greater than two floors will be supported on galvanized structural steel angles anchored to the floor framing.
- No building expansion joints are anticipated.

Conclusions / Recommendations
This option would pose several challenges related to new construction adjacent to existing structures but is potentially a more structurally feasible option than Scheme A in achieving the number and sizes of spaces required by the EdSpec while avoiding extensive shoring and demolition within the 1890 and 1911 buildings that would be required. Structural steel construction is very common in Washington, DC, and there are several building contractors with expertise in this industry. The site is easily accessible on all four sides, which would facilitate site access and excavation for shallow foundations. This option would have greater building demolition costs than Scheme C, but the overall costs are expected to be comparable because of the smaller footprint for new construction and less site clearing and excavation.

In the new building areas, moment frames and/or braced frames will be located at select classroom dividing walls in both the transverse and longitudinal directions and oriented to allow doors for classroom access. In the existing building areas, field verification and testing to verify the material strengths and load-carrying capabilities of the existing structural elements should be undertaken to properly implement the renovation work.

Figure 1 – Step crack at left side of window extending right.

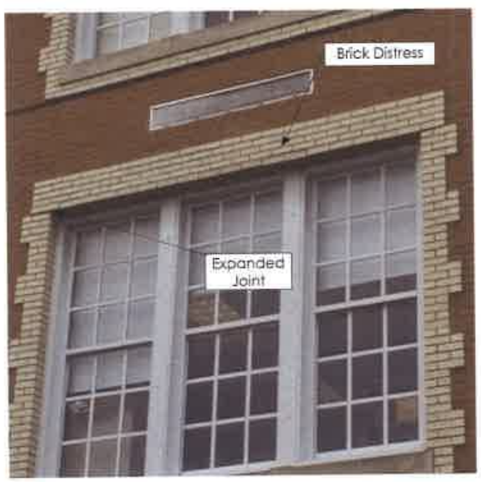


Figure 2 – Expanded joint at lintel bearing & brick distress.

Figure 3 – Parapet distress at northwest corner of 1980's bldg.

Figure 4 – Concrete distress at existing stairs.

Figure 5 – Concrete distress at base of 1980's building column.

Figure 6 – 1930's building roof distress.

Figure 7 – Gutter distress.

Figure 8 – Moisture distress at rafter bearing pockets slab.

Figure 9 – 1911 Bldg: exposed rebar at underside of stairwell slab.

Figure 10 – Moisture distress at underside of second floor.

Figure 11 – Peeling paint in basement of 1930's connector.

MECHANICAL, ELECTRICAL AND PLUMBING FEASIBILITY

MECHANICAL OVERVIEW

Provide a new mechanical system meeting all local codes including the 2013 DC Mechanical Code, Energy Code and Green Construction Code. In addition, mechanical systems shall meet LEEDv4 for Schools pre-requisites and enough credits to achieve at minimum LEED Gold certification. The recommended system for consideration is an air-cooled variable refrigerant flow (VRF) system for conditioning with dedicated outdoor air supply (DOAS) units for ventilation.

MECHANICAL RECOMMENDATIONS

Air-cooled VRF system – school conditioning

Provide air-source heat recovery VRF outdoor units located on the roof of the connector and the new wing. The heat recovery type unit with 3-pipe refrigerant distribution system allows for efficient simultaneous cooling and heating throughout the building. Install two (2) approximately 36-ton units on the roof of the connector to serve the existing portions of the school. Install one (1) approximately 24-ton unit on the roof of the new wing to serve the new wing.

Provide refrigerant piping mains from each outdoor unit through a central shaft to the corridor overhead of each floor. Connect mains in the corridor overhead to refrigerant piping branches with branch selectors serving VRF fan coil units located in each thermal zone.

Provide VRF fan coil units in each space of the ceiling cassette, wall-mounted or ducted concealed type. Connect the ducted concealed type VRF fan coil unit to low pressure ductwork serving ceiling diffusers and return air from the ceiling plenum. Provide manufacturer's integral condensate pump or a remote condensate pump where nearest open site drain cannot be reached by gravity.

Each zone is to be provided with a wall-mounted thermostat for local control of fan speed and temperature. A central controller should also be provided for remote control of outdoor units and indoor units, trending and scheduling.

DOAS – School Ventilation

Provide energy recovery units located on the roof of the connector and the new wing. Install an approximately 10,000 cfm unit on the roof of the connector providing ventilation air to the existing portions of the school. Install an approximately 4,000 cfm unit on the roof of the new wing providing ventilation air to the new wing. A supply and return duct main should be located in a central shaft within each wing. Locate supply mains in the corridor overhead of each floor and connect to air devices within spaces. Return mains should also be located in the corridor overhead of each floor and connect to air devices within bathrooms, janitor closets and classrooms.

Provide energy recovery units with air-cooled direct expansion cooling with variable speed compressor and hot gas reheat, natural gas stainless steel heat exchanger, total energy heat exchanger with bypass, plenum fans with vibration isolation and EC motor or VFD, MERV 13 filtration and packaged controller.

The energy recovery unit is to provide ventilation direct to spaces at a neutral air temperature. The energy recovery unit should also provide dehumidification by controlling the space dewpoint. Locate a remote relative humidity sensor in the building.

An additional energy conservation measure to consider is to provide variable volume operation for the energy recovery unit with a single duct variable volume terminal unit in each space connected to an occupancy sensor or carbon dioxide monitor. Upon a signal of inoccupancy or drop in carbon dioxide levels ventilation airflow to the space can be reduced.

Packaged Rooftop Unit – Gym Conditioning & Ventilation

Provide a packaged rooftop unit located on the roof of the gym/multi-purpose room and connector. Install an approximately 15,000 cfm unit with 50% outdoor air on the roof of the gym/multi-purpose room. Install an approximately 5,000 cfm unit with 30% outdoor air on the roof of connector to serve the library. Locate a supply and return duct main in the overhead of the spaces served and connect to air devices within the space.

Provide the packaged rooftop unit with air-cooled direct expansion cooling with variable speed compressor and hot gas reheat, natural gas stainless steel heat exchanger, total energy heat exchanger with bypass, plenum fans with vibration isolation and EC motor or VFD, MERV 13 filtration, and packaged controller for single-zone VAV and air-side economizer operation.

An additional energy conservation measure to consider is to provide high volume, low speed fans in the gym overhead to reduce stratification and increase air changes in the space.

Miscellaneous Systems

Provide kitchen with dedicated exhaust and make-up air system. Connect kitchen hood with welded grease duct and fire warp to up-blast exhaust fan on roof. Provide rooftop make-up air unit with direct-expansion cooling and gas heat.

Provide 2-ton direct expansion split systems with indoor unit located in the main IT rooms, main electrical rooms and elevator machines rooms. Locate outdoor units on the roof. A remote condensate pump is required where nearest open site drain cannot be reached by gravity. Provide cabinet unit heaters at entrances to the building and in stairwells. Locate a ceiling suspended unit heater in the water entry room.

Alternate Mechanical Systems

Additional systems for consideration are the following:

Hybrid Geothermal System: Ground-source geothermal system using wells on site to reject or accept heat from the ground to a closed loop condenser water system. Supplemental cooling for the closed loop condenser water system provided by a fluid cooler. Conditioning to spaces provided by water-source heat pumps connected to the closed loop condenser water system. Water-source heat pumps located in closets or ceiling plenums outside occupied spaces and connected to low pressure ductwork serving ceiling diffusers within the occupied space. Ventilation provided by water-source energy recovery units with gas heat located on the roof of each wing and ducted to return plenum of water-source heat pumps. Multi-purpose room provided with dedicated rooftop unit with water-source cooling, gas heat and single zone VAV controls.

4-pipe Hydronic System: Central plant with chilled water production by water-cooled centrifugal chiller connected to rooftop induced draft, counter-flow cooling tower and hot water production by natural gas condensing boilers. Chilled water and hot water distributed by 4-pipe system with variable speed pumping. Conditioning and ventilation provided by air-handling units serving large spaces and just conditioning provided by fan coil units serving smaller spaces. Ventilation to smaller spaces provided by energy recovery units with hydronic coils located in the attic of each wing and ducted direct to ceiling diffusers within each space.

Rooftop Variable Air Volume (VAV) Units: Rooftop VAV units with direct-expansion cooling and gas heating located on the roof of each wing. Rooftop units provide conditioning and ventilation air by medium pressure ductwork to VAV boxes with electric heat located in each thermal zone. VAV box distributes air to low pressure ductwork and ceiling diffusers within each space. Temperature and carbon dioxide measured in each classroom to determine quantity of air to be delivered to classroom and outdoor air percentage at rooftop unit.

An additional energy conservation measure to consider is to provide sorbic air filtration meeting the alternate ASHRAE 62.1-2010 Indoor Air Quality Procedure and LEEDv4 requirements. Addition of a sorbic filter into the return airstream to the rooftop VAV units in alternate system 3 above may result in greatly reducing the quantity of outdoor air required, energy usage and equipment size along with improving the indoor air quality of the learning environment.

PLUMBING OVERVIEW

Provide new plumbing systems meeting all local codes including the 2013 DC Plumbing Code, Energy Code and Green Construction Code. In addition, plumbing systems shall meet LEEDv4 for Schools pre-requisites and enough credits to achieve at minimum LEED Gold certification.

PLUMBING RECOMMENDATIONS

1. Re-use of existing 3" water service main. Provide a new domestic water booster pump in the water service room. A hydrant flow test is required to determine the size of the domestic water booster pump.
2. New domestic cold water, hot water and hot water recirculation distribution to plumbing fixtures throughout the facility.
3. New fire tube, condensing storage domestic hot water heater with circulating pump located in water service room.
4. Low flow plumbing fixtures.
5. Re-use of existing gas service, meter and regulator for Option A. Relocation of gas service, meter and regulator as required for Options C and C.1.
6. New gas distribution to backup generator, energy recovery units and packaged rooftops on each roof and domestic hot water heater located in water service room.
7. Re-use of existing 6" sanitary laterals from each existing wing and new laterals as required from new construction for Options C and C.1.
8. New sanitary piping to plumbing fixtures throughout the facility.
9. Re-use of existing storm lateral from each existing wing and new laterals as required from new construction for Options C and C.1.
10. New storm piping to roof drains and overflow drains located on roofs throughout the facility.
11. New sump pump in basement of central connector for foundation drainage.
12. New 4" fire service to water service room. Provide a new fire pump in the water service room. A hydrant flow test is required to determine the size of the fire pump.
13. New fire protection system to provide fully sprinklered NFPA 13 compliant facility.

ELECTRICAL OVERVIEW

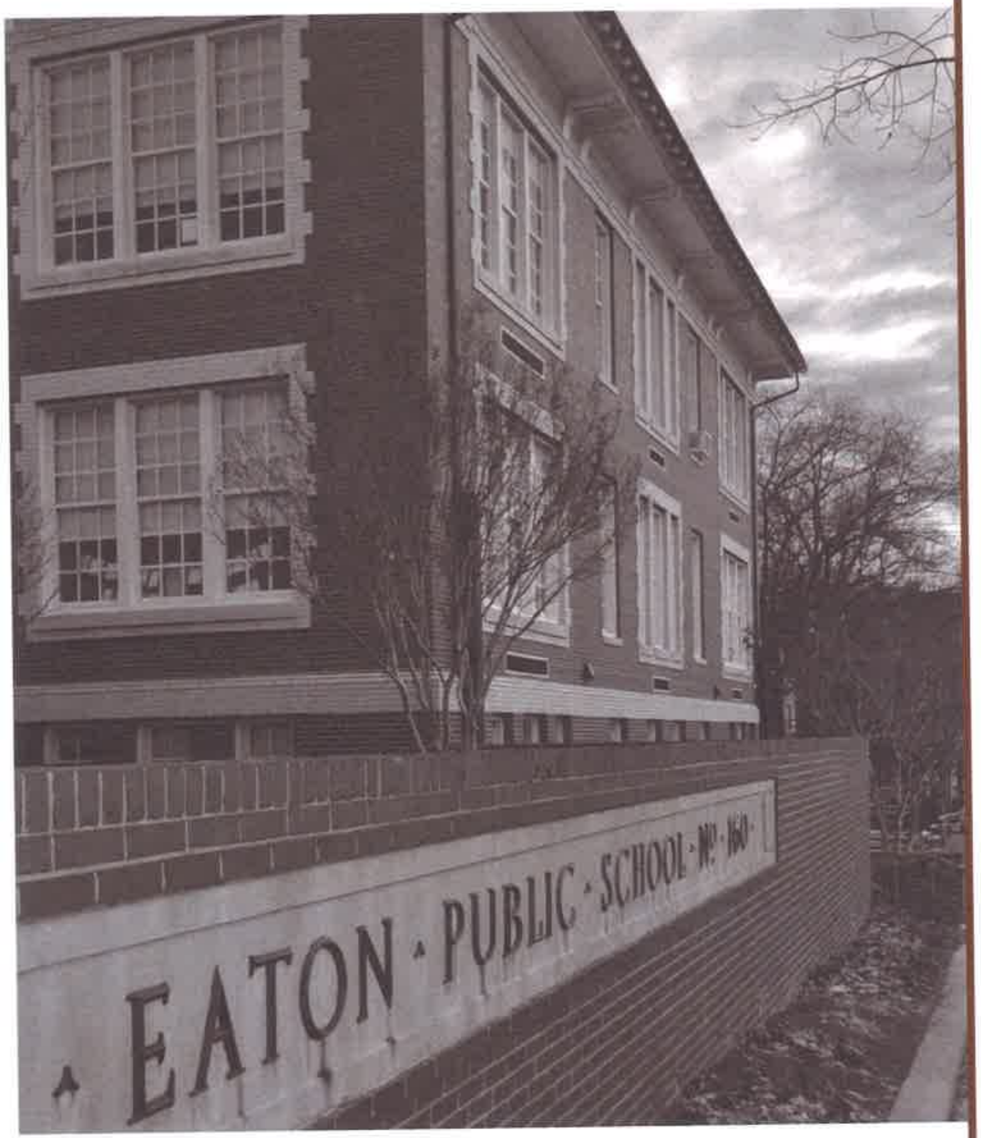
Provide new electrical systems meeting all local codes including the 2013 DC Electrical Code, Energy Code and Green Construction Code. In addition, electrical systems shall meet LEEDv4 for Schools pre-requisites and enough credits to achieve at minimum LEED Gold certification.

ELECTRICAL RECOMMENDATIONS

1. New complete electrical distribution system sized for the expected expansion due to this modernization project, and including metering capabilities to meet the 2013 D.C. Green Construction Code section 603. This will require a new utility feed and new utility transformer provided by PEPCO.
    a. Option A will require a 1200A service rated at 480V 3-phase. The basement area that formerly housed the mechanical equipment can be used as the new main electrical room. This option could keep the existing location of the service entrance ductbank. However, it would require a new service transformer with opportunity to relocate location of the new service transformer.
2. Option C and C1 will require a 1600A service rated at 480V 3-phase. The new main electrical room will be located in the new building and distribute out to feed the new building and the existing building areas. Alternately, this option could reuse the basement area of the existing building that formerly housed the mechanical equipment. This option could keep the existing location of the service entrance ductbank. However, both options would require a new service transformer with the location to be coordinated with PEPCO.New electrical rooms located strategically for distribution panelboards. Any areas under renovation should be provided with an electrical room per wing per floor for distribution equipment. New emergency/life safety electrical system to provide power in case of utility power failure. This system to include a new natural gas generator, associated transfer switches as required by code, and distribution panels necessary to deliver power where needed. This system will power life safety lighting, the fire alarm system, security system, sewage ejector, sump pump, kitchen refrigeration for food, DC Net, and the clock system. The standby system shall be designed to meet the requirements for separation of systems required by NEC 2014, to ensure that life safety, legally required, and optional standby loads are fed from separate transfer switches as required.
    a. Option A will require 100kW/125kVA generator.
    b. Option C and C1 will require a 120kW/150kVA generator.
3. New energy efficient LED light fixtures, with a modern lighting control system able to control light fixtures based on occupancy, time of day, daylight, and space functionality/flexibility. The system should also meet all applicable energy codes mentioned above.
    a. Additionally, a building wide lighting control system can be provided to tie into the BMS to allow full head end control from a central location in the school, or can be tied in to a central DCPS control system.
4. A new complete, addressable fire alarm system should be installed to meet NFPA 72 and D.C. codes, with the possibility of the FACP being re-used upon evaluation.
5. New special systems should be installed to replace the clock, telephone, and sound system with modern technology systems. The DC Net system should be re-used if it meets the school's needs after the expansion programming has been determined

JOHN EATON ELEMENTARY SCHOOL MODERNIZATION FEASIBILITY ASSESSMENT
District of Columbia Public Schools

DESIGN SCHEMES



JOHN EATON ELEMENTARY SCHOOL MODERNIZATION FEASIBILITY ASSESSMENT
District of Columbia Public Schools

SCHEME A

SCHEME A

PRELIMINARY STORMWATER MANAGEMENT CALCULATIONS AND NARRATIVE

DOEE will consider scenario A2 to be a substantial renovation of the existing school with additional exterior land disturbance. The required stormwater retention volume (SWRV) is calculated below.

For the building
(21,670 SF) x (0.95 Impervious runoff coefficient) x (0.8 in / 12 in/ft) = 1,370 CF

Site disturbance is estimated to be about 31,700 SF practically all of which is impervious. Thus,
(31,700 SF) x (0.95 Impervious runoff coefficient) x (1.2 in / 12 in/ft) = 3,010 CF

The total SWRV required is thus about 4,380 CF.

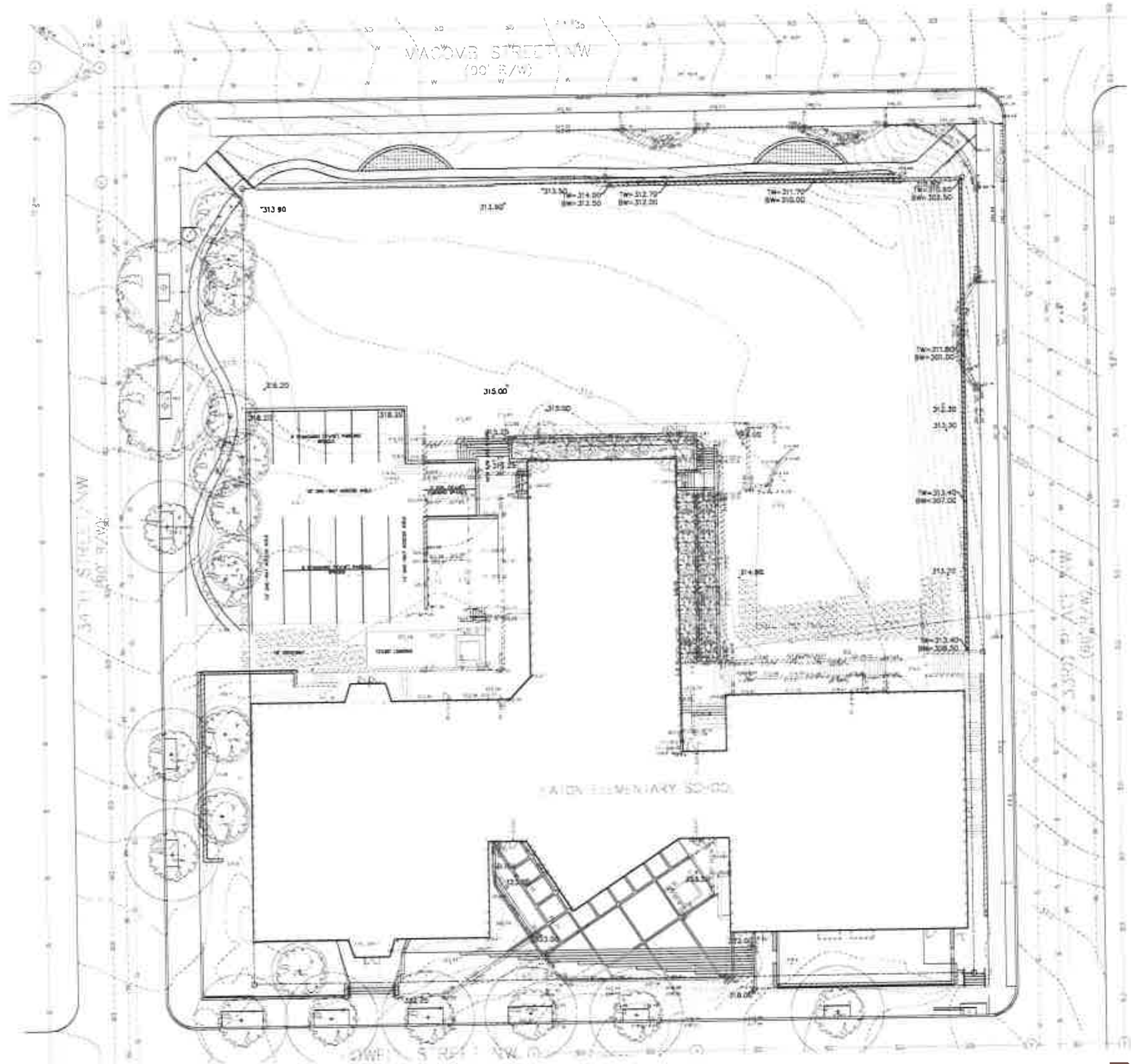
The new plaza pavement is assumed to be constructed in such a way as to not disturb the subgrade, and so is exempt from stormwater management requirements.

Due to the approximate nature of the topographic information currently available, it is not possible to depict detailed drainage areas. Nonetheless, Huska Consulting believes the SWRV could be met with one or a combination of the following strategies:

A light-weight, extensive (4" depth max.) green roof could be placed on much of the existing school despite the sloped (gabled) nature of much of the roof. Huska Consulting assumes no more than perhaps 15,000 SF of the roof could be converted to green roof. If sized to retain the 1.7" storm event, this would yield about 2,000 CF.

Bioretention facilities could be placed at the perimeters of the north playground and sports field. Huska estimates the drainage area in the northern play areas could be sufficient to meet the SWRV requirements, especially if a trench drain is placed east of the small children's play area along the existing retaining wall. A typical bioretention cross section could be 1' of gravel, 3' of soil media, 3" of mulch, and 18" of ponding depth. With this cross section in mind and conservatively assuming the in situ soils do not percolate, the total square footage of bioretention needed to meet the requirements for the entire site would be about 2,760 SF. Note, this would likely require some portion of the building to be conveyed to the bioretention facilities.

A rainwater cistern could be installed inside the school building. The primary demand of the cistern would be to flush toilets. The source of the cistern would be from runoff from the school's roof and possibly the northern play areas, as well. Preliminary calculations suggest the cistern would be about 40,000 gallons.



SCHEME A CIVIL DESIGN

Scope
Scheme A will involve repurposing of existing building spaces within the current building footprint to achieve the architectural program requirements and does not include expansion. There is no change to the building envelop.

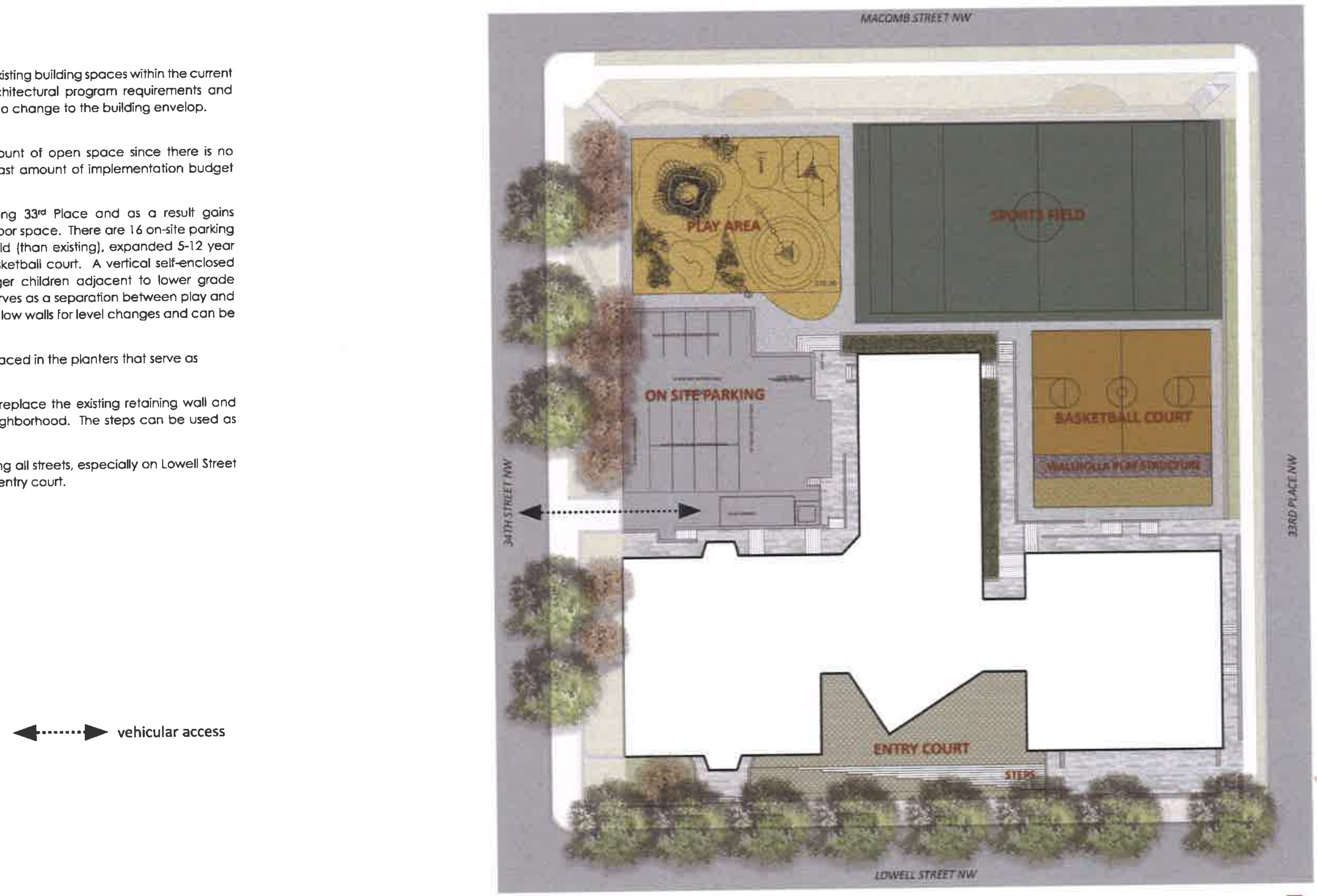
Discussion
This scheme leaves the greatest amount of open space since there is no building expansion. It requires the least amount of implementation budget and shortest time for completion.

It involves a new retaining wall along 33rd Place and as a result gains approximately 3,000 sf of usable outdoor space. There are 16 on-site parking spaces. There is expanded sports field (than existing), expanded 5-12 year play area (than existing) and full basketball court. A vertical self-enclosed play structure is designed for younger children adjacent to lower grade classrooms. The play structure also serves as a separation between play and ball court. There are broad steps and low walls for level changes and can be used as seating.

Medium to small trees or shrubs are placed in the planters that serve as grade separation.

In the front entry court, broad steps replace the existing retaining wall and open the school entrance to the neighborhood. The steps can be used as casual outdoor seating.

There will be street trees planting along all streets, especially on Lowell Street to provide shade to the south facing entry court.



SCHEME A LANDSCAPE DESIGN

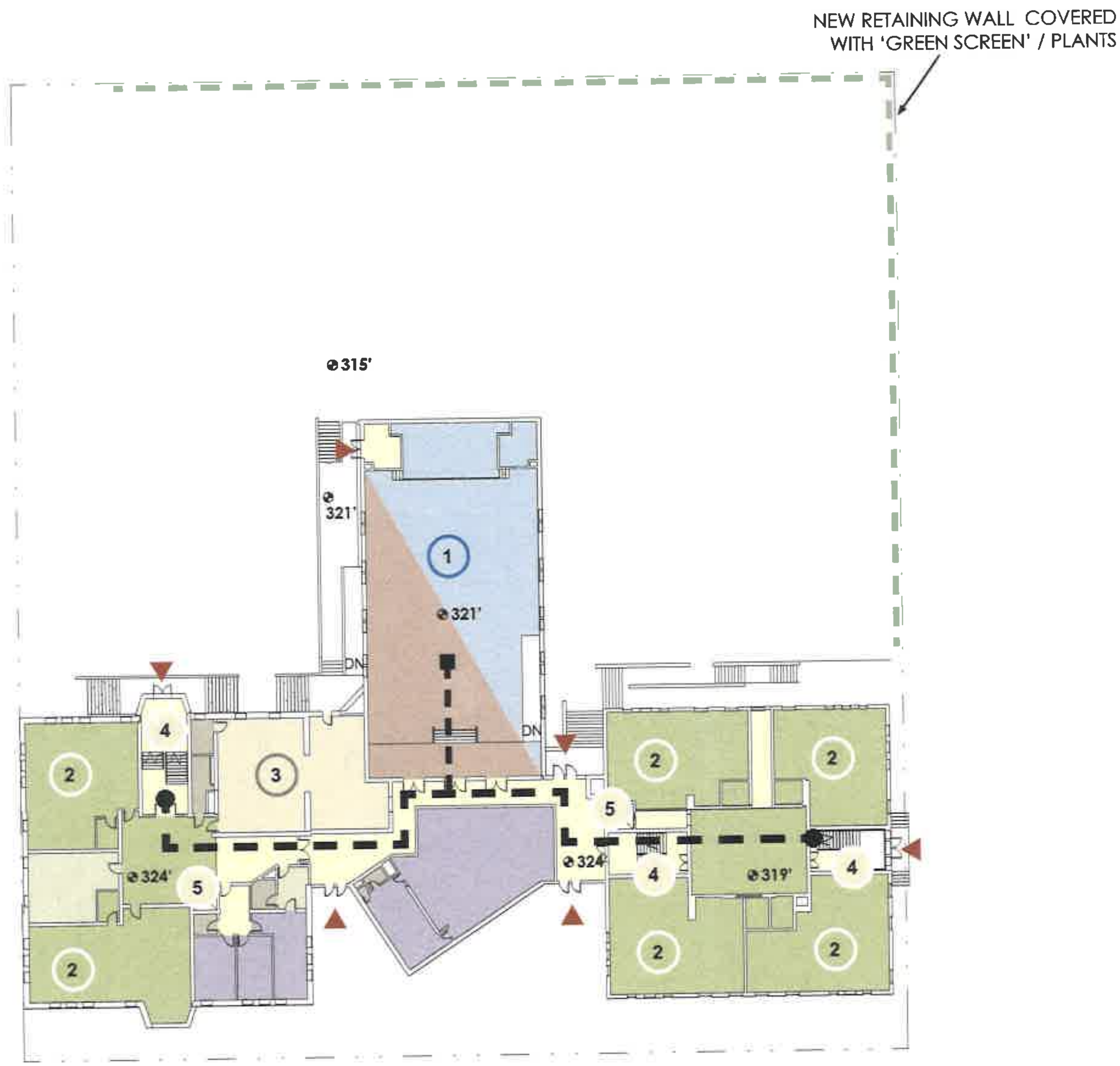
LANDSCAPE STEPS AT ENTRY PLAZA

PLAY AREA

GREEN SCREEN RETAINING WALL

WALHOLLA PLAY STRUCTURE

EQUIPMENT



NOTE KEY

#	Program Element
1	MULTIPURPOSE ROOM
2	PRE-K - 1ST GR CLASSROOM
3	KITCHEN
4	STAIR
5	ELEVATOR

- academic area
- academic support area
- administrative
- dining
- kitchen
- library / media center
- physical education
- circulation

- main circulation
- secondary circulation
- building entry

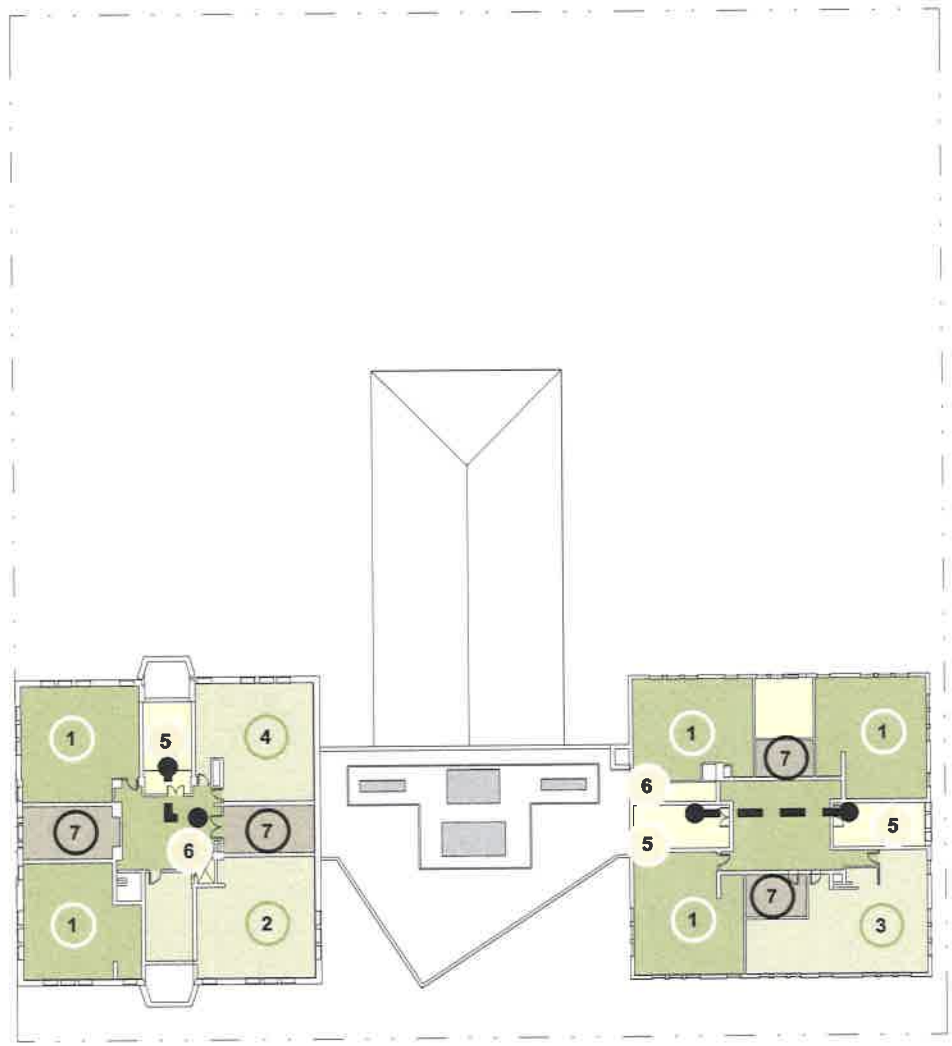
SCHEME A
FIRST FLOOR

SCHEME A
SECOND FLOOR

NOTE KEY

#	Program Element
1	LIBRARY
2	PRE-K - 1ST GR CLASSROOM
3	2ND - 5TH GRADE CLASSROOM
4	STAIR
5	ELEVATOR
6	TOILET

- academic area
- academic support area
- administrative
- dining
- kitchen
- library / media center
- physical education
- circulation
- main circulation
- secondary circulation
- building entry



NOTE KEY

#	Program Element
1	2ND - 5TH GRADE CLASSROOM
2	MUSIC
3	ART
4	SCIENCE
5	STAIR
6	ELEVATOR
7	TOILET

- new mechanical equipment
- academic area
- academic support area
- administrative
- dining
- kitchen
- library / media center
- physical education
- circulation

- main circulation
- secondary circulation
- building entry

N

0 8 16 32

SCHEME A
THIRD FLOOR