PATRICK HENRY SCHOOL
FEASIBILITY STUDY - APPENDIX
MAY **6**, 2015

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WJE | ENGINEERS ARCHITECTS MATERIALS SCIENTISTS

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DRAFT

Via US Mail and Email: (Bill Conkey <billc@sorgarchitects.com>)

9 March 2015

Bill Conkey, AIA
Sorg Architects
918 U Street NW
Washington DC 20001

Re: Patrick Henry Elementary School
Limited Building Enclosure Evaluation
WJE No. 2014.6716

Dear Mr. Conkey:

Wiss, Janney, Elstner Associates, Inc. (WJE) is pleased to provide the following report to Sorg Architects (Song) for the limited evaluation of the building enclosures of Patrick Henry Elementary School located in Alexandria, Virginia. This report includes our visual observations pertaining to the building enclosure, our recommendations for future repair and maintenance, and our opinions of probable life expectancy of the conditions of the building envelope observed.

DISCLAIMER

Our observations were limited to exposed and accessible exterior wall and roof elements which were visible from grade, roofs, and selected interior locations. They did not include examination of concealed wall elements. Also, our inspection was not an investigation to determine the cause or causes of problems that were discovered or may be occurring at the building. As a result, our recommendations may also include further investigation of existing conditions where appropriate.

PROJECT BACKGROUND

Patrick Henry Elementary School (PHES) was constructed in 1953 and serves students in grades Pre-Kindergarten through fifth grades in the City of Alexandria, Virginia. A total of eight modular classroom units were added around 2011. The Patrick Henry Recreation Center (PHRC) constructed in 1973 with a major addition in 1990 is attached to the western end of PHES and contains a gymnasium facility as well as offices, kitchen, and multi-purpose rooms. The original PHES is roughly H-Shaped in plan with a wing extending on the west elevation to which the PHRC is attached. The additional modular classrooms are located between the two southern wings of the H-Shaped building.

The facade of the original PHES facility is comprised of brick masonry, exterior insulation finish system (EIFS), and stucco with aluminum ribbon windows. The roof of PHES appears to be a single-ply Polyvinyl Chloride (PVC) roof membrane and several skylights are present along the low slope roof areas (along hallways). The PHRC is comprised of brick masonry veneer with an ethylene propylene diene monomer (EPDM) ballasted roof. The facade of the modular class rooms is comprised of open-jointed formed metal panels, and corrugated metal panels installed as an apparent rain screen system, as well as thin brick masonry veneer precast panels along the base of the walls. The roof of the modular class rooms is a thermo-set roof membrane. The library has a standing seam metal roof.

The Alexandria City Public Schools (ACPS) is in the planning stages of an expansion to the facility that currently houses PHES and the attached PHRC as well as the athletic fields. The expansion project, referred to as the Patrick Henry Capacity Project, is intended to increase classrooms and core spaces to meet the current and future demands of the City of Alexandria. The expansion project also includes an assessment of the current facilities, exterior improvements including the expansion of parking spaces, modifying existing roadways and sidewalks, and landscaping. In accordance with the ACPS, the project is broken into two major phases; the first phase is the planning and feasibility assessment and study which includes the development of multiple concepts for design of the project. The second phase will commence after the City's review and approval of the first phase and its selection of a design concept.

To assist Song in the development of the Phase I of the ACPS, Song has requested that WJE perform an evaluation of the building envelope, which includes the above grade walls and roofs, in order to identify areas of moisture and air infiltration, determine the current condition of all assemblies in order to provide an expected life expectancy, and identify any deficient conditions visible in the building envelope. It is our understanding that Song intents to use the building envelope evaluation as part of their overall evaluation of the current buildings, aiding in the development of a master plan which will compare demolition of the existing building and construction of new facilities with renovation and construction of an addition to the existing facilities.

OBSERVATIONS

On February 4, 2015; Messrs. Frederick Peters, and Joel Hackett of WJE visited the site to evaluate the building enclosure of both PHES and PHRC. Observations were made from the ground, roofs, interior rooms, and the interior common areas as noted. The purpose of our visual survey was to identify deficient conditions that we believe will warrant repair, maintenance, or other corrective action over the next 10 years. Notable conditions observed during our site visit are summarized below which are divided into separate sections for the PHES and PHRC.

Patrick Henry Elementary School

Enclosure of Original Building

- The exposed parged concrete foundation are in fair condition with isolated cracking (see Figure 1). The mortar joint between the foundation and the brick masonry is deteriorated and mortar is missing in several locations (see Figure 2).
- The below-grade waterproofing membrane is exposed in several locations on the south and east elevations and is in poor condition due to exposure and impact (see Figure 3). In two locations the membrane has debonded from the masonry wall. The below-grade waterproofing appears to have been removed during the installation of sidewalks which are poured tight to the face of the masonry without capability for expansion (see Figure 4).
- The brick masonry facade from grade to the bottom of the ribbon windows on all elevations is in generally good condition with some minor cracking through the masonry and mortar joints (see Figure 5 and 6). The brick masonry infill below the ribbon windows on the east and south elevations at locations

of apparent abandoned vents or mechanical units is in good conditions; however, an improperly colored and possibly incorrect type of mortar was used (see Figure 7).

- The rowlock course of masonry supporting the ribbon windows is in poor condition with missing masonry units, significant spalling, cracking and mortar loss (see Figure 8 and 9). In several locations, brick masonry and mortar of the rowlock course have been replaced (see Figure 10). The mortar joint between the brick masonry wall and the rowlock course is significantly deteriorated and has vegetative growth in isolated locations (see Figure 11).
- The brick masonry piers between the doorways on the south elevation are in generally good condition with minor cracking on the top five courses (see Figure 12).
- The break metal closure installed at building expansion joints is in generally good condition; however, it is not air/water tight at horizontal seams and the perimeter sealant between the ribbon windows and/or brick masonry is in poor condition (see Figure 13).
- Corrosion is present on the exposed conduits which run along the metal fascia panels (see Figure 14). In two locations the conduit is not connected, exposing the wiring (see Figure 15).
- The plastic light protecting covers are in poor condition, are typically discolored and cracked and broken in isolated locations (see Figure 16).
- The metal panel fascia panels are in generally fair condition; however, several open vertical seams are present (see Figure 17). In isolated locations sections of the metal panel fascia have been replaced (see Figure 18). Galvanized nails secure the metal panels and are exposed and do not appear to be sealed (see Figure 19). At isolated locations the metal panel fascia is loose and dislodged and/or bowed outward (see Figure 20). The perimeter sealant and step flashing at the intersection of the metal panel fascia and adjacent facade elements is in poor condition (see Figure 21). A coating applied to metal base flashing of the fascia panels has failed on the south elevation (see Figure 22).
- The stucco between the ribbon windows and metal panel fascia panels on the south elevation is in serviceable condition with minor cracking at control joints (see Figure 23).
- The aluminum ribbon windows, including the window frames and glazing are in serviceable condition (see Figure 24). The glazing gaskets are in generally good condition with minimal shrinkage. The perimeter sealant between window frame components at operable units as well as between the window frames and adjacent facade elements is in poor condition (see Figure 25 and 26). The aluminum subsill pan flashing does not contain end dams at its termination at the structural columns which allows air/moisture to migrate behind the metal column closures (see Figure 27).
- The ribbon windows are installed between the structural steel columns which occur every nine feet. The structural columns are enclosed by a brake metal closure flashing which is intended to be sealed to the aluminum window jamb frame with two sided butyl tape. The butyl tape securing the metal column closures has failed and the closures are not well adhered (see Figure 28). Perimeter sealant is present in several locations between the ribbon window frame and the column closure which is in poor condition (see Figure 29). In several locations the column closure are dislodged exposing the steel columns and interior finishes (see Figure 30). In one location the column closure is missing (see Figure 31). The column closures are not water or air tight and allow significant moisture to migrate to the interior spaces resulting in interior damage of finishes as well as corrosion of the steel columns (see Figure 32). This condition is compounded by the lack of end dams on the subsill flashing which allows moisture to migrate around the column closure.
- In several locations including along the east elevation the fascia metal panel extends over the head track of the ribbon window preventing observation of the transitional detailing of the ribbon window (see Figure 33).

- The metal panel canopy over the main entrance is in generally good condition. The termination of the canopy roof membrane on the brick masonry is deteriorated (see Figure 34). The sealant between the metal panels of the canopy and the adjacent brick masonry is in poor condition.
- The aluminum downspouts are in generally poor condition and in several locations are detached from the wall. Sections of the downspout are missing, particular the lower segments (see Figure 35).
- The aluminum storefront at the main entrance is in serviceable condition and the doors appear to be properly functioning (see Figure 36).
- The double and single entry doors are in serviceable condition and the doors properly function (see Figure 37). The weather stripping is in fair condition. The perimeter sealant between the metal door frame and the brick masonry is in poor condition (see Figure 38).
- Corrosion is present on the exposed areas of the steel lintels at the window openings, above louver and doorways on the north elevation at the service entrance (see Figure 39).
- The mortar around the louvers is in poor condition and is typically missing along the steel lintel (see Figure 40).
- At two locations the upper lite of glass of the ribbon window is cracked (see Figure 41).
- Aluminum punched windows are set into individual openings at isolated locations of the connecting segments of the wings connecting classroom. The aluminum window frames and glazing are in serviceable condition (see Figure 42). The perimeter sealant between the aluminum window frame and the brick masonry is in fair condition with minor adhesive failure (see Figure 43). The steel lintel above the window has been painted and has minimal corrosion (see Figure 44). Previous repairs to the mortar joints and brick masonry are present above the punched windows to address apparent cracking.
- Abandoned electrical boxes and penetrations in the brick masonry have not been appropriately patched/repaired (see Figure 45).
- The EIFS over the ribbon windows on the north and east elevation is in serviceable condition with minor cracking at corners as well as minor spalls along the base above the ribbon windows (see Figure 46). The cracking at the corners is likely the result of thermal stress as no provisions for expansion are present. The metal fascia panels above the EIFS extend over the top of the EIFS and the transitional detailing cannot be observed. The reinforcement mesh is visible along the base of the EIFS and no top coat is present. The perimeter sealant between the head track of the ribbon window and the base of the EIFS is applied to the reinforcing mesh and has adhesively failed (see Figure 47). The steel column at the outside and inside corner of the buildings have been painted and the EIFS is installed tight to the column (see Figure 48). The EIFS has separated from the column and is not air/water tight (see Figure 49). The top of the column is open and does not appear to be air/water tight (see Figure 50).

Enclosure of Newer Modular Classroom Additions

- The open-jointed formed metal panel and corrugated metal panels installed on the majority of the exterior walls of the modular units is in generally good condition (see Figure 51). This system appears to be an apparent rain screen system as it is not wet glazed and the joints are open. Dry set gaskets within the metal panels system are in good condition.
- Thin brick masonry veneer which appears to be integral to precast wall segments at the base of the units as well as full height adjacent to the existing building is in generally good condition (see Figure 52).
- Pressure treated wood retaining walls are constructed around the base of the units and are filled with crushed stone to provide drainage. This system appears to be in generally good condition (see Figure 53).

- Protection board is visible in areas with the wood retaining walls. The protection board is in generally good condition; however, in several locations it appears that the board was damaged with lawn equipment and this has exposed the waterproofing (see Figure 54). In one location, the waterproofing was damaged exposing the concrete foundation.
- The metal base flashing, copings and metal panels installed at expansion joints at the intersection of the original building are in good condition.
- The aluminum window set into individual punched window openings are in generally good condition.

Enclosure of Patrick Henry Recreation Center

- The brick masonry facade is in serviceable condition with minor cracking and spalling except at the top three courses of the parapet which is in poor condition (see Figure 55). The rowlock course of masonry along the top of the parapet wall is in poor condition and is spalled and several masonry units are missing (see Figure 56). The mortar is in fair condition, except at the top ten courses in which it is in poor condition (see Figure 57). The masonry adjacent to the northern entry doors appears to be replaced as it does not match in color or profile (see Figure 58). Cracks through the masonry are typically present at the ends of lintels for entrances, above the EIFS and at louvers (see Figure 59 and 60).
- The masonry is stained with apparent asphaltic membrane runoff along the parapet (see Figure 61).
- The concrete through-wall scuppers are in fair condition and are typically cracked with minor spalling (see Figure 62). The coating has also failed.
- In several locations, the masonry is spalled at the attachment of signs, conduits and lighting (see Figure 63).
- The conduits running to the lights are heavily corroded and have dislodged from the masonry in several areas (see Figure 64).
- The sealant installed in the masonry expansion joint is in generally good condition with minor deterioration and adhesive failure at isolated locations (see Figure 65).
- The concrete canopies over the entranceways are in poor condition and are cracked and spalled (see Figure 66 and 67). Evidence of water infiltration through the concrete canopy is present on the soffit.
- The metal emergency doors are in fair condition and are dented and damaged (see Figure 68).
- The steel lintel at the projected parapet is heavily corroded (see Figure 69).
- The downspouts are in poor condition and are corroded and missing segments, particularly at the bottom (see Figure 70). The brick masonry is in poor condition at missing sections of downspout which contributes a significant amount water to the masonry.
- The EIFS between the ribbon windows and the brick masonry on the north elevation is in serviceable condition with minor cracking and spalling along the base above the ribbon windows (see Figure 71). The perimeters sealant between the head track of the ribbon window and the base of the EIFS is in poor condition (see Figure 72). The EIFS is installed tight to the concrete columns and is sealed with a sealant joint which is in poor condition (see Figure 73).
- The aluminum ribbon windows, including the window frames and glazing are in serviceable condition. The glazing gaskets are in generally good condition with minimal shrinkage. The perimeter sealant between window frame components at operable units as well as between the window frames and adjacent facade elements is in poor condition.

Interior

WJE discussed the performance and maintenance of the building with a representative from building facilities. The intent of our discussion was to gain an understanding of current and past issues with regard to the building envelop including air and water infiltration. Under the direction of the facility representative who provided access to the classroom and other areas, Messrs. Hackett and Peters reviewed all accessible areas which were not in use at the time of our inspection. Our inspection was performed after student dismissal; however, many after school activities were in progress which we were instructed not to interrupt.

Notable conditions in the interior include the following:

- A crack is present in the hallway leading to the library at the intersection of the newer and original building (see Figure 74).
- Several people interviewed indicated significant air infiltration into the hallways around the entrance doors. Air infiltration was detected at or around the ribbon window and entrance door assemblies in the original building which occur at three locations. At one location no seal is present between the aluminum subsill pan of the ribbon window assembly and brick masonry and daylight is visible (see Figure 75). In the other two areas, the perimeter sealant of the ribbon and entrance door assembly is in poor condition
- Several people interviewed indicated significant air infiltration along the ribbon windows at various locations throughout the original building. Several people reported that the blinds move during windy days. The interior sealant applied between the ribbon window frame and adjacent finishes is in generally poor condition (see Figure 76).
- No mechanical units or ventilation is provided in the hallways which relays on the mechanical systems in the classroom to condition the environment.
- Significant uncontrolled water leakage is present at several locations in the cafeteria, library, and throughout the recreation center (see Figure 77 through 78). In these locations the roof is low sloped. The water leakage in all three locations is typically along the perimeter of the walls, at transitions in building/roof height and around mechanical equipment. We could not gain access to the auditorium which also has a low sloped roof.
- Evidence of uncontrolled water leakage is present in 14 classrooms in the original building (see Figure 79).
- No evidence of uncontrolled water leakage is present in the newer modular classroom; however, three areas of water leakage are present in the hallways.
- Evidence of uncontrolled water leakage is present at six locations in the hallways which typically occurs at or adjacent to the skylights (see Figure 80). A newer drop ceiling is installed over top of the original ceiling tiles which makes precise identification of the leak source difficult.
- Damage to the interior finishes is typically present at the sill of the ribbon windows, particularly at or adjacent to the structural columns (see Figure 81).

Patrick Henry School Roof

The fully adhered thermo-plastic fully reinforced single-ply roof membrane assembly on the original building is in serviceable condition on the sloped section and fair condition on the low slope areas. The majority of uncontrolled water infiltration identified during our interior survey as documented above occurs on the low sloped areas of the roof or at transitions in the roof membrane. The base flashing are in generally poor condition, have been poorly installed and are not fully adhered to the parapet walls. The drains are corroded and obstructed by debris in insolated locations but appear to be functional. WJE was not able to walk on the sloped areas of roofs as adequate safety equipment was not immediately available and observations were made from adjacent low-sloped roof areas. WJE did not have access to the modular addition roof and all observations were made from the adjacent low roofs. The addition roof assembly appeared to be a single-ply thermo-set membrane in serviceable condition.

Notable conditions of the single-ply roof membrane include the following:

- Wrinkles are present throughout the field of the single-ply roof membrane on both the sloped and low-sloped areas; however, the membrane is largely well adhered (see Figure 82). The seams in the field of the roof are generally fully adhered and a probe could not be easily inserted (see Figure 83). Edge sealant is inconsistently applied at both vertical and horizontal seams. Where applied, the edge sealant is in generally poor condition (see Figure 84).
- Patches and previous repairs are typical on both the sloped and low-sloped roofs (see Figure 85). In several locations the patches are of different material than the single-ply roof membrane and appear to be a mixture of thermo-set and thermo-plastic products (see Figure 86). Several patches are poorly applied and are not fully adhered. Sealant is inconsistently applied to the perimeter of the patches (see Figure 87).
- In isolated locations, the single-ply roof membrane is deteriorated along the seams and the woven fabric reinforcement is exposed (see Figure 88).
- The termination of single-ply membrane with a termination bar and sealant at the intersection with the masonry parapet was poorly installed and is in generally poor condition. Several different sealants are applied between the termination bar and the masonry as well as between the bar and the roof membrane (see Figure 89).
- The single-ply roof membrane is not fully adhered on the sloped roof segment connecting the recreation center to the elementary school (see Figure 90).
- A significant bulge and adjacent depression in the roof membrane is present at the peak of the northwestern most section of sloped roofing adjacent to the recreation center low roof (see Figure 91).
- The termination sealant typically applied from the top of the mechanically fastened termination bar to the brick masonry has failed adhesively and cohesively (see Figure 92).
- Several mechanical conduits appear to have been installed following the application of the roof. The conduits are detailed with pitch pockets which are poorly applied and are in generally poor condition (see Figure 93 and 94). The patch membrane installed around the conduit penetration are typically are not the same as the single-ply roof membrane and are in poor condition.
- In mechanical vent stacks which penetrate the roof are heavy corroded. The single-ply membrane is booted around the vents and terminated with a band clamp and sealant in accordance with NRCA guidelines; however, the previous roofing membrane was not removed from the vents prior to the installation of the current roof membrane (see Figure 95). This installation does not appear to be water tight.
- The mechanical ventilation shafts are corroded. The single-ply roof membrane extends up the built-up curb supporting the unit and is terminated with a mechanically fastened termination bar and sealant. The termination sealant is poorly applied and in poor condition and as a result the base of the shaft is not fully sealed to the roof membrane (see Figure 96). Pin holes were observed at isolated locations in the target patches at the corner of the curb (see Figure 97).
- The metal C channel supports which support conduits are attached through the single-ply roof membrane on the interior face of the parapet with bolts which are inconsistently sealed (see Figure 98).

- The base flashings are in generally poor condition and are typically not fully adhered to the parapet walls (see Figure 99). The vertical seams in the base flashing are inconsistently sealed with termination sealant. The vertical seams were roughly cut and do not appear to have a consistent overlap (see Figure 100). In several locations on the low-sloped roof areas, in locations in which the base flashing extends the full height of the parapet wall and is installed to either multiple parapet wall profiles or irregular profiles it is typically un-adhered (see Figure 101).
- The coated metal coping to which the single-ply roof membrane is terminated on the sloped roof areas is dislodged and does not appear to be water tight in several locations (see Figure 102). The application of sealant at the seams in the metal coping is inconsistent through the roof.
- The termination sealant along the termination of the single-ply roof membrane to the coated metal coping on the sloped roof areas is inconsistently applied, in poor condition and is missing in isolated locations (see Figure 103).
- Skylights manufactured by Wasco are present in the low-sloped roof areas along the hallways to provide natural light. The skylights are installed on a built-up curb on which the single-ply roofing membrane is turned up and terminated on top of the curb. The skylight metal frame wraps over the top of the curb and is typically sealed to the single-ply roofing. The sealant between the skylight glass and the metal flashing as well as between the metal flashing and the roofing is in poor condition (see Figure 104). Several of the skylights are badly scratched and discolored (see Figure 105). The outer plastic cover was broken in one location (see Figure 106). In several locations the single-ply roofing does not extend to the top of the curb and is not engaged by the termination bar (see Figure 107). At one location the termination bar for the roof membrane is mounted to the metal counter-flashing of the skylight and is not in contact with the single-ply roofing (see Figure 108).
- The exposed brick masonry on the interior of the parapet walls is in generally fair condition with cracking typical at or adjacent to the attachment of structural elements supporting mechanical equipment (see Figure 109 and 110). The mortar is also in fair condition and has bond line failure and minor mortar loss in isolated locations.
- Standing water is present on the low sloped areas of the roof, primarily above the hallways, around mechanical equipment and along the exterior perimeter of the low sloped areas (see Figure 111).
- Debris is present in the low sloped areas, primarily in the recessed areas above the hallways (see Figure 112).
- The roof access hatch is in poor condition and the weather seals have failed (see Figure 113). The access hatch is not fully sealed to the single-ply roofing.
- Aluminum gutters are present along the interior parapet at several sections of sloped roofing. The gutters do not have downspouts and drain through the holes in the gutters intended for the downspouts. In one location, an older aluminum gutter was not removed and the new gutter installed over top of the older gutter (see Figure 114).
- In one location a conduit penetrates the single-ply roofing which is not detailed to the roof membrane or installed into a pitch pocket (see Figure 115). It does not appear that this installation is water tight.
- The EIFS installed on the interior of the parapet appeared to be in good condition with minor cracking and spalling (see Figure 116).
- The single-ply thermo-set membrane roof on the classroom additions appeared to be in serviceable condition. Pounding water is present along the east and west edges of the roof (see Figure 117).
- The standing seam panels installed on the steep-sloped sections of the library roof is in good condition.

- At one location a section of metal panel fascia is dislodged from the building, exposing the wood blocking (see Figure 118).
- The masonry chimneys are in fair conditions with minor cracking and mortar loss (see Figure 119). The concrete chimney cap is in poor condition and several spalled sections are on the roof membrane below (see Figure 120).

Patrick Henry Recreation Center Roof

The roof of the PHRC is an ethylene propylene diene monomer (EPDM) single-ply roof membrane covered with ballast. The ballast is intended to provide the weight required to prevent window uplift as the membrane is not adhered. The EPDM roof membrane is in poor condition and is nearing the end of its useful service life. WJE could not access the high roof over the gymnasium as the access ladder was not safe to use.

Notable conditions of the EPDM roof membrane include the following:

- The EPDM membrane is deteriorated, particularly at the exposed areas at curbs, transitions, separating curbs and at the base flashing (see Figure 121).
- The EPDM roof overlaps the single-ply thermo-plastic roof membrane on the connecting building segment and is poorly sealed. Several layers of sealant are present which appear to be attempts to address water infiltration (see Figure 122).
- The painted steel coping along the lower low-slope roof section is heavy corroded and the coating has failed (see Figure 123). The sealant at the seams in the coping has also failed.
- The termination sealant at the patches and seams in the EPDM membrane is in generally poor condition and additional sealant has been applied in several locations (see Figure 124).
- The base flashings are secured to the brick masonry with a mechanically fastened termination bar and sealant which is in poor condition (see Figure 125). The base flashing is not fully adhered in several locations.
- EPDM membrane is installed into a gutter which runs the length of the low roof. The membrane is not fully adhered and several voids and fish-mouths are present (see Figure 126).
- The brick masonry on the interior of the parapet is in poor condition. The mortar joints are deteriorated and open joints are present (see Figure 127). In several locations bricks are displaced and/or missing from the rowlock course of the masonry at the top of the parapet wall.
- The single-ply thermo-plastic roof membrane on the low roof over the multi-purpose room attached to the recreation center is in poor condition and is nearing the end of its service life (see Figure 128).

RECOMMENDATIONS

Based on our visual observations and our experience with similar projects, we recommend the following actions be taken to correct the conditions observed at the PHES and PHRC. Refer to Table 1 for the prioritization of these repairs and anticipated life expectancy.

Patrick Henry Elementary School

Enclosure of Original Building

- Perform repair to all cracked and spalled concrete parging. Repoint mortar joint at top of the foundation to brick masonry.

- Repair damaged areas of below grade waterproofing to reestablish continuous waterproofing. Install new protection board over exposed below-grade waterproofing. Perform investigation of condition of below-grade waterproofing in location in which it appears to have been removed or modified to ensure that continuous waterproofing is maintained.
- Perform minor brick repair including rout-and-pointing and crack repair in accordance with BIA requirements. Cracks in stable masonry units should be routed and pointed with a mortar matching the existing. Remove and replace displaced and/or unstable units in kind. Repoint areas of deteriorated mortar. Remove existing mortar to a depth of 3/4 inch and then install a new compatible mortar.
- Remove and replace all damaged, spalled, loose or cracked brick at the rowlock course of masonry supporting the ribbon windows in kind. Repoint all head and bead joints for the rowlock course of masonry. Repoint areas of deteriorated mortar. Remove existing mortar to a depth of 3/4 inch and then install a new compatible mortar. Perform in conjunction with sealant replacement at the perimeter of the ribbon windows.
- Perform investigation to determine if the brake metal closure installed at building expansion joints is air/water tight at seams and transitions. Replace all sealant at seams and the perimeter sealant between the ribbon windows and/or brick masonry. Prepare substrates and use backing materials and joint profiles to optimize service life and sealant adhesion.
- Repair broken and/or unconnected sections and replace heavily corroded sections of the conduit. Remove and replace any cracked or damaged light covers.
- Install new sealant at all vertical and horizontal seams, and at the intersection with adjacent facade elements in the metal panel fascia panels. Seal all fastener penetrations in the metal fascia panels. Prepare substrates and use backing materials and joint profiles to optimize service life and sealant adhesion. Reattach any displaced or missing section of metal fascia panels.
- Perform minor repairs to stucco to address cracking and spalling. Prepare crack and install reinforcing mesh and apply based coat followed by new top coat to match existing.
- Remove and install new perimeter sealant at window frame-to-frame joints as well as frame-to-masonry around the perimeter of the ribbon windows. Prepare substrates and use backing materials and joint profiles to optimize service life and sealant adhesion. Perform an investigation to determine the required remediation to install end dams at the termination of the aluminum subsill pan flashing. Perform in conjunction with remediation to column closure flashings.
- Perform destructive openings to determine the current detailing of the column closure flashing to the ribbon window as well as brick masonry. Remove all column closure flashing. Install new end dams for the aluminum subsill pan flashing of the adjacent ribbon windows. Apply corrosion inhibiting coating to the steel column and replace any deteriorated blocking along the structural steel column. Install water tight closure flashing along the jambs of the ribbon windows and at the masonry cavity to provide continuous waterproofing around the structural column prior to the reinstallation of new brake metal column enclosure flashing.
- Remove and install new perimeter sealant at the intersection of the canopy over the main entrance and the brick masonry. Prepare substrates and use backing materials and joint profiles to optimize service life and sealant adhesion.
- Remove all damaged or nonfunctional sections of aluminum downspouts and replace with new aluminum downspouts to match original size, profile and color. Extend all downspouts to grade and were possible connect with below-grade drainage pipes to control runoff.

- Remove and install new perimeter sealant between the metal door frames and the brick masonry. Prepare substrates and use backing materials and joint profiles to optimize service life and sealant adhesion.
- Clean and paint all corroded exposed areas of the steel lintels at the window openings, louvers and doorways. Apply corrosion inhibiting coating once substrate is prepared.
- Repoint areas of deteriorated mortar at the perimeter of the louvers. Remove existing mortar to a depth of 3/4 inch and then install a new compatible mortar.
- Replace any cracked or fogged glazing lites in kind.
- Remove and install new perimeter sealant between the aluminum punched windows and the brick masonry. Prepare substrates and use backing materials and joint profiles to optimize service life and sealant adhesion.
- Remove all abandon and non-functioning electrical boxes which penetrate the brick masonry. Replace damaged, cracking or displace brick masonry in kind.
- Perform minor repairs to EIFS on the exterior walls. Rout-and-seal cracks at control joints and corners in accordance with manufacturer's repair recommendations. Remove sealant between EIFS and head track of ribbon window and repair base of EIFS to provide base flashing. Remove sections of EIFS around exposed steel columns and install closure flashing to terminate EIFS. Install metal enclosure over columns which is integrated with EIFS closure flashing to provide air/water tight assembly. Install new sealant between the EIFS and brick masonry, ribbon windows and metal closure flashing at columns. Prepare substrates and use backing materials and joint profiles to optimize service life and sealant adhesion.

Enclosure of Newer Modular Classroom Additions

- Repair damaged or missing areas of protection board which extend above grade. Inspect exposed waterproofing to ensure it is not deteriorated and is continuous. Repair waterproofing in accordance with manufacturer's requirements to provide continuous waterproofing.

Enclosure of Patrick Henry Recreation Center

- Perform minor brick repair including rout-and-pointing and crack repair in accordance with BIA requirements. Cracks in stable masonry units should be routed and pointed with a mortar matching the existing. Remove and replace displaced and/or unstable units in kind. Repoint areas of deteriorated mortar. Remove existing mortar to a depth of 3/4 inch and then install a new compatible mortar.
- Remove and replace all damaged, spalled, loose or cracked brick at the rowlock course of masonry at the top of the parapet wall. Repoint all head and bead joints for the rowlock course of masonry as well as masonry on the parapet walls. Repoint areas of deteriorated mortar. Remove existing mortar to a depth of 3/4 inch and then install a new compatible mortar. Perform in conjunction with sealant replacement at the perimeter of the ribbon windows.
- Repair broken and/or unconnected sections and replace heavily corroded sections of the conduit. Remove and replace any cracked or damaged light covers.
- Remove and install new sealant masonry expansion joints. Prepare substrates and use backing materials and joint profiles to optimize service life and sealant adhesion.
- Perform repairs to concrete canopies. Remove spalled and deteriorated concrete and replace with new concrete to match the existing concrete. Rout-and-seal all cracks less than 1/8 inch wide. Apply elastomeric coating to all sides of the canopy once repairs are completed.

- Clean and paint all corroded exposed areas of the steel lintels at the window openings, louvers and doorways. Apply corrosion inhibiting coating once substrate is prepared.
- Remove all damaged or nonfunctional sections of aluminum downspouts and replace with new aluminum downspouts to match original size, profile and color. Extend all downspouts to grade and were possible connect with below-grade drainage pipes to control runoff.
- Perform minor repairs to EIFS on the exterior walls. Rout-and-seal cracks at control joints and corners in accordance with manufacturer's repair recommendations. Remove sealant between EIFS and head track of ribbon window and repair base of EIFS to provide base flashing. Install new sealant between the EIFS and brick masonry, ribbon windows and concrete columns. Prepare substrates and use backing materials and joint profiles to optimize service life and sealant adhesion.
- Remove and install new perimeter sealant at window frame-to-frame joints as well as frame-to-masonry around the perimeter of the ribbon windows. Prepare substrates and use backing materials and joint profiles to optimize service life and sealant adhesion.

Interior

- Preform an investigation to determine the source of cracking in the hallway leading to the library. Ensure that the soil is not subsiding and is stable.
- Remove and install new interior perimeter sealant at window frame-to-frame joints as well as frame-to-interior finish around the perimeter of the ribbon windows. Prepare substrates and use backing materials and joint profiles to optimize service life and sealant adhesion.
- Engaged a mechanical engineer to review the current HVAC system and determine if the system is properly balanced, sufficient ventilation is provided and the interior environment is maintained as intended.
- Address water infiltration through the roof assembly as discussed below.

Patrick Henry School Roof

The majority of the reported and observed water infiltration is occurring in the low-sloped areas of the main roof including over hallways, the cafeteria, boiler room, and auditorium. Evidence of water leakage in the classrooms is typically adjacent to vertical transitions, separation curbs, penetrations in the sloped section of roof and along the perimeter of the sloped roof areas in which the slope is minimal and pounding water is present. As the single-ply thermo-plastic reinforced roof membrane is nearing the end of its service life and as a result of extensive water infiltration reported and observed, consider removing and replacing the single-ply roof membrane in the low-slope areas, all base flashing and at vertical transitions and curbing. Due to the complexity of the roof layout a built-up multi-ply roof assembly should be considered. Additionally, perform investigation at all areas with evidence of, or reported water infiltration in the sloped roof areas and repair in accordance with manufacturer's recommendations. Consider complete roof replacement if the investigation reveals wide spread deficiencies within the sloped roof areas or if the water infiltration and intended roof performance cannot be achieved.

If complete roof replacement is not performed or will be performed at a future date the following is recommended:

- Inspect all previous patches and remove all poorly adhered patches as well as patches made of a different material than the single-ply thermo-plastic membrane. Install new edge sealant compatible with the single-ply roof membrane. Prepare substrate and prime as required to achieve optimal adhesion.

- Install target patches over all deteriorated areas in which the reinforcement mesh is exposed in the single-ply roof membrane.
- Remove all sealant along the termination of the base flashing along the termination bar and install new edge sealant between the termination bar and facade elements. Remove and reinstall the termination bar as required to achieve full compression on the single-ply roof membrane.
- Reestablish full adhesion of the single-ply roof membrane at all bulged, loose and adhered areas suspected of water infiltration.
- Inspect all mechanical conduits which penetrate the single-ply roof membrane to ensure that they are detailed in a water tight manner. Remove any poorly detailed roof membrane, pitch pockets and failed sealed. Install new single-ply roof membrane detailed in accordance with NRCA recommendations. Install new curbing as required to provide NRCA detailing at penetrations. Ensure that all conduits are of proper type and spacing and replace as required to achieve water tight penetration and comply with NRCA requirements. Remove and install new sealant around all repaired conduits.
- Remove all roof membrane on the mechanical vent stacks. Remove all corrosion and prepare the vent stacks to allow for installation of new single-ply roof membrane detailed in accordance with NRCA recommendations. Install new single-ply membrane boot around cleaned vent stacks and terminate with new band clamp and sealant.
- Inspect the single-ply membrane roofing, termination bar and sealant at the base of the mechanical ventilation shafts. Remove and reinstall the single-ply roofing membrane in location in which it does not extend to the top of the curb. Ensure that the termination bar provides compression on the single-ply membrane and remove and reinstall as required. Remove the edge sealant on the termination bar and install new compatible edge sealant. Ensure that the target patches at the base of the mechanical curb are fully adhered and sealed. Remove all poorly adhered patches as well as patches made of a different material than the single-ply thermo-plastic membrane. Install new edge sealant compatible with the single-ply roof membrane. Prepare substrate and prime as required to achieve optimal adhesion.
- Remove all unsealed fasteners for the metal C channels that support conduits, back-seal the hole in the single-ply membrane and reinstall fastener. Remove all C channels which are not in use and patch all holes in the single-ply membrane in accordance with the manufacture's requirements.
- Replace all vertical base flashing which are deteriorated, poorly adhered or damaged. Install new single-ply membrane fully adhered to prepared substrate in accordance with the manufacture's requirements. Ensure required overlap between the new and existing membrane is achieved. Install edge sealant along the vertical seams. Install termination bar along the top termination of the base flashing. In locations were on the low-sloped roof areas, the base flashing extends the full height of the parapet wall and is installed to either multiple parapet wall profiles or irregular profiles install additional termination bar to provide compression and secure the membrane in locations in which the membrane changes profile from vertical to horizontal.
- Inspect all seams in the coated metal coping and reattach any displaced sections of coping. Ensure that the coping is secured to the parapet. Remove all existing sealant at seams and transitions and install new sealant. Prepare substrate and prime as required to achieve optimal adhesion
- Remove the skylight in their entirety. Remove existing single-ply membrane which is poorly applied, does not extend the full height of the curb or it deteriorated. Install new single-ply membrane which extends onto the top of the curb. Install new termination bar at the top of the curb to secure the membrane. Reinstall the skylight over the remediated single-ply roofing and bed seal the metal frame to the single- ply membrane on top of the curb. Install new sealant joint between skylight frame and

single-ply membrane at the termination bar to provide water tight installation. Remove and replace all sealant within the skylight assembly. Replace broken or scratched outer plastic covers.

- Address all areas of standing water which last longer than 48 hours following a rain event. Install additional slope in insulation or membrane as required to prevent pounding.
- Remove all debris from the low-sloped areas of the roof and at all drains.
- Repair the gaskets in the roof access hatch. Replace the handle for the access hatch.
- Remove double gutter assemblies and provide single gutter with downspouts that extend to the drains.
- Perform visual inspection of the single-ply thermo-set membrane roof on the classroom additions. Address all areas of standing water which last longer than 48 hours following a rain event. Install additional slope in insulation or membrane as required to prevent pounding.
- Perform visual inspection of the standing seam panels installed on the steep-sloped sections of the library to determine the source of the water infiltration occurring. Repair standing seam roof as required to provide water tight assembly as intended.
- Perform minor brick repair including rout-and-pointing and crack repair in accordance with BIA requirements to the chimneys. Cracks in stable masonry units should be routed and pointed with a mortar matching the existing. Remove and replace displaced and/or unstable units in kind. Repoint areas of deteriorated mortar. Remove existing mortar to a depth of 3/4 inch and then install a new compatible mortar. Replace the concrete chimney cap with new concrete cap to match existing profile.

Patrick Henry Recreation Center Roof

The ethylene propylene diene monomer (EPDM) single-ply roof membrane covered with ballast roof on the PHRC is nearing the end of its service life. The visible areas of the membrane are deteriorated and in poor condition, the field of the membrane cannot be observed without removal of the ballast. Due to the age of the membrane and number of reported and observed water leaks the roof assembly should be replaced with a new built-up roof assembly or fully adhered single-ply assembly. Un-adhered EPDM membrane roofs are difficult to determine the source of water infiltration as once water penetrates the membrane it is free to migrate laterally below. The expense of performing water penetration testing and removal of ballast makes repairs impractical. The adjacent single-ply low sloped roof over the multi-purpose room should also be replaced in kind as it is nearing the end of its service life.

As part of the roof replacement the following notable conditions should be addressed:

- The heavily corroded painted steel coping along the lower low-slope roof section should be removed and replaced with a stainless steel or aluminum coping.
- The gutter which runs the length of the low roof and collects all water from the higher roofs should be abandon and other means of drain for each roof be provided. Either scuppers which extend through the parapet wall or internal drain lines should be provided.
- Perform brick repair including rout-and-pointing and crack repair in accordance with BIA requirements. Cracks in stable masonry units should be routed and pointed with a mortar matching the existing. Remove and replace displaced and/or unstable units in kind. Repoint areas of deteriorated mortar. Remove existing mortar to a depth of 3/4 inch and then install a new compatible mortar. Remove and replace all damaged, spalled, loose or cracked brick at the rowlock course of masonry at the top of the parapet wall.

OPINION OF ANTICIPATED LIFE

Table 1 contains our opinions of the anticipated life expectancy of major facade elements as well as assigning a priority for the recommendations outlined above. The table also categorizes each recommendation as follows:

- *Life Safety:* Conditions that require immediate attention to limit risk to building occupants or pedestrians.
- *Repair and Maintenance:* Conditions that require repair or maintenance to limit further deterioration or deterioration of other systems that would result from deferring maintenance.
- *Optional Improvement:* Conditions that are recommended to improve occupancy comfort or increase service life, or reduce future maintenance.

The table assigns an urgency rating to each repair required for the building envelop component identified as well as the corresponding anticipated life expectancy of that component provided that the repairs are performed in the timeframe provided.

If you have any other questions, or if we can be of any further assistance, please do not hesitate to contact us. Thank you for the opportunity to work with you on this challenging project.

Very truly yours,

WISS, JANNEY, ELSTNER ASSOCIATES, INC

Fred W Peters

Frederick Peters, P.E.
Senior Associate

Attachments
Appendix A – Figures
Appendix B – Table of Probable Cost

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Patrick Henry

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Structural Condition Assessment

Prepared For:
Sorg Architects

918 U Street NW
Washington, DC 20001

April 20, 2015

Prepared By:
Keast & Hood
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Table of Contents

1.0 Executive Summary

In an effort to facilitate the planning and feasibility for the expansion and/or renovation of Patrick Henry School Elementary School, Keast & Hood (K&H) performed a structural assessment and condition assessment survey.

A site visit was conducted of Patrick Henry Elementary School by K&H engineers Matthew Daw and Laura Burke Tuesday, 9 December 2015.

The recommendations and comments herein are based on K&H's visual observations during site assessment and the professional judgment and experience of K&H engineers. The review was focused upon overall structural condition of the building as obtained through visual observation. The following documents Keast & Hood's site investigation and lists recommendations to address noted areas of concern.

An additional section has been added to address the following three (3) potential Master Plan concepts:

1. Concept 1: New Building Option 1
2. Concept 2: New Building Option 2
3. Concept 3: Renovation and Addition

2.0 General Overview and Purpose of Assessment

In order to proceed with the planning and feasibility for the expansion and/or renovation of Patrick Henry Elementary School a structural analysis was requested. The elementary school is located at 4643 Taney Ave in Alexandria, Virginia.

In an effort to facilitate the development of the Master Plan Concepts Keast & Hood (K&H) was retained by Sorg Architects to perform the following tasks:

- Structural condition assessment survey related to the existing structure's capacity to accommodate renovation and expansion.
- Provide outline of geotechnical requirements to assist geotechnical project engineer in developing recommendations for the project, and
- Establish structural design criteria and identify structural requirements to further develop the three (3) master plan concepts.

3.0 Existing Documentation

K&H reviewed the following documents and reports in part or in their entirety:

1. Original base building drawings by Joseph H. Saunders, AIA and associated design team dated 01 November 1952.
2. Addition to Patrick Henry School Construction drawings by Joseph H. Saunders and associated design team dated 25 February 1955, and
3. ACPS Modular Classroom Addition Construction Drawings by Maginniss+Del Ninno Architects and associated design team dated 04 March 2011.

Please reference Section 5.0 for commentary on existing structure.

4.0 Description of Assessment Methods

Matthew J. Daw (Principal) and Laura Burke (Structural Designer) from Keast & Hood visited Patrick Henry Elementary School to conduct a site visit and structural condition assessment of the existing building condition and its surrounding area on Tuesday, 9 December 2015.

K&H Engineers performed a self-guided interior and exterior assessment of all buildings encompassed by Patrick Henry Elementary School.

When visible, the building's structural system was observed for signs of distress, impaired structural integrity, and other non-structural related concerns. Where the building's structural system was covered by finishes, K&H examined finishes for evidence of distress.

Exploratory probe work (removal of finishes at select locations) was not conducted at this time.

Photographs were taken with a digital camera to record existing conditions and areas of concern; binoculars were utilized to obtain a closer perspective, where needed; and descriptive information was recorded in field notes for the buildings encompassed by Patrick Henry Elementary School. No materials were removed for testing.

A description of noted areas of concern with photographs and recommendations is presented in Section 6.0 of this report.

5.0 General Description and Discussion of Building Structure

Originally established in 1925 to replace Alexandria's first public school, Patrick Henry has seen 2 major renovations since the current building's original conception in 1952.

Today, Patrick Henry Elementary School is currently home to over 20 different nationalities.

Figure 1 illustrates the individual buildings that encompass Patrick Henry Elementary School.

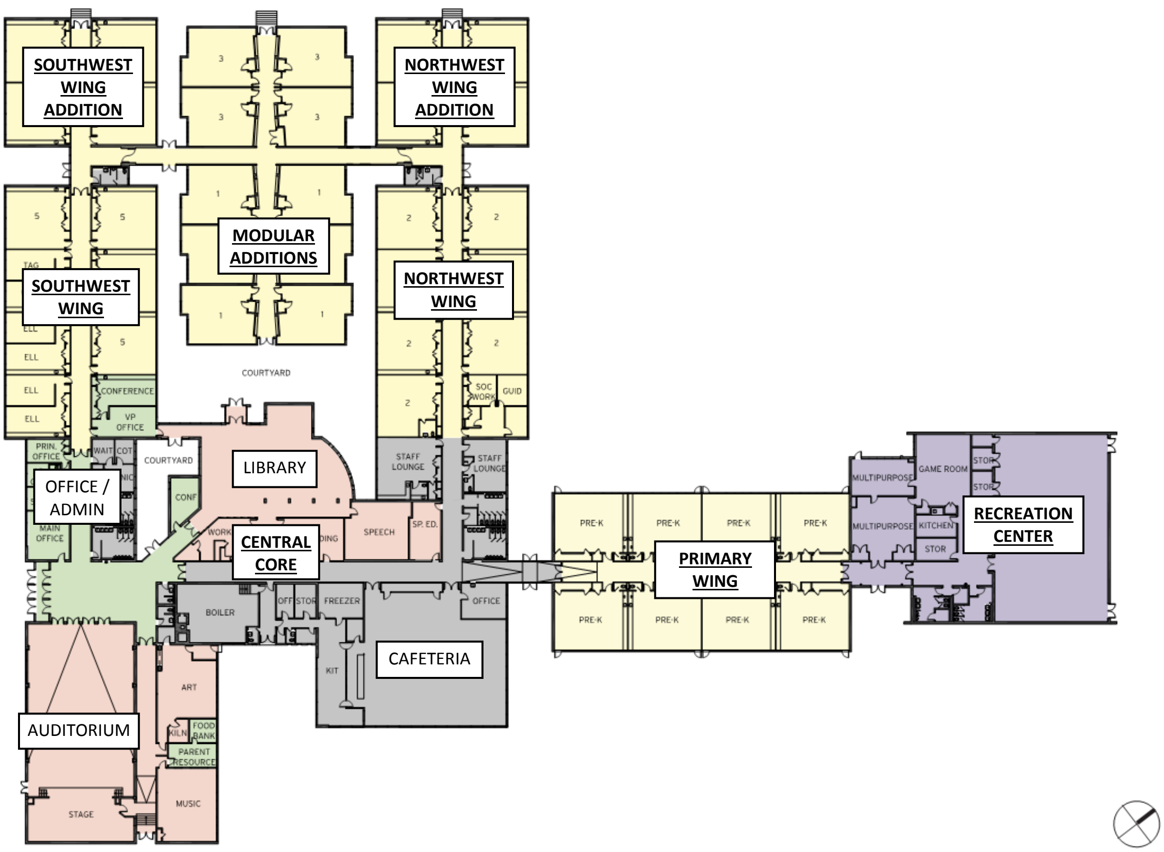

Figure 1: Patrick Henry existing building layout (Sorg Architects).

Building Construction Properties by Phase

Original 1952 Building

The following properties were obtained from item 1 noted in Section 3.0. The properties apply to the Primary Wing, Central Wing, Northwest Wing and Southwest Wing.

- Concrete Compressive Strength
  - 2500 psi for reinforced structure
  - 2000 psi for slabs on grade, wall footings, and column footings
- Live Load
  - Roof = 35 psf
  - Classrooms = 70 psf
  - Stage = 100 psf
- Soil Bearing Pressure
  - 6000 psf

1955 Building Northwest and Southwest Wing Additions

The following properties were obtained from item 2 noted in Section 3.0.

- Concrete Compressive Strength
  - 2500 psi for reinforced structure
  - 2000 psi for slabs on grade, wall footings, and column footings
- Live Load
  - Roof = 35 psf
  - Classrooms = 70 psf
  - Stage = 100 psf
- Soil Bearing Pressure
  - 6000 psf

2011 Modular Additions

The following properties were obtained from item 3 noted in Section 3.0.

- Concrete Compressive Strength
  - 3500 psi for slabs on grade and slabs on metal deck
  - 3000 psi for footings, piers, and walls.
- Loading
  - Snow Ground Load (pg) = 25 psf
  - Lateral Load - Wind
    - Wind Speed = 90 mph
    - Wind Importance Factor = 1.15

        - Wind Exposure Category = B
    - Lateral Load – Seismic
        - Seismic Importance Factor = 1.25
        - Short Period Spectral Acceleration = 0.16
        - (1) Second Period Spectral Acceleration = 0.053
        - Seismic Use Group = III
        - Seismic Design Category = B
        - Site Classification = D
        - Response Modification Factor = 1.5
        - Deflection Amplification Factor = 1.25
        - Seismic Base Shear = 20 kips
    - Live Load
        - Slab on Grade = 100 psf
        - Classrooms = 40 psf
        - Corridor = 80 psf
        - Roof = 30 psf
- Soil Bearing Pressure
    - 2000 psf for footings on undisturbed soil or controlled structural fill

Recreational Center

Original base building drawings were not available for review.

Primary Wing

The existing Primary Wing is a single story building with structural framing consisting of two rows of sloped steel joists spanning approximately 27'-6" between steel wide flange beams. The wide flange beams are supported on exterior steel columns at the perimeter of the building and interior steel columns at the corridor. The corridor roof is framed with wide flange beams and angles spanning approximately 15'-0". Exterior steel columns are supported on a continuous wall footing around the building perimeter. Interior steel columns are supported on individual spread footings.

CMU infill walls are present to laterally brace the gravity loaded brick masonry exterior façade.

Central Core

The central core area encompasses the auditorium, cafeteria, and main corridor. The auditorium has a clear floor to ceiling height of approximately 18 feet. The existing structural framing is similar in concept to the Primary Wing with sloped steel joists spanning between steel wide flange beams. The wide flange beams are supported on exterior columns and interior columns.

A single exposed column is provided in the center of cafeteria to provide structural support for the roof members. The concept helps to reduce the structural depth necessary to accommodate the 64'-9" x 64'-9" open cafeteria space.

Steel joists support the auditorium roof load and span between exterior masonry bearing walls and wide flange steel beams. The wide flange steel beams span 50'-0" across the width of the auditorium in order to facilitate the open auditorium space below. The ide flange beams are spaced approximately 10'-10 3/8" on center and are supported by steel columns. The auditorium perimeter walls are concrete masonry block units (CMU) supporting brick masonry façade.

Additional support of the select steel roof framing is provided by masonry bearing walls, both interior and exterior supported on continuous wall footing.

CMU infill walls are present to laterally brace the gravity loaded brick masonry exterior façade.

Exterior steel columns are supported on a continuous wall footing around the building perimeter. Interior steel columns are supported on individual spread footings. The auditorium steel columns are supported on individual spread footings. A continuous wall footing is located around the auditorium perimeter between each column footing.

Northwest & South West Wings

The existing Northwest and Southwest Wing buildings are framed similar to the Primary Wing with of two rows of sloped steel joists spanning approximately 28'-4" between steel wide flange beams. The wide flange beams are supported on exterior steel columns at the perimeter of the building and interior steel columns at the corridor. The corridor roof is framed with wide flange beams and steel angles spanning approximately 12'-4". Exterior steel columns are supported on a continuous wall footing around the building perimeter. Interior steel columns are supported on individual spread footings.

CMU infill walls are present to laterally brace the gravity loaded brick masonry exterior façade.

The intermediate wing between the classrooms and the central core consists of steel joists spanning 19'-2" between exterior masonry bearing walls and interior masonry corridor bearing walls. The corridor roof is framed with steel joists spanning approximately 9'-0". All CMU bearing walls are supported on continuous wall footings.

Northwest & South West Wing Additions

The existing Northwest and South West Additions are framed similar to the Northwest and South West Wing buildings with two rows of sloped steel joists spanning approximately 27'-6" between steel wide flange beams. The wide flange beams are supported on exterior steel columns at the perimeter of the building and interior steel columns at the corridor. The corridor roof is framed with wide flange beams and steel angles spanning approximately 13'-0". Exterior steel columns are supported on a continuous wall footing around the building perimeter. Interior steel columns are supported on individual spread footings.

CMU infill walls are present to laterally brace the gravity loaded brick masonry exterior façade.

2011 Modular Addition

The modular addition consists of 1-story prefabricated system. The foundations were designed as a continuous wall footing around the building perimeter with intermediate spread footings supporting concrete piers. Similarly the interior of the building foundation plan has regularly spaced piers supported on individual spread footings.

Perimeter concrete piers appear to have been designed to support columns from the modular framing prefabricated system. Concrete piers in line with the modular framing corridor appear to be designed to receive interior columns supporting roof loads.

Existing Recreational Facility

Original base building drawings for the Recreational Facility were not available for K&H's review.

However from our observations, the roof is likely framed with steel joists spanning between exterior perimeter masonry bearing walls. Steel columns may be encased within the masonry bearing walls to provide additional support.

6.0 Discussion of Observations and Recommendations for Repairs

The following highlights areas of notable concern observed during Keast & Hood's structural investigation and condition assessment:

- Section 6.1 – Exterior Observations
- Section 6.2 – Interior Distress

6.1 – Exterior Observations

6.1.1 – Structural Steel

Figure 2: Deterioration of MEP roof top steel.

Figure 3: Deterioration of exposed structural steel col.

Figure 4: Step Cracking in mortar joint below exposed column (see Figure 5).

Observations:

Deterioration of the MEP rooftop steel over the Northwest and Southwest Wing additions is pictured in Figure 2.

Figure 3 depicts deterioration of an exposed structural steel column (typical 3 locations observed). The exposure may have or may lead to moisture accumulation at the base of the column causing further deterioration.

Step cracking observed in Figure 4 may indicate moisture accumulation at base of exposed steel column, corrosion and additional deterioration of structural support.

Recommendations:

All steel members displaying signs of rust and distress shall be wire brushed clean to bare metal. Steel shall be re-primed and coated with an appropriate exterior grade rust-inhibitive coating. Supplemental structural work to either reinforce or replace the deteriorated framing may be required If cleaning reveals significant steel delamination.

Where step cracking is visible a probe is recommended to investigate the integrity of the structural back-up system. Following review of the structural backup system, repair of the cracks to restore the integrity of the building envelop is recommended. Repair should consist of securing the brick to the backup structure using supplemental masonry ties, installing horizontal reinforcement across the cracks and grout injection (where necessary). Broken bricks should be replaced


Figure 5: Exposed structural steel column @ Cafeteria.

with bricks to match the existing condition. A mortar analysis is recommended to determine the appropriate color and strength of repair mortar.

6.1.2 – Moisture Issues at Concrete Canopies at Gym Exits

Figure 6:Efflorescence staining at Gym Canopy

Figure 7: South Gym Canopy Condition

Observations:

Efflorescence staining and deterioration of the existing concrete canopies were apparent at the north elevation exists of Recreational Building.

Moisture staining is also visible at the interface of the existing brick façade and exterior concrete canopies.

Recommendations:

K&H recommends the evaluation of existing reinforcing for signs of excessive rusting. Existing canopies be sounded to detect potential areas of delamination. Partial or full depth repairs utilizing an appropriate concrete patching mortar containing a rust inhibitor are recommended at areas exhibiting deteriorated concrete. Alternatively the existing canopy structures may be removed and replaces if necessary with an alternative modern canopy system.

Furthermore, the use of gutters or other runoff collection systems may be employed to reduce the amount of staining at the interface of the existing brick façade and the exterior canopy structures.

6.1.3 – Site Grading and Drainage Issues

Figure 8: Negative Drainage & Exposed Foundation Wall.

Figure 9: Pooling of drainage at modular foundation walls (clogged)

Figure 10: Lack of connection to foundation drainage system.

Observations:

Negative drainage slope was observed around the entire building perimeter thereby allowing runoff to be diverted towards building exterior walls.

Exposed concrete foundations walls were observed at numerous locations around the building perimeter (Figure 8).

Figure 9 illustrates pooling water from a downspout directly against the foundation walls of the modular addition. This condition was noted around the perimeter of the modular addition.

Figure 10, 11, 12 and 13 illustrate inadequate downspout termination above grade (no connection to the foundation drain system) thereby allowing runoff to accumulate and sit at building exterior walls. Significant moisture staining and biological growth is evident indicating consistent moisture in Figure 10.

Figures 14 and 15 picture moisture staining of the exterior brick façade. The staining is due in part to inadequate or missing gutter runoff control systems above. In some instances the roof overhangs are insufficient to cover the projection of the brick sill courses below windows. Furthermore no flashing is apparent at skyward facing mortar joints.

Recommendations:

K&H recommends the site be regraded to raise the elevation above existing foundation walls and provide positive drainage, away from the building

.
Figure 11: Inadequate attachment to foundation drain.

Figure 12: Lack of attachment to foundation drain system.

perimeter.

In addition K&H recommends that the working capacity of the existing foundation drain system be evaluated. All downspouts shall be connected to the foundation drain or oriented such that runoff is directed way from the building perimeter.

Installation of flashing to protect all skyward facing mortar joints is recommended where joints are exposed runoff at window sills and similar locations.


Figure 13: Lack of attachment to foundation drain system.


Figure 14: Moisture staining of brick.


Figure 15: Moisture staining of brick

6.1.4 – Deteriorated Concrete Retaining Wall

Figure 16: Deteriorated Concrete Retaining Wall.

Observations:

Concrete deterioration was apparent at the concrete retaining wall pictured in Figure 16. Efflorescence staining is apparent along with significant out of plane movement.

In addition the anchorage of the blue railing post appears to be insufficient.

Recommendations:

K&H recommends removal of the existing retaining structure and replacement with structure sized to appropriately resist soil and applicable surcharge loading.

6.1.5 – Inadequate Flashing Detail

Figure 17: Deteriorated Flashing at Bldg Return.

Observations:

An inadequate flashing detail was observed at the northwest corner of the cafeteria exterior wall.

Recommendations:

K&H recommends the detail be revised and repaired.

6.1.6 – Open Mortar Joints

Figure 18: Cracking at lintel steel lintel bearing.

Figure 19: Open mortar joints.

Observations:

Settlement cracking (Figure 18) was observed at the bearing of the brick relief angle over the auditorium windows. If a joint in the masonry is not provided at this location, the brick will naturally settle and mortar joints may crack and open due to the high load concentration at the lintel bearing.

Figure 19 depicts open mortar joints beneath the masonry sill course and window above. The condition is common around the building perimeter.

Recommendations:

K&H recommends repair of all exterior cracks and open mortar joints to restore the integrity of the building envelope. Crack repair should consist of full-depth repointing with an appropriate repair mortar or grout injection, based on observed extent and depth of cracking.

6.1.7 – Perimeter Sealant Issues

Figure 20: Open joints at windows.

Observations:

Open sealant joints at the exterior windows were observed at numerous locations around the building perimeter.

Recommendations:

K&H recommends all open joints be repaired in order to reestablish the building envelope.

6.1.8 – Unventilated Crawl Spaces

Figure 21: Unventilated crawl space.

Observations:

The crawl spaces for the Northwest and Southwest Wing Additions were observed to be unventilated.

Unventilated crawl space traps moisture and may lead to deterioration of the structural elements.

Recommendations:

K&H recommends the installation of vented louvers to provide a means of passive ventilation within existing crawl spaces.

6.2 – Interior Distress

6.2.1 –Moisture Distress

Figure 22: Plaster cracking at window.

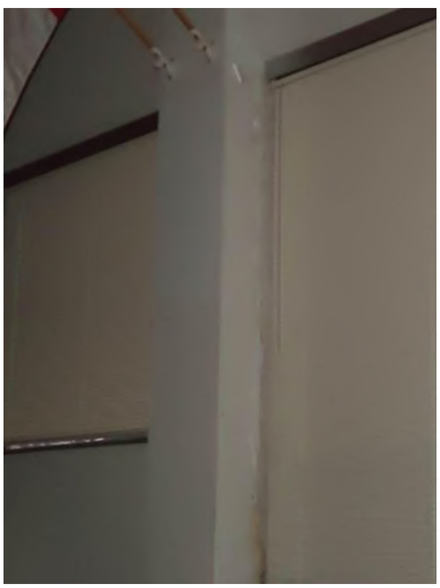

Figure 23: Signs of moisture infiltration at Auditorium Column.

Observations:

Existing moisture infiltration issues were noted throughout the building interior survey most primarily located around building windows.

Recommendations:

K&H recommends all brick masonry joints be repointed as noted in Item 6.1.6 – Open Mortar Joints in addition to the repair of all open joints around windows as noted in Item 6.1.7 – Perimeter Sealant Issues.

Repair of the cosmetic elements including pealing pain may be conducted at the discretion of the owner.

7.0 Master Plan

As part of the Master Plan concept, K&H has teamed with Sorg Architects to present the pro's and cons of three potential concepts in addition to design of a recreational building:

1. Concept 1: New Building Option 1
2. Concept 2: New Building Option 2
3. Concept 3: Renovation & Addition
4. New Recreational Building (part of Concepts 1, 2, and 3).

The following briefly discusses the structural implications for each of the above options in addition to the new recreational building.

Referenced Building Codes and Prescribed Load Criteria

- 2004 Commonwealth of Virginia Construction and Professional Service Manual (CPSM)
- 2012 Virginia Uniform State Wide Building Code (VUSBC)
- 2012 Virginia Construction Code (VCC)
- 2012 International Building Code (IBC)
- ASCE7-10, Minimum Design Loads for Buildings and Other Structures
- ACI 318-11, Building Code Requirements for Structural Steel
- AISC 360-10, Specification for Structural steel Buildings, American Institute of Steel Construction
- ACI 530-11, Building Code Requirements and Specification for Masonry Structures

The following values are specified by the applicable codes and standards or are higher values selected for use on this project:

- Structural Live Loads: The following preliminary values are minimum requirements specified by the applicable codes and standards or are higher values selected for use on this project (psf = pounds per square foot). Design of all floor areas for a minimum 100 psf live load may be considered for maximum future flexibility.

Occupancy or Use	Uniform Live Load
Classrooms	40 psf (+15 psf partition)
Labs	60 psf (+15 psf partition)
Offices	50 psf (+15 psf partition)
Libraries (stack rooms)	150 psf
Libraries (reading rooms)	60 psf
Mechanical Space (see note)	150 psf estimated (at ground and roof)
Storage	125 psf

Lobbies	100 psf
Corridors on first floor	100 psf
Corridors on upper floors	80 psf (or same as occupancy served)
Stairs	100 psf
Roof (snow)	30 psf minimum + snow drift

Note: All loading conditions due to mechanical equipment will be confirmed with mechanical engineer during the course of design coordination.

- Floor live load deflection shall be limited to 1/360 of span length.
- Roof deflection for unoccupied space shall be limited to 1/240 of the span length.
- Green roof deflection for unoccupied space shall be limited to 1/360 of the span length.
- Spandrel beam deflection shall be limited to 1/600 of the span length or 0.3 inches where masonry cladding is supported.
- Deflection of CMU or metal stud backing shall be limited to 1/720 of the vertical span length (or 1/200 * veneer thickness) where appropriate).
- Lateral building displacement due to wind loads shall be limited to h/400.
- Lateral building displacement due to seismic loads shall be limited to requirements as set per ASCE 7, depending on the selected lateral system(s).
- Floor vibrations due to walking or rhythmic excitation will be evaluated for the proposed program requirements in accordance with the provisions in AISC's Design Guide 11, Floor Vibrations Due to Human Activity.
- Wind Design Criteria:
  Exposure C
  Occupancy Category = III
  Wind Importance Factor (I) = 1.00
  Basic Wind Speed (V) = 120 mph
- Seismic Design Criteria:
  Site Classification D (per geotechnical report)
  Seismic Use Group III
  Seismic Importance Factor (I) = 1.25
  Short Period Spectral Response Acceleration Value (S_s) = 0.15g
  1-Second Period Spectral Response Acceleration Value (S_1) = 0.06g
  Response Modification Factor (R) = 3.5 (Ordinary Steel Moment Frames) or
  (R) = 3.25 (Ordinary Steel Concentrically Braced Frames)

Concept 1: New Building Option 1

Foundations:

- Per the geotechnical report foundations shall be shallow isolated column spread footings and continuous wall footings with an allowable 4,000 psf allowable bearing capacity. The foundations shall be set a minimum of 2.5 feet below top of existing grade for frost protection.

- The ground floor slab for new additions will likely be a 5+ inch slab on grade (SOG).

Superstructure:

- The primary structural system will consist of structural steel columns supported on shallow spread footing foundations. Steel wide-flange girders will span between steel columns to create a grid of structural bays. Where possible the structural framing will follow classroom and corridor building layout in order to locate columns within interior building walls.

- The elevated second and third floor structures will consist of a 2 ½+" normal-weight concrete slab over 2" 20GA metal deck (assumed total depth of 4+") spanning between open-web steel joists spaced at an approximate 5'-0" on center and spanning the length of each classroom across each classroom. The vibration performance of the above noted open-web steel joists is a concern and will be evaluated further. Welded wire mesh will be used to reinforce the concrete slab with supplemental rebar reinforcing.

- The depth of the elevated floor structures may change based on floor occupancy, vibration and acoustical requirements.

- For a building of construction type IIA, a one-hour fire rating will be required for all structural superstructure framing, likely with sprayed-on fire-proofing. The slab on metal deck was selected to allow for a 1-hour fire rating without requiring sprayed-on fire-proofing, per UL-D916.

- The roof structure consist of a 2+" normal-weight concrete slab over 1-1/2" 20GA metal deck (assumed total depth of 3½+") spanning between 20+" open-web steel joists spaced at 5' on center and spanning from exterior to the corridor. The above noted design will increase to support an intensive green roof with 18" soil depth (if desired). Additional structural steel wide-flange beams will be required at the roof to support mechanical units and other architectural elements such as solar chimneys and skylights.

- In order to accommodate the open geometry and proposed window framing between structural steel framing, the lateral system may consist of structural steel Braced Frames or Moment Frames.

1. Braced Frames:
    - Cons:
        - Diagonal braces between columns may visually extend through open glass extents at exterior and interior walls.
    - Pros:
        - Reduced size of structural steel framing (weight)
        - Connections are less expensive and labor intensive as compared to moment frame connections.
2. Moment Frames:
    - Cons:
        - Column and beam framing sizes are significantly heavier per linear foot than required for braced frames. Often increase required depth of ceiling structure.
        - Connections are more expensive and labor intensive.
    - Pros:
        - Allows for large extents of visually uninterrupted glass extents at exterior and interior walls.

Moment and 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.

<u>Site Exterior Slab/Stair/Ramp:</u>

<u>Non-Structural Elements:</u>

- Exterior walls are expected to consist of cold-formed steel (metal Stud) framing with large extents of glass.
- Solar Chimneys
- New mechanical units are expected to be located ?
- Intensive vs Extensive Green Roof
- Solar Screens
    - Thermal Isolation breaks shall be provided by utilizing bolted connections and a product similar to Fabreeka's Thermal Insulation Material.
- Brick Cladding

Concept 2: New Building Option 2

The structural system will be similar as noted for Option 1.

The primary difference between Option 1 and Option 2 new construction will be location and configuration of the structural columns and beams. Where possible the structural framing will follow classroom and corridor building layout in order to locate columns within interior building walls.

Concept 3: Renovation & Addition

Foundations:

- Per the geotechnical report foundations shall be shallow isolated column spread footings and continuous wall footings with an allowable 4,000 psf allowable bearing capacity. The foundations shall be set a minimum of 2.5 feet below top of existing grade for frost protection.

- Per further structural analysis and design, where the existing building is to remain 1-story in height, existing foundations may be structurally sufficient to support proposed renovations. However, new shallow foundations will be required at the current modular classrooms and the southwest wing floor level additions.

- New shallow foundations will be required at the modular classroom infill and the southwest wing floor level additions

- The ground floor slab for new additions will likely be a 5+ inch slab on grade (SOG).

Superstructure:

- Where existing building structures are to remain, new framing may be required. New framing may include but is not limited to the following locations:
    1. Penetrations through or elimination of masonry bearing walls,
    2. Roof penetrations including skylight and MEP, and
    3. Elimination of existing structural steel framing such as columns in order to create larger clear spans.

- The primary structural system for the new southwest wing renovation and modular classroom infill will consist of structural steel columns supported on shallow spread footing foundations. Steel wide-flange girders will span between steel columns to create a grid of structural bays.

- The elevated second and third floor structures will consist of a 2 ½+" normal-weight concrete slab over 2" 20GA metal deck (assumed total depth of 4+") spanning between open-web steel joists spaced at an approximate 5'-0" on center and spanning the length of each classroom across each classroom. The vibration performance of the above noted open-web steel joists is a concern and will be evaluated further. Welded wire mesh will be used to reinforce the concrete slab with supplemental rebar reinforcing.

- The depth of the elevated floor structures may change based on floor occupancy, vibration and acoustical requirements.

- For a building of construction type IIA, a one-hour fire rating will be required for all structural superstructure framing, likely with sprayed-on fire-proofing. The slab on metal deck was selected to allow for a 1-hour fire rating without requiring sprayed-on fire-proofing, per UL-D916.

- The roof structure consist of a 2+" normal-weight concrete slab over 1-1/2" 20GA metal deck (assumed total depth of 3½+") spanning between 20+" open-web steel joists spaced at 5' on center and spanning from exterior to the corridor. The above noted design will increase to support an intensive green roof with 18" soil depth (if desired). Additional structural steel wide-flange beams will be required at the roof to support mechanical units and other architectural elements such as solar chimneys and skylights.

- In order to accommodate the open geometry and proposed window framing between structural steel framing, the lateral system may consist of structural steel Braced Frames or Moment Frames.

    1. Braced Frames:
        - Cons:
            - Diagonal braces between columns may visually extend through open glass extents at exterior and interior walls.
        - Pros:
            - Reduced size of structural steel framing (weight)
            - Connections are less expensive and labor intensive as compared to moment frame connections.
    2. Moment Frames:
        - Cons:
            - Column and beam framing sizes are significantly heavier per linear foot than required for braced frames. Often increase required depth of ceiling structure.
            - Connections are more expensive and labor intensive.
        - Pros:
            - Allows for large extents of visually uninterrupted glass extents at exterior and interior walls.

Moment and 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.

Site Exterior Slab/Stair/Ramp:

Non-Structural Elements:

- Exterior walls are expected to consist of cold-formed steel (metal Stud) framing with large extents of glass.
- Solar Chimneys
- New mechanical units are expected to be located ?
- Intensive vs Extensive Green Roof
- Solar Screens
  - Thermal Isolation breaks shall be provided by utilizing bolted connections and a product similar to Fabreeka's Thermal Insulation Material.
- New steel framed open stairs are to be adjacent to the southwest wing addition.
- Brick Cladding

New Recreational Building

Through discussions with Sorg Architects, the new Recreational Building is to be composed of two parts:

- Pre-Engineered Long Span Structure
  - House indoor soccer field with elevated running track.
- 2-Story Facility Space
  - House fitness rooms, a multi-purpose room, offices, locker rooms, and other amenities.

The structural engineer for the project will provide foundation design to accommodate the new pre-engineered long span structure in addition to complete design for the 2-Story Facility Space.

Important aspects for the prefabricated long span structure include design and accommodation of the elevated running track. Calculations shall include consideration of vibrational and impact loads for the elevated track.

The adjacent facility building will likely be a steel framed structure, with CMU or light gauge infill walls.

8.0 Conclusion

Overall, the existing building structure appears to be in good condition.

Please reference preceding sections 6.1 through 6.2 for detailed observations and recommendations.

The recommendations and comments contained herein are based on K&H's visual observations during site assessment of the existing conditions and the professional judgment and experience of K&H engineers. This report represents the extent of Keast & Hood's review.

Please do not hesitate to contact the undersigned if we can be of continued assistance or if we may answer any questions regarding K&H's observations and recommendations.

Very Truly Yours,

KEAST & HOOD

Laura M Burke, EIT

Matthew J Daw, P.E., LEED® AP

102676

GENERAL NOTES

1. THE PROPERTY SHOWN HEREON IS IDENTIFIED ON THE CITY OF ALEXANDRIA , VIRGINIA GEOGRAPHIC INFORMATION SYSTEM AS ACCOUNT #30544000 AND IS CURRENTLY ZONED R-12
2. THE PROPERTY SHOWN HEREON IS NOW IN THE NAME OF THE CITY OF ALEXANDRIA, RECORDED AT DEED BOOK 344 AT PAGE 89 ALL AMONG THE LAND RECORDS OF THE CITY OF ALEXANDRIA, VIRGINIA.
3. DURING THE PROCESS OF OUR PHYSICAL SURVEY NO INDICATIONS OF A CEMETERY WERE FOUND. NO FURTHER INSPECTION OF THESE PROPERTIES HAVE BEEN MADE FOR POSSIBLE CEMETERIES.
4. NO TITLE REPORT FURNISHED. ALL UNDERLYING TITLE LINES, EASEMENTS, SERVITUDES AND OTHER MATTERS OF TITLE MAY NOT BE SHOWN HEREON.
5. THE BOUNDARY AND PHYSICAL IMPROVEMENTS SHOWN HEREON ARE BASED UPON A FIELD SURVEY DONE BY THIS FIRM BETWEEN THE DATES OF NOVEMBER 25, 2014 AND FEBRUARY 3, 2015.
6.) A.) HORIZONTAL DATUM SHOWN HEREON IS REFERENCED TO THE VIRGINIA COORDINATE SYSTEM (VCS) 1983 - NORTH AS ESTABLISHED FROM A CURRENT GPS SURVEY.

   B.) THE VERTICAL DATUM SHOWN HEREON IS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) AS ESTABLISHED FROM A CURRENT GPS SURVEY.
7. NO GEOTECHNICAL, SUBSURFACE, FIELD REVIEWS, RESEARCH, AGENCY OR GOVERNMENTAL RECORD REVIEWS, OR OTHER INVESTIGATIONS HAVE BEEN MADE FOR THE PURPOSE OF LOCATING, OR DETERMINING THE EXISTENCE OF WETLANDS, HAZARDOUS MATERIALS, OR OTHER ENVIRONMENTAL CONCERNS ON SITE IN THE PERFORMANCE OF CHRISTOPHER CONSULTANTS, LTD SERVICES FOR THE PROJECT AS SHOWN HEREON.
8. THE PROPOSED FUTURE WIDENING SHOWN HEREON IS BASED INFORMATION FOUND ON TWO PLATS RECORDED AT DEED BOOK 394 AT PAGE 379 AND DEED BOOK 432 AT PAGE 114.

FLOOD ZONE NOTE

THE AREA SHOWN HEREON IS LOCATED ON THE FLOOD INSURANCE RATE MAPS (FIRM), COMMUNITY PANEL NO. 5155190028 E, WITH AN EFFECTIVE DATE OF JUNE 16, 2011.

BY GRAPHICALLY DEPICTION ONLY, THE PROPERTY SHOWN HEREON IS SHOWN IN:
- FLOOD ZONE "X" (OTHER AREAS), AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN.

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

UTILITY MARKING NOTES:

1. THE LOCATION OF UTILITIES SHOWN HEREON ARE FROM OBSERVED EVIDENCE OF ABOVE GROUND APPURTENANCES AND SURFACE GROUND MARKINGS.
2. BEFORE DIGGING IN THIS AREA, CALL "MISS UTILITY" 1-800-552-7001 FOR FIELD LOCATIONS (REQUEST FOR GROUND MARKINGS) OF UNDERGROUND UTILITY LINES.
3. UTILITY PROFESSIONALS INC. MARKED FOR UNDERGROUND UTILITIES BETWEEN THE DATES OF NOVEMBER 25, 2014 AND FEBRUARY 5, 2015 AND LOCATED BY THIS FIRM BETWEEN THE DATES OF NOVEMBER 25, 2014 AND FEBRUARY 5, 2015.

DIG WITH C.A.R.E. KEEP VIRGINIA SAFE

STORM STRUCTURE DATA

EX. A — 28.21 LF OF 12" CMP
- EX. 394: RIM EL. = 134.52; INV. - (FROM 395 = 128.72); INV. - (TO 649 = 128.49)
- EX. 649: RIM EL. = 132.37; INV. - (FROM 394 = 128.39)

EX. B — 56.81 LF OF 18" RCP
- EX. 649: RIM EL. = 132.37; INV. - (TO 705 = 128.35)
- EX. 705: RIM EL. = 132.09; INV. - (FROM 649 = 127.56)

EX. C — 45.05 LF OF 18" RCP
- EX. 705: RIM EL. = 132.09; INV. - (TO 355 = 127.32)
- EX. 355: RIM EL. = 130.61; INV. - (FROM 705 = 126.84)

EX. D — 48.41 LF OF 24" RCP
- EX. 355: RIM EL. = 130.61; INV. - (TO 356 = 126.53)
- EX. 356: RIM EL. = 131.09; INV. - (FROM 355 = 125.57); INV. - (FROM S.W. = 126.29); INV. - (TO E. = 125.55)

EX. E — 71.78 LF OF 6" RCP
- EX. 4838: RIM EL. = 151.85; INV. - (TO 4796 = 141.95)
- EX. 4796: RIM EL. = 147.38; INV. - (FROM 4838 = 140.53); INV. - (TO S. = 140.43)

EX. F — 89.08 LF OF 12" PVC
- EX. 2355: RIM EL. = 134.80; INV. - (FROM ROOF DRAIN = 132.12); INV. - (TO 2338 = 132.08)
- EX. 2338: RIM EL. = 134.78; INV. - (FROM ROOF DRAIN = 131.08); INV. - (FROM 2355 = 131.03)

EX. G — 31.74 LF OF 18" RCP
- EX. 2338: RIM EL. = 134.78; INV. - (TO 1746 = 130.83)
- EX. 1746: RIM EL. = 134.02; INV. - (FROM 2338 = 130.22)

EX. H — 36.93 LF OF 44"x29" RCP
- EX. 1746: RIM EL. = 134.02; INV. - (TO 1745 = 129.47)
- EX. 1745: RIM EL. = 132.94; INV. - (FROM 1746 = 129.04)

EX. I — 86.27 LF OF 18" RCP
- EX. 1745: RIM EL. = 132.94; INV. - (TO 1861 = 128.84)
- EX. 1861: RIM EL. = 130.52; INV. - (FROM 1745 = 128.25)

EX. J — 202.03 LF OF 8" RCP
- EX. 1395: RIM EL. = 134.67; INV. - (TO 1861 = 133.57)
- EX. 1861: RIM EL. = 130.52; INV. - (FROM 1395 = 128.23); INV. - (FROM N. = 128.26)

EX. K — 131.39 LF OF 18" RCP
- EX. 1861: RIM EL. = 128.20; INV. - (TO 1161 = 128.20)
- EX. 1161: RIM EL. = 128.46; INV. - (FROM 1861 = 122.19)

EX. L — 65.30 LF OF 15" RCP
- EX. 4073: RIM EL. = 142.46; INV. - (TO 2290 = 136.26)
- EX. 2290: RIM EL. = 138.93; INV. - (FROM 4073 = 132.99)

EX. M — 80.15 LF OF 15" RCP
- EX. 2253: RIM EL. = 138.57; INV. - (TO 2290 = 135.07)
- EX. 2290: RIM EL. = 138.93; INV. - (FROM 2253 = 133.00)

EX. N — 102.91 LF OF 10" RCP
- EX. 1354: RIM EL. = 138.97; INV. - (TO 2290 = 134.72)
- EX. 2290: RIM EL. = 138.93; INV. - (FROM 1354 = 133.06)

EX. O — 184.70 LF OF 21" RCP
- EX. 2290: RIM EL. = 138.93; INV. - (TO 2134 = 132.63)
- EX. 2134: RIM EL. = 133.90; INV. - (FROM 2290 = 129.94); INV. - (FROM S.E. = 130.20)

EX. P — 235.58 LF OF 21" RCP
- EX. 2134: RIM EL. = 133.90; INV. - (TO 2040 = 128.92)
- EX. 2040: RIM EL. = 130.44; INV. - (FROM 2134 = 122.97)

EX. Q — 156.82 LF OF 36" RCP
- EX. 2040: RIM EL. = 130.44; INV. - (TO 1161 = 119.74)
- EX. 1161: RIM EL. = 128.46; INV. - (FROM 2040 = 118.80)

EX. R — 164.59 LF OF 39" RCP
- EX. 1161: RIM EL. = 128.46; INV. - (TO 1173 = 118.79)
- EX. 1173: RIM EL. = 125.20; INV. - (FROM 1161 = 118.10)

EX. S — 21.26 LF OF 18" RCP
- EX. 1173: RIM EL. = 125.20; INV. - (TO 1187 = 118.04)
- EX. 1187: RIM EL. = 121.78; INV. - (FROM 1173 = 117.83)

EX. T — 38.53 LF OF 18" RCP
- EX. 1187: RIM EL. = 121.78; INV. - (TO 5060 = 117.48)
- EX. 5060: RIM EL. = 121.48; INV. - (FROM 1187 = 116.10); INV. - (TO N.W. = 115.44)

EX. U — 14.81 LF OF 15" RCP
- EX. 2183: RIM EL. = 131.53; INV. - (TO 2681 = 127.48)
- EX. 2681: RIM EL. = 131.54; INV. - (FROM 2183 = 127.21); INV. - (FROM S.E. = 127.21)

EX. V — 23.37 LF OF 15" RCP
- EX. 2681: RIM EL. = 131.54; INV. - (TO 2524 = 126.54)
- EX. 2524: RIM EL. = 131.57; INV. - (FROM 2681 = 126.40)

EX. W — 11.91 LF OF 15" RCP
- EX. 2526: RIM EL. = 131.83; INV. - (TO 2524 = 126.90)
- EX. 2524: RIM EL. = 131.57; INV. - (FROM 2526 = 126.42)

EX. X — 125.27 LF OF 15" RCP
- EX. 2524: RIM EL. = 131.57; INV. - (TO 2638 = 126.37)
- EX. 2638: RIM EL. = 123.53; INV. - (FROM 2524 = 118.53)

EX. Y — 200.39 LF OF 15" RCP
- EX. 2638: RIM EL. = 123.53; INV. - (TO 5059 = 118.48)
- EX. 5059: RIM EL. = 121.59; INV. - (FROM 2638 = 116.31)

EX. Z — 11.39 LF OF 15" RCP
- EX. 1002: RIM EL. = 121.50; INV. - (TO 5059 = 116.39)
- EX. 5059: RIM EL. = 121.59; INV. - (FROM 1002 = 116.36)

SANITARY STRUCTURE DATA

EX. S A — 172.57 LF OF 8" DIP
- EX. S 487: RIM EL. = 131.42; INV. - (TO 5301 = 128.17); INV. - (FROM S.W. = 128.34); INV. - (FROM W. = 128.22); INV. - (FROM SCHOOL = 128.36)
- EX. S 5301: RIM EL. = 135.34; INV. - (FROM 487 = 127.56)

EX. S B — 43.65 LF OF 10" DIP
- EX. S 5301: RIM EL. = 135.34; INV. - (TO 5302 = 127.54)
- EX. S 5302: RIM EL. = 134.60; INV. - (FROM 5301 = 127.24); INV. - (FROM N. = 126.93)

EX. S C — 350.51 LF OF 10" DIP
- EX. S 5302: RIM EL. = 134.60; INV. - (TO 5303 = 126.90)
- EX. S 5303: RIM EL. = 120.39; INV. - (FROM 5302 = 110.89)

EX. S D — 249.81 LF OF 10" DIP
- EX. S 5303: RIM EL. = 120.39; INV. - (TO 5304 = 110.80)
- EX. S 5304: RIM EL. = 113.09; INV. - (FROM 5303 = 97.80); INV. - (FROM W. = 98.04)

EX. S E — 225.50 LF OF 10" DIP
- EX. S 5304: RIM EL. = 113.09; INV. - (TO 5305 = 97.77)
- EX. S 5305: RIM EL. = 110.90; INV. - (FROM 5304 = 95.80)

EX. S F — 336.06 LF OF 10" DIP
- EX. S 5305: RIM EL. = 110.90; INV. - (TO 5306 = 95.74)
- EX. S 5306: RIM EL. = 102.09; INV. - (FROM 5305 = 89.90); INV. - (FROM N. = 89.89); INV. - (FROM E. = 90.11)

EX. S G — 16.28 LF OF 12" DIP
- EX. S 5306: RIM EL. = 102.09; INV. - (TO 5307 = 89.68)
- EX. S 5307: RIM EL. = 102.04; INV. - (FROM 5306 = 88.99)

EX. S H — 321.47 LF OF 12" DIP
- EX. S 5307: RIM EL. = 102.04; INV. - (TO 5308 = 88.72)
- EX. S 5308: RIM EL. = 93.14; INV. - (FROM 5307 = 82.09)

EX. S I — 20.39 LF OF 12" DIP
- EX. S 5308: RIM EL. = 93.17; INV. - (TO 5309 = 81.99)
- EX. S 5309: RIM EL. = 92.26; INV. - (FROM 5308 = 81.83)

EX. S J — 348.17 LF OF 12" DIP
- EX. S 5306: RIM EL. = 102.09; INV. - (TO 5309 = 89.69)
- EX. S 5309: RIM EL. = 92.26; INV. - (FROM 5306 = 82.00)

EX. S K — 253.46 LF OF 15" DIP
- EX. S 5309: RIM EL. = 92.26; INV. - (TO 5310 = 81.55)
- EX. S 5310: RIM EL. = 88.02; INV. - (FROM 5309 = 78.02); INV. - (FROM E. = 78.62)

EX. S L — 125.97 LF OF 15" DIP
- EX. S 5310: RIM EL. = 88.02; INV. - (TO 5311 = 78.00)
- EX. S 5311: RIM EL. = 86.91; INV. - (FROM 5310 = 76.07); INV. - (FROM N.E. = 76.57)

EX. S M — 183.62 LF OF 15" DIP
- EX. S 5311: RIM EL. = 86.91; INV. - (TO 5312 = 75.99)
- EX. S 5312: RIM EL. = 84.64; INV. - (FROM 5311 = INACCESSIBLE)

EX. S N — 367.10 LF
- EX. S 5312: RIM EL. = 84.64; INV. - (TO 5313 = INACCESSIBLE)
- EX. S 5313: RIM EL. = 79.77; INV. - (FROM 5312 = INACCESSIBLE)

EX. S O — 345.58 LF
- EX. S 5313: RIM EL. = 79.77; INV. - (TO 5314 = INACCESSIBLE)
- EX. S 5314: RIM EL. = 69.57; INV. - (FROM 5313 = INACCESSIBLE)

EX. S P — 66.95 LF OF 15" DIP
- EX. S 5314: RIM EL. = 69.57; INV. - (TO 5315 = INACCESSIBLE)
- EX. S 5315: RIM EL. = 68.52; INV. - (FROM 5314 = 51.05)

EX. S Q — 22.88 LF OF 18" DIP
- EX. S 5315: RIM EL. = 68.52; INV. - (TO 5316 = 50.97)
- EX. S 5316: RIM EL. = 58.79; INV. - (FROM 5316 = 50.44); INV. - (FROM N. = 48.09); INV. - (TO S. = 48.04)

EX. S R — 174.64 LF OF 10" DIP
- EX. S 1078: RIM EL. = 128.37; INV. - (TO 5061 = INACCESSIBLE, FUSED LID)
- EX. S 5061: RIM EL. = 121.67; INV. - (FROM 1078 = 111.34)

EX. S S — 260.01 LF OF 10" DIP
- EX. S 2712: RIM EL. = 142.36; INV. - (TO 2646 = 132.82)
- EX. S 2646: RIM EL. = 125.02; INV. - (FROM 2712 = 114.37)

EX. S T — 276.29 LF OF 10" DIP
- EX. S 2646: RIM EL. = 125.02; INV. - (TO 5061 = 114.27)
- EX. S 5061: RIM EL. = 121.66; INV. - (FROM 2646 = 111.30); INV. - (FROM SOUTH = 111.21); INV. - (TO WEST = 111.08)

SCHEDULE OF TREES

Tree Tag #	Tree Description	Tree Tag #	Tree Description
5002	ct sz8/12 9 twin	6120	ct sz12/12
5003	ct sz25/21	6121	ct sz12/12
5004	dt sz25/21	6122	dt sz10/8
5005	dt sz10/9	6123	ct sz12/12
5006	dt sz15/9 7 6 multiple	6124	dt sz10/12
5007	dt sz12/12	6125	dt sz10/6
5008	dt sz35/33	6126	dt sz10/8
5009	dt sz6/5	6127	dt sz10/8
5010	ct sz25/21	6128	dt sz10/6
5011	ct sz15/15 5 twin	6129	dt sz10/10
5012	dt sz20/9 multiple trunks	6130	dt sz8/10
5014	dt sz12/12	6131	ct sz10/12
5015	dt sz45/27	6132	dt sz25/20
5016	ct sz15/15 15 9 5 quad	6133	dt sz20/18
5017	ct sz40/33	6134	ct sz15/12
5018	dt sz25/21	6135	ct sz20/15
5019	ct sz4/6	6136	dt sz20/14
5020	ct sz4/6	6137	dt sz14/12
5021	ct sz5/9	6138	ct sz15/18
5022	dt sz40/27	6139	ct sz12/10
5023	dt sz30/12 12 12 6 4 quint	6140	ct sz25/20
5024	dt sz35/15 12 9 7 quad	6141	dt sz20/24
5025	dt sz30/18 12 9 trip	6143	dt sz20/12
5026	dt sz20/9 7 5 3 quad	6144	ct sz16/12
5027	dt sz30/18	6145	ct sz30/24
5028	dt sz12/9 6 5 3 2 2	6146	ct sz20/18
5029	dt sz40/18 12 12 9	6147	dt sz15/8
5030	dt sz30/12 12 9 6 quad	6148	dt sz15/12
5031	dt sz25/24	6149	ct sz10/6
5032	dt sz30/18	6150	ct sz12/10
5033	dt sz20/18	6151	dt sz20/14
5034	dt sz12/12	6152	dt sz10/8
5035	dt sz35/18	6153	dt sz25/24
5036	dt sz12/12	6154	ct sz10/8
5037	dt sz12/9	6155	ct sz10/8
5038	dt sz30/12 12 12 trip	6156	dt sz40/32
5039	dt sz30/15	6157	dt sz20/16
5040	dt sz35/18	6158	dt sz10/6
5041	dt sz15/9 5 5 trip	6159	dt sz15/8
5042	dt sz15/6	6160	ct sz17/15
5043	dt sz18/12 sextuplet	6161	ct sz6/6
5044	dt sz12/9	6162	dt sz15/12
5045	ct sz7/6	6163	dt sz10/12
5046	ct sz8/9	6164	ct sz15/10
5047	dt sz10/6 4 twin	6165	ct sz20/12
5048	dt sz7/8	6166	dt sz12/10
5049	dt sz8/ 8 8 twin	6167	dt sz30/24
5050	ct sz12/10	6168	ct sz20/15
5051	ct sz8/7	6169	ct sz10/8
5052	ct sz10/6	6170	dt sz15/8
5053	ct sz15/12	6171	ct sz20/12
5054	ct sz12/12	6172	dt sz20/14
5055	dt sz10/12	6173	ct sz12/8
5056	dt sz4/9	6174	ct sz15/10
5057	dt sz15/15	6175	ct sz10/8
5058	dt sz30/18 12 9 trip	6176	ct sz49/40
5059	dt sz40/18 12 9 trip	6177	dt sz45/32
5060	dt sz12/9	6178	dt sz38/25
5061	dt sz6/12 6 twin	6179	ct sz12/10
5062	dt sz5/9	6180	ct sz12/7
5063	dt sz15/15 8 twin	6181	dt sz10/8
5064	dt sz8/9	6182	dt sz12/7
5065	dt sz15/12	6183	dt sz27/24
5066	dt sz20/15 12 twin	6184	ct sz15/14
5067	ct sz30/21	6185	ct sz20/16
5068	dt sz5/9	6186	dt sz32/26
5069	dt sz10/12	6187	dt sz20/30
5070	dt sz35/24	6188	ct sz15/12
5071	dt sz5/9	6189	ct sz10/8
5072	dt sz3/6	6190	ct sz25/18
5073	dt sz12/12	6191	dt sz20/12
5074	ct sz8/12	6192	dt sz25/20
5075	ct sz12/9	6193	ct sz10/6
5076	ct sz10/6	6194	dt sz30/24
5077	ct sz8/6	6195	ct sz10/18
5078	ct sz8/6	6196	dt sz15/18
5079	ct sz6/6	6197	dt sz25/12
5080	ct sz12/9	6198	ct sz15/12
5081	ct sz10/12	6199	ct sz15/15
5082	ct sz12/9	6200	dt sz25/15 twin
5083	ct sz8/9	6201	ct sz35/21
5084	ct sz10/6 6 twin	6202	ct sz12/12
5085	dt sz15/9 6 multiple	6203	ct sz12/9
5086	dt sz12/9 6 twin	6204	ct sz15/10
5087	dt sz12/15	6205	dt sz20/12
5088	ct sz35/24	6206	dt sz25/18
5089	dt sz6/12	6207	ct sz25/15
5090	ct sz30/18	6208	ct sz20/12
5091	dt sz8/9	6209	ct sz20/12
5092	dt sz0/12	6210	ct sz15/6 6 twin
5093	dt sz5/9	6211	ct sz6/8
5094	dt sz3/7	6212	ct sz3/6
5095	ct sz8/6	6213	ct sz30/18
5096	dt sz3/8	6214	ct sz35/18
5097	dt sz10/6	6215	ct sz25/18
5098	dt sz10/8	6216	dt sz8/12
5099	dt sz6/6	6217	dt sz15/12
5100	dt sz15/24	6218	ct sz12/6
5101	dt sz10/6	6219	dt sz12/6
5102	dt sz10/8	6220	ct sz30/15
5103	dt sz15/18	6221	ct sz50/21
5104	dt sz8/8	6222	ct sz45/24
5105	dt sz10/10	6223	dt sz50/27
5106	dt sz12/10	6224	ct sz50/24
5107	dt sz8/10	6225	ct sz30/21
5108	dt sz15/18	6226	ct sz40/21
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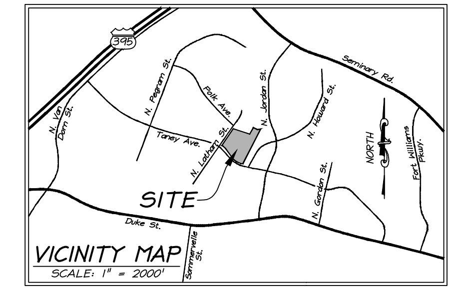
5110	ct sz12/10	6228	ct sz30/18
5111	ct sz10/10	6229	ct sz30/21
5112	dt sz12/20	6230	dt sz20/18
5113	dt sz8/8	6231	ct sz30/15
5114	dt sz8/8	6232	ct sz30/15
5115	dt sz8/8	6233	dt sz18/18
5116	dt sz15/20	6234	ct sz18/21
5117	ct sz15/10	6235	dt sz10/18
5119	dt sz15/16	6236	ct sz35/24



VICINITY MAP
SCALE: 1" = 2000'

SURVEYOR'S CERTIFICATION

THIS BOUNDARY AND TOPOGRAPHIC SURVEY ON THE CITY OF ALEXANDRIA WAS COMPLETED UNDER THE DIRECT AND RESPONSIBLE CHARGE OF BRENT E. EVANS FROM AN ACTUAL GROUND SURVEY MADE UNDER MY SUPERVISION BETWEEN THE DATES OF NOVEMBER 25, 2014 AND FEBRUARY 3, 2015 AND THAT THIS PLAT MEETS MINIMUM ACCURACY STANDARDS UNLESS OTHERWISE NOTED.

GIVEN UNDER THIS 19th DAY OF FEBRUARY 3, 2015

COMMONWEALTH OF VIRGINIA
BRENT E. EVANS
Lic. No. 2843
2/9/15
LAND SURVEYOR

Brent E Evans

BRENT E. EVANS, LS
COMMONWEALTH OF VIRGINIA
LICENSED LAND SURVEYOR NO. : 2843

Rev#	DATE	REVISION
1	02/09/15	ADDED PUNCH LIST ITEMS

christopher consultants
engineering · surveying · land planning
9417 innovation drive, manassas, virginia 20110
703-393-9887 · fax 703-393-4076

BOUNDARY & TOPOGRAPHIC SURVEY ON THE LANDS OF
THE CITY OF ALEXANDRA
"PATRICK HENRY ELEMENTARY SCHOOL"
(DEED BOOK 344 PAGE 89)
CITY OF ALEXANDRIA, VIRGINIA

PROJECT: 11033.002.00
SCALE: 1" = 40'
DATE: 01/16/15
DRAWN: WEB
CHECKED: BEE
SHEET No.
1 OF 3

102676

LEGEND

Utilities - Storm
- STORM MANHOLE
- STORM CATCH BASIN
- ROOF DRAIN

Utilities - Sanitary
- SANITARY MANHOLE

Utilities - Electric
- ELECTRIC BOX
- ELECTRIC MANHOLE
- LIGHT POLE
- UTILITY POLE
- GUY WIRE
- ELECTRIC METER

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

Utilities - Gas
- GAS VALVE
- GAS METER
- GAS TEST HOLE

Utilities - Communication
- COMMUNICATION PEDESTAL
- COMMUNICATION VAULT

Surfaces
- ASPHALT AREA
- CONCRETE AREA
- GRAVEL AREA

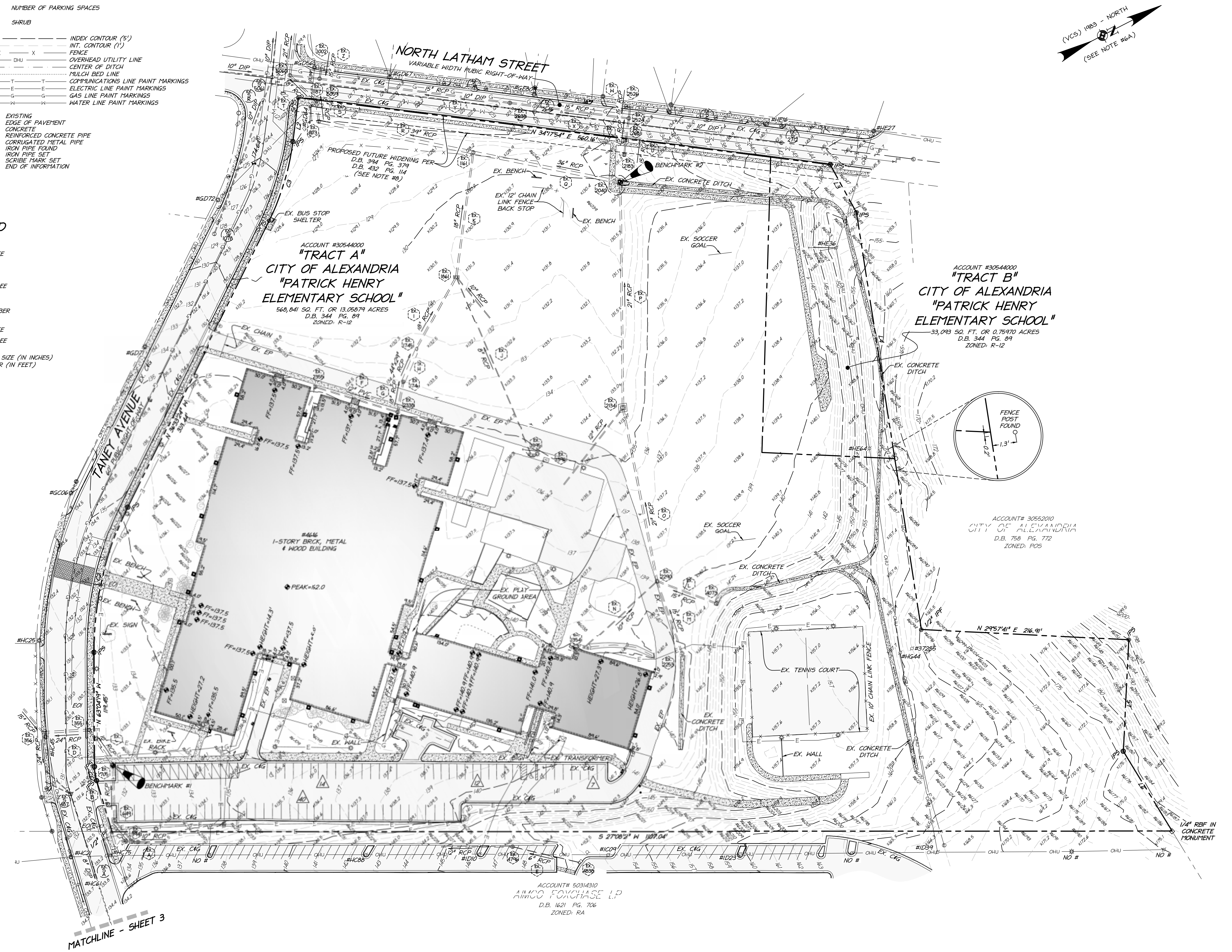
Misc. Structures
- 150.0 INTERPOLATED SPOT SHOT
- SIGN
- BOLLARD
- UNKNOWN UTILITY STUB
- FLAG POLE
- NUMBER OF PARKING SPACES
- SHRUB

Linetypes
- INDEX CONTOUR (5')
- INT. CONTOUR (1')
- FENCE
- OVERHEAD UTILITY LINE
- CENTER OF DITCH
- MULCH BED LINE
- COMMUNICATIONS LINE PAINT MARKINGS
- ELECTRIC LINE PAINT MARKINGS
- GAS LINE PAINT MARKINGS
- WATER LINE PAINT MARKINGS

Abbreviations
- EX. EXISTING
- EP EDGE OF PAVEMENT
- CONC. CONCRETE
- RCP REINFORCED CONCRETE PIPE
- CMP CORRUGATED METAL PIPE
- IPF IRON PIPE FOUND
- IPS IRON PIPE SET
- SMS SCRIBE MARK SET
- EOI END OF INFORMATION

TREE LEGEND

- DECIDUOUS TREE
- CONIFEROUS TREE
- #1234 TREE TAG NUMBER
- DT DECIDUOUS TREE
- CT CONIFEROUS TREE
- CT 52 15/7 — TREE TYPE; TRUNK SIZE (IN INCHES); TREE COVER (IN FEET)



LINE TABLE

LINE	BEARING	DISTANCE
L1	N 79°55'49" W	55.42'
L2	N 55°40'19" W	46.32'
L3	N 89°03'54" E	57.35'
L4	S 71°41'29" E	440.60
L5	S 60°02'19" E	116.62'
L6	N 85°42'41" E	97.78'

CURVE TABLE

CURVE	RADIUS	LENGTH	DELTA	TANGENT	BEARING	CHORD
C1	50.00'	14.71'	16°51'30"	7.41'	S 71°30'04" E	14.66'
C2	340.00'	157.34'	26°30'55"	80.11'	S 49°48'52" E	155.94'
C3	260.00'	86.74'	19°06'55"	43.78'	N 46°06'52" W	86.34'

COMMONWEALTH OF VIRGINIA
BRENT E. EVANS
Lic. No. 2843
2/3/15
LAND SURVEYOR

BENCHMARKS

BENCHMARK #1	BENCHMARK #2
STORM MANHOLE	STORM MANHOLE
N: 6,983,252.85	N: 6,984,002.45
E: 11,878,557.94	E: 11,878,257.27
ELEVATION=132.09	ELEVATION=130.44

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BOUNDARY & TOPOGRAPHIC SURVEY ON THE LANDS OF
THE CITY OF ALEXANDRIA "PATRICK HENRY ELEMENTARY SCHOOL"
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PROJECT: 11033.002.00
SCALE: 1" = 40'
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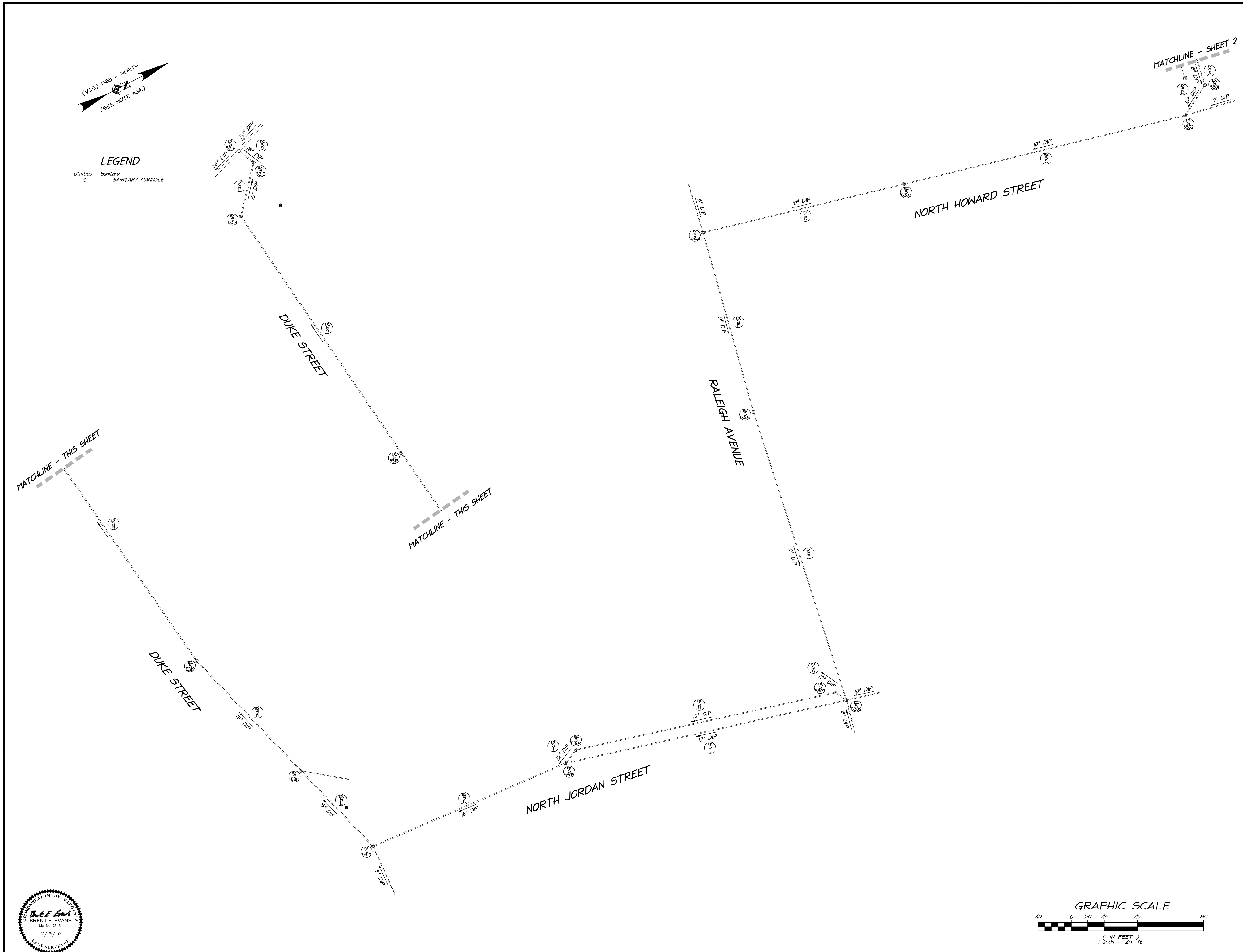
SHEET No. 2 OF 3

102676



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BOUNDARY & TOPOGRAPHIC SURVEY ON THE LANDS OF

THE CITY OF ALEXANDIRA
"PATRICK HENRY ELEMENTARY SCHOOL"

(DEED BOOK 344 PAGE 89)
CITY OF ALEXANDRIA, VIRGINIA

PROJECT: 11033.002.00
SCALE: 1" = 40'
DATE: 01/16/15
DRAWN: WEB
CHECKED: BEE
SHEET No.
3 OF 3

102676

REPORT OF

SUBSURFACE EXPLORATION AND
GEOTECHNICAL ENGINEERING AND ANALYSIS

PATRICK HENRY ELEMENTARY SCHOOL
ALEXANDRIA, VIRGINIA

FOR

SORG ARCHITECTS

MARCH 26, 2015

March 26, 2015

Mr. Bill Conkey, AIA
Sorg Architects
918 U Street NW
Washington, DC 20001

ECS Project No. 01:24129

Reference: Report of Subsurface Exploration and Geotechnical Engineering Analysis, Patrick Henry Elementary School, 4643 Taney Ave, Alexandria, VA, 22304

Dear Mr. Conkey:

As authorized by your acceptance of our Proposal No. 49337-GP, dated October 29, 2014, ECS Mid-Atlantic, LLC (ECS) has completed the subsurface exploration for the proposed addition to Patrick Henry Elementary School in Alexandria, Virginia. The enclosed report discusses the subsurface exploration procedures as well as the results of our subsurface exploration and laboratory testing programs, and presents our recommendations for the design and construction of the proposed structure. A Boring Location Diagram is included in the Appendix of this report, along with boring logs and laboratory test results

We appreciate the opportunity to be of service to you on this project. If you have any questions regarding the information and recommendations contained in the accompanying report, please do not hesitate to contact us.

Respectfully,

ECS MID-ATLANTIC, LLC

Andy Tao, E.I.T.
Staff Project Engineer

Bryan C. Layman, P.E.
Principal Engineer

James P. Racine, P.E.
Senior Project Engineer

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REPORT

PROJECT

Subsurface Exploration and
Geotechnical Engineering Analysis for
Patrick Henry Elementary School
4643 Taney Ave, Alexandria, VA, 22304

CLIENT

Sorg Architects
918 U Street NW
Washington, DC 20001

PROJECT NO.	01:24129-GP
DATE	March 26, 2015

TABLE OF CONTENTS

PROJECT OVERVIEW

Introduction

This report presents the results of our subsurface exploration and geotechnical engineering analysis for the proposed addition to Patrick Henry Elementary School located at 4643 Taney Avenue in Alexandria, Virginia. The study was conducted in general accordance with Proposal No. 01:49337-GP, dated October 29, 2014. The site location and the approximate boring locations are shown on the Boring Location Diagram included in the Appendix of this report.

Site Description and Proposed Construction

The project site is located at 4643 Taney Avenue in Alexandria, Virginia and is bound by Taney Avenue to the south, North Latham Street to the west, wooded area to the north, and residential housing to the east. Based our review of the provided site plan dated, March 9, 2015, it appears that the site generally slopes from the northeast towards the southwest with the existing grades ranging from EL. +140 to EL. +127 feet. The site consists of the existing Patrick Henry school building, which is on-grade with one level of above-grade space. Surrounding the school are several grassed areas and an asphalt parking lot. The existing building appears to have been constructed in several phases and additions.

We understand that the proposed project will consist of a large renovation for the Patrick Henry Elementary School, which may consist of a new building and/or renovation of the existing structures. Conceptual site plans of renovations or new building options were provided by Sorg Architects, but a final site plan was not available. The conceptual site plans include four different layouts, which can be found in the Appendix. The boring locations were selected to accommodate these layouts. For the purposes of this report, we have assumed that the new additions/renovations are on-grade and contain up to 2-levels of above-grade space. No below-grade space is anticipated.

Proposed Foundations

ECS has not been provided with any preliminary structural drawings at this time. Based on our review of the provided conceptual drawings, we have assumed that the building will be on-grade and supported by shallow spread foundations. Estimated loading has not been provided. Therefore, we have assumed that the building is relatively lightly loaded and will have maximum column loading on the order of 125 kips and wall loading on the order of 5 kips per linear foot.

If any of this information is in error, either due to our misunderstanding or due to any design changes that may occur later, ECS should be contacted so that we may review our recommendations and provide alternate or additional recommendations at that time.

Purpose and Scope of Work

The purpose of this exploration was to explore the subsurface conditions at the site and to develop engineering recommendations to guide the design and construction of the project. We accomplished these purposes by performing the following scope of services:

1. drilling borings to explore subsurface soil and groundwater conditions,
2. performing laboratory tests on selected representative soil samples from the borings to evaluate pertinent engineering properties,
3. analyzing the field and laboratory data to develop appropriate engineering recommendations, and
4. preparing this geotechnical report of our findings and recommendations.

The recommendations presented in this report are based on the results of our field subsurface exploration, laboratory testing, and review of available geological and/or geotechnical data. A total of eight borings (Borings B-1 to B-8) were performed by ECS.

The results of the completed soil borings along with a Boring Location Diagram are included in the Appendix of this report. The Boring Location Diagram was prepared based on the provided site plan, dated March 9, 2015. The borings were located in the field by representatives of ECS by pacing from existing structures. The site plan was utilized to determine the ground surface elevations noted on the attached boring logs.

Following drilling operations laboratory tests were performed on selected soil samples to identify the soils and to assist in determination of the properties of the site soils. The results of the laboratory testing are included in the Appendix of this report and are also noted on the boring logs.

EXPLORATION PROCEDURES

Subsurface Exploration Procedures

The soil borings were performed with an ATV-mounted auger drill rig, which utilized continuous flight, hollow-stem augers to advance the boreholes. In hollow-stem auger drilling operations, drilling fluid is not typically used to maintain or advance the borings. After the completion of each boring, the boreholes were backfilled with the spoils generated during drilling and the excess spoils were removed off site.

Representative soil samples were obtained by means of the split-barrel sampling procedure in accordance with ASTM Specifications D1586. In the split-barrel sampling procedure, a 2-inch O.D., split-barrel sampler is driven into the soil a distance of 18 inches by means of a 140-pound hammer falling 30 inches. The number of blows required to drive the sampler through a 12-inch interval is termed the Standard Penetration Test (SPT) "N" value and is indicated for each sample on the boring logs. This value can be used to provide a qualitative indication of the in-place relative density of cohesionless soils. In a less reliable way, it also indicates the consistency of cohesive soils. This indication is qualitative, since many factors can significantly affect the SPT value and prevent a direct correlation between drill crews, drill rigs, drilling procedures, and hammer-rod-sampler assemblies.

A field log of the soils encountered in the borings was maintained by the drill crew. After recovery, each sample was removed from the sampler and visually classified. Representative portions of each sample were then sealed and brought to our laboratory in Chantilly, Virginia for further visual examination and laboratory testing.

Laboratory Testing Program

Representative soil samples were selected and tested in our laboratory to determine pertinent engineering properties and soil classification. The laboratory testing program included visual classifications, natural moisture content tests, Atterberg Limits tests, and washed sieve analyses. All data obtained from the laboratory testing program is included on the respective boring logs and on the laboratory sheets within the Appendix of this report.

Each soil sample was visually classified on the basis of texture and plasticity in accordance with the Unified Soil Classification System (USCS). The group symbols for each soil type are indicated in parentheses following the soil descriptions on the boring logs. A brief explanation of the USCS will be included with the boring logs. The various soil types were grouped into the major zones noted on the boring logs. The stratification lines designating the interface between earth materials on the boring logs and profiles are approximate. In situ, the transitions between these strata may be gradual.

The soil samples from our exploration will be retained in our laboratory for a period of 60 days, after which they will be discarded unless other instructions are received as to their disposition.

EXPLORATION RESULTS

Regional Geology

The proposed site is located in the Coastal Plain Physiographic Province of Virginia. This Coastal Plain Province is characterized by a series of south-easterly dipping layers of relatively consolidated sandy clay deposits, with lesser amounts of gravel. These coastal Plain deposits are estimated to be approximately 250 feet thick and are underlain by the eastward continuation of the crystalline rock of the Piedmont Physiographic Province.

In general the higher elevations of the site area have few remnants of the Quaternary Age River Terrace deposits. The Quaternary Age Deposits are typically underlain, by the Potomac Group sediments of the older Cretaceous Age. The Cretaceous Age Potomac Group deposits generally consist of interbedded, layers of sand, silt, clay and gravel layers. The sand layers generally consist of fine to medium sand with variable amounts of clay and silt. In isolated areas, gravel can also be encountered.

Although not encountered during this exploration, the clay layers of the Potomac Group are commonly referred to as “marine clay” and it is generally believed that they were deposited in a deltaic environment. These very stiff to hard clays are often moderately to highly over consolidated and have a blocky structure.

Soil Conditions

The descriptions of the soil conditions encountered at the site are based on samples obtained from eight soil borings (B-1 to B-8). The borings were extended to depths on the order of 25 feet.

Stratum I – Fill Materials

Topsoil material up to 6 to 7 inches was observed in most of the borings, with the exception of B-3, which had 18 inches of topsoil material. Beneath the topsoil layer, existing fill materials were encountered to a depth of approximately 2.0 to 2.5 ± feet below the existing site grades. The fill material generally consisted of Lean CLAY (CL) with varying amounts of sand and root fragments. SPT N-Values ranged from 4 bpf to 12 bpf, which indicated soft to stiff consistencies.

Stratum II – Alluvial Soils

The soils underlying the stratum I material were observed to be consistent with the local geology. The soils encountered below the fill material generally consisted of SANDS (SP and SC) with varying amounts of clay and Lean CLAY (CL) with varying amounts of sand. The fine grained soils encountered exhibited SPT N-values ranging from 5 bpf to 30 bpf, which indicate medium stiff to very stiff consistencies. The granular materials exhibited SPT N-values ranging from 8 bpf to 28 bpf, which indicate loose to medium dense relative densities. The stratum II material was generally observed to the end of the boring depths.

Groundwater Conditions

Groundwater was not observed in any of the borings (B-1 to B-8) during drilling or before or after pulling augers. In auger drilling operations, water is not introduced into the boreholes, and the groundwater position can often be determined by observing water flowing into or out of the boreholes. Furthermore, visual observation of the soil samples retrieved during the auger drilling exploration can often be used in evaluating the groundwater conditions.

The groundwater table may undergo seasonal variations in elevation on the order of 10± feet. Generally, variations in the location of the water tables can occur at the site as a result of changes in precipitation, evaporation, surface water runoff, pumping and other factors not immediately apparent at the time of this exploration. However, perched water tables are also common at the interface of fill and natural soils.

ANALYSIS AND RECOMMENDATIONS

Based on the subsurface conditions encountered in the borings and on our experience in the project area, it appears the site is suited for the proposed structure from a geotechnical perspective. The conclusions and recommendations presented in this report should be incorporated in the design and construction of the project to minimize possible soil and/or foundation related problems.

The following sections present more detailed recommendations with regard to the support of the proposed structure. These include recommendations with regard to foundations, earthwork, and subgrade preparation. Discussion of the factors affecting the foundation for the proposed construction, as well as additional recommendations regarding design and construction at the project site are included below. We recommend that ECS review the final design and specifications to check that the earthwork and foundation recommendations presented in this report have been properly interpreted and implemented in the design and specifications.

Shallow Foundations – Proposed

For foundations bearing on natural soils approximately 2.5 feet below existing grades, we recommend an allowable bearing capacity of 4,000 psf. Suitable natural materials adequate to support the 4,000 psf bearing capacity can be found on the boring logs as those with a minimum Standard Penetration Test (SPT) N-value of 10 bpf or denser and classified Clayey SAND (SC), Poorly-Graded SAND (SP), and Lean CLAY (CL), each with varying amounts of sand, gravel, and clay. A minimum embedment depth of 2.5 feet is required (measured from the finished floor elevation to the bottom of footing elevation). We anticipate in some areas that the existing grades may be raised. For new, shallow footings bearing on approved, suitable, and properly compacted fill material, an allowable bearing pressure of 4 ksf may also be used.

We emphasize the need for verifying the suitability of footing subgrades during construction. The bearing pressure should be checked in the field by the geotechnical engineer of record.

General Shallow Foundation Recommendations

We emphasize the need for verifying the suitability of footing subgrades during construction. The bearing pressure should be checked in the field by the geotechnical engineer of record. Footings should be excavated, tested, and poured the same day. In the event the footing cannot be poured the same day, we recommend that the bearing surface be covered with a 3 to 4 inch lean concrete mud mat.

Settlement of a structure is a function of the bearing pressure and column loads. If our recommendations for shallow foundations are strictly followed, we expect the maximum total settlement of the footings to be less than one inch. Differential settlement between adjacent columns in the same structure is expected to be half this value. These settlement values are based on our analysis and engineering experience of the subsurface conditions and the anticipated structural loading, and are to guide the structural engineer with their design.

Recommendations included in this report apply only to development of the site at the above referenced bearing elevations. Should foundation bearing levels differ significantly from the anticipated elevations, ECS should be retained to modify the provided recommendations. Additionally, if loading conditions should change significantly, the recommendations in this report will not be suitable for support of the proposed development. In these cases, ECS should be provided the changes for our review.

Floor Slab Design

Based on our analysis of the on-site surficial soils, floor slabs on-grade are feasible for the proposed development. We recommend that unsuitable materials be removed from these subgrade areas once they are exposed. The floor slab area should be proofrolled with a loaded tandem axle dump truck with a weight not less than 10 tons and observed by an experienced soil technician during the time of construction in order to aid in locating all such unsuitable materials which should be removed.

Where new fill material is required to reach the design floor slab subgrade elevation, it is recommended that an approved inorganic material, with LL less than 40 and PI less than 20 and free of debris be used. This material should be placed in lifts not exceeding 8 inches in loose thickness, moisture conditioned to within ±2 percentage points of the optimum moisture content and compacted to a minimum of 95% of the maximum density obtained in accordance with ASTM D698, Standard Proctor.

We recommend that the floor slab be isolated from the foundation footings so that differential settlement of the structure will not induce shear stresses in the floor slab. Also, in order to reduce the crack width of any shrinkage cracks that may develop near the surface of the slab, we recommend mesh reinforcement be used. The mesh should be in the top half of the slab to be effective.

We also recommend the building slabs on grade be underlain by a minimum of 6 inches of granular material having a maximum aggregate size of 1.5 inches and no more than 2% passing the #200 sieve. This granular layer will facilitate the fine grading of the subgrade and help prevent the rise of water through the floor slab. Prior to placing the granular material, the floor subgrade soil should be properly compacted, proofrolled, and free of standing water, mud, and frozen soil. Before the placement of concrete, a vapor barrier may be placed on top of the granular material to provide additional moisture protection. However, special attention should be given to the surface curing of the slab in order to reduce uneven drying of the slab and associated cracking.

Underslab Subdrainage

As no below-grade space is planned, we recommend that an exterior, perimeter foundation drain be installed. The drain should be a minimum 4-inch slotted PVC pipe encapsulated (all around) in 6 inches of clean gravel wrapped in filter fabric. The drain may rest on the exterior footings and should daylight to a suitable outlet.

Site Retaining Walls

We do not anticipate any site retaining walls at this time. If these walls are required, ECS should be provided with the wall details and locations we can provide specific wall recommendations.

Seismic Design Considerations

The International Building Code (IBC) 2012 requires site classification for seismic design based on the upper 100 feet of a soil profile. Where site specific data are not available to a depth of 100 feet, appropriate soil properties are permitted to be estimated by the registered design professional preparing the soils report based on known geologic conditions.

Utilizing the data obtained from the on-site boring exploration and our previous experience at neighboring sites, a mean SPT "N"-value of less than 50 blows per foot (bpf) is anticipated within 100 feet of the ground surface. Three methods are utilized in classifying sites, namely the shear wave velocity (v_s) method; the unconfined compressive strength (s_u) method; and the Standard Penetration Resistance (N-value) method. The latter method (N-Value method) was used in classifying this site.

SITE CLASS	SOIL PROFILE NAME	AVERAGE PROPERTIES IN TOP 100 ft, AS PER SECTION 1613.5.2
		Standard Penetration Resistance, N-bar
A	Hard Rock	Not Applicable
B	Rock	Not Applicable
C	Very Dense Soil and Soft Rock	N-bar > 50
D	Stiff Soil Profile	15 ≤ N-bar ≤ 50
E	Soft Soil Profile	N-bar < 15
E	–	Any profile with more than 10 feet of soil having the following characteristics: 1. Plaxticity Index , PI > 10 2. Moisture content , w ≥40% 3. Undrained shear strength, Su-bar < 500 psf
F	–	Any profile containing soils having one or more of the following characteristics: 1. Soils vulnerable to potential failure or collapse under seismic loading such as liquefiable soils, quick and highly sensitive clays, collapsible weakly cemented soils. 2. Peats and/or highly organic clays (H > 10 ft or peat and/or highly organic clay where H = thickness of soil) 3. Very high plasticity clays (H> 25 ft with plasticity index PI > 75) 4. Very thick soft/medium stiff clays (H > 120 ft)

Based on our interpretation of the IBC 2012 Building Code and Table 1613.5.2, the project is defined as "Site Class D" for seismic design considerations. The Site Class definition should not be confused with the Seismic Design Category designation, which the Structural Engineer typically assesses. If a higher site classification is beneficial to the project, ECS would be pleased to discuss additional testing capabilities in this regard.

PROJECT CONSTRUCTION

Subgrade Preparation and Earthwork Operations

The subgrade preparation should consist of removing any deleterious, soft, or unsuitable material from the proposed building areas as required in slab, footing, and wall areas. After excavating to the desired grade, and prior to fill placement (if required), the initial exposed subgrade for the foundation should be observed by the Geotechnical Engineer of Record or his authorized representative.

The preparation of fill subgrades should be observed on a full-time basis. These observations should also be performed by an experienced geotechnical engineer, or their representative, to document that all unsuitable materials have been removed, and that the subgrade is suitable for support of the proposed construction and/or fills.

After examining the exposed soils, loose and yielding areas can be identified by proofrolling, probing, or testing. In the event that any loose natural soils are encountered during the operations, the subgrade should be either densified in-place, if deemed appropriate in the field by the geotechnical engineer, or undercut to firm ground and replaced with approved controlled fill compacted to the criteria given in the section below entitled Fill Placement. We recommend that an authorized representative of the Geotechnical Engineer of Record be present on-site working with the contractor to document the necessary depths of undercut.

If any problems are encountered during the earthwork operations, or if site conditions deviate from those encountered during our subsurface exploration, the Geotechnical Engineer should be notified immediately.

Fill Placement

All fills should consist of an approved material, free of organic matter and debris, cobbles greater than 4-inches and have a Liquid Limit and Plasticity Index less than 40 and 20, respectively. Unacceptable fill materials include topsoil and organic materials (OH, OL), and high plasticity silts and clays (CH, MH). Under no circumstances should high plasticity soils be used as fill material in proposed structural areas or close to site slopes.

The on-site materials classifying as (SC), (SP), and (CL) appear to be suitable for reuse as fill as detailed herein; however they will likely require moisture content adjustments. The planning of earthwork operations should recognize and account for these efforts and increased costs.

Fill materials should be placed in lifts not exceeding 8-inches in loose thickness and moisture conditioned to within ±2 percentage points of the optimum moisture content. Soil bridging lifts should not be used, since excessive settlement of overlying structures will likely occur. Controlled fill soils should be compacted to a minimum of 95% of the maximum dry density obtained in accordance with ASTM D698, Standard Proctor. However, the upper one foot of soil supporting pavements, slabs, sidewalks, or gutters should be compacted to a minimum of 98% of the maximum dry density obtained in accordance with ASTM D698, Standard Proctor.

All fill operations should be observed on a full-time basis by a qualified soil technician to determine that the specified compaction requirements are being met. A minimum of one compaction test per 2,500 square foot area should be tested in each lift placed. The elevation and location of the tests should be clearly identified at the time of fill placement.

Compaction equipment suitable to the soil type used as fill should be used to compact the fill material. Theoretically, any equipment type can be used as long as the required density is achieved. Ideally, a steel drum roller would be most efficient for compacting and sealing the surface soils. All areas receiving fill should be graded to facilitate positive drainage from building pad and pavement areas of any free water associated with precipitation and surface runoff.

It should be noted that prior to the commencement of fill operations and/or utilization of any off-site borrow materials, the Geotechnical Engineer of Record should be provided with representative samples to determine the material's suitability for use in a controlled compacted fill and to develop moisture-density relationships. In order to expedite the earthwork operations, if off-site borrow materials are required, it is recommended they be comprised of a select granular material which will provide suitable support and be easily compacted and well drained.

The on-site materials may be reused, as appropriate, provided that they do not contain organic or foreign debris, are not high plasticity, are not environmentally impacted, and conform to the criteria outlined above. The suitability of any materials for use as engineered fill should be further evaluated at the time of construction.

Fill materials should not be placed on frozen soils or frost-heaved soils and/or soils which have been recently subjected to precipitation. All frozen soils should be removed prior to continuation of fill operations. Borrow fill materials, if required, should not contain frozen materials at the time of placement. All frost-heaved soils should be removed prior to placement of controlled, compacted fill, granular subbase materials, foundation or slab concrete, and asphalt pavement materials.

Construction Dewatering

Although significant excavations are not anticipated for this project, a system of trenching and sumping should be expected during foundation work, particularly during the rainy season. In addition, positive drainage should be utilized by the contractor in order to prevent rain water from running into and ponding in the site slab or footing areas. If proper runoff control is not in place, undercuts and construction delays should be expected. The French Drain Detail found in the appendix should be utilized when trenching and sumping is needed.

Closing

We recommend that if there are any changes to the project characteristics as outlined in this report, ECS is retained to review the plans and determine if modifications to the recommendations or if additional geotechnical recommendations are necessary for the proposed development. Once development details are finalized, this information should be provided to ECS in order to review our recommendations and finalize this report.

The foundation installation for the project site will be primary considerations during development and construction. We recommend that the Geotechnical Engineer of Record be retained to observe the foundation bearing surfaces and to verify the proposed design bearing pressures. All earthwork and structural renovations should be performed under the supervision of the Geotechnical Engineer of Record/ approved testing agency, or his authorized representative for compliance with the project contract drawings. ECS would be pleased to provide these services.

APPENDIX

Unified Soil Classification System

Reference Notes for Boring Logs

Borings Logs B-1 to B-8

Laboratory Testing Summary

Atterberg Limits Test Summary

Grains Size Test Summary

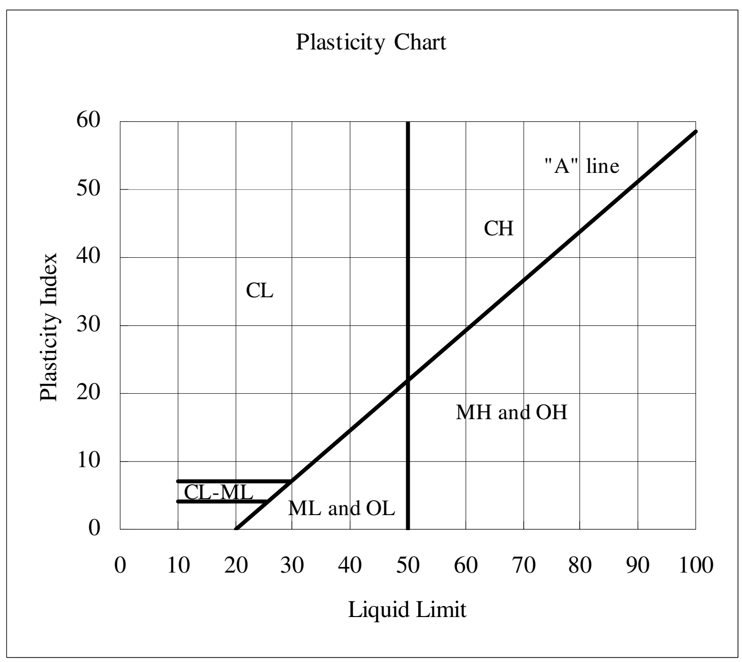
French Drain Installation Procedure

Boring Location Diagram

Cross Section A - A’

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487)

Major Divisions			Group Symbols		Typical Names	Laboratory Classification Criteria		
Coarse-grained soils (More than half of material is larger than No. 200 Sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW		Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows: Less than 5 percent: GW, GP, SW, SP; More than 12 percent: GM, GC, SM, SC; 5 to 12 percent: Borderline cases requiring dual symbols [b]	$C_u = D_{60}/D_{10}$ greater than 4 $C_c = (D_{30})^2/(D_{10} x D_{60})$ between 1 and 3	
			GP		Poorly graded gravels, gravel-sand mixtures, little or no fines		Not meeting all gradation requirements for GW	
		Gravels with fines (Appreciable amount of fines)	GM[a]	d	Silty gravels, gravel-sand mixtures		Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
				u				
			GC		Clayey gravels, gravel-sand-clay mixtures		Atterberg limits below "A" line or P.I. less than 7	
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW		Well-graded sands, gravelly sands, little or no fines		$C_u = D_{60}/D_{10}$ greater than 6 $C_c = (D_{30})^2/(D_{10} x D_{60})$ between 1 and 3	
			SP		Poorly graded sands, gravelly sands, little or no fines		Not meeting all gradation requirements for SW	
		Sands with fines (Appreciable amount of fines)	SM[a]	d	Silty sands, sand-silt mixtures		Atterberg limits above "A" line or P.I. less than 4	Limits plotting in CL-ML zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
				u				
			SC		Clayey sands, sand-clay mixtures		Atterberg limits above "A" line with P.I. greater than 7	
Fine-grained soils (More than half material is smaller than No. 200 Sieve)	Silts and clays (Liquid limit less than 50)		ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity	Plasticity Chart (see below)		
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays			
			OL		Organic silts and organic silty clays of low plasticity			
	Silts and clays (Liquid limit greater than 50)		MH		Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts			
			CH		Inorganic clays of high plasticity, fat clays			
			OH		Organic clays of medium to high plasticity, organic silts			
	Highly Organic soils		Pt		Peat and other highly organic soils			



[a] Division of GM and SM groups into subdivisions of d and u are for roads and airfields only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 28 or less and the P.I. is 6 or less; the suffix u used when L.L. is greater than 28.

[b] Borderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC,well-graded gravel-sand mixture with clay binder. (From Table 2.16 - Winterkorn and Fang, 1975)

REFERENCE NOTES FOR BORING LOGS

I. Drilling Sampling Symbols

SS	Split Spoon Sampler	ST	Shelby Tube Sampler
RC	Rock Core, NX, BX, AX	PM	Pressuremeter
DC	Dutch Cone Penetrometer	RD	Rock Bit Drilling
BS	Bulk Sample of Cuttings	PA	Power Auger (no sample)
HSA	Hollow Stem Auger	WS	Wash sample
REC	Rock Sample Recovery %	RQD	Rock Quality Designation %

II. Correlation of Penetration Resistances to Soil Properties

Standard Penetration (blows/ft) refers to the blows per foot of a 140 lb. hammer falling 30 inches on a 2-inch OD split-spoon sampler, as specified in ASTM D 1586. The blow count is commonly referred to as the N-value.

A. Non-Cohesive Soils (Silt, Sand, Gravel and Combinations)

Density		*Relative Properties*	
Under 4 blows/ft	Very Loose	Adjective Form	12% to 49%
5 to 10 blows/ft	Loose	With	5% to 12%
11 to 30 blows/ft	Medium Dense		
31 to 50 blows/ft	Dense		
Over 51 blows/ft	Very Dense		

Particle Size Identification		
Boulders		8 inches or larger
Cobbles		3 to 8 inches
Gravel	Coarse	1 to 3 inches
	Medium	½ to 1 inch
	Fine	¼ to ½ inch
Sand	Coarse	2.00 mm to ¼ inch (dia. of lead pencil)
	Medium	0.42 to 2.00 mm (dia. of broom straw)
	Fine	0.074 to 0.42 mm (dia. of human hair)
Silt and Clay		0.0 to 0.074 mm (particles cannot be seen)

B. Cohesive Soils (Clay, Silt, and Combinations)

Blows/ft	*Consistency*	*Unconfined Comp. Strength Q_p (tsf)*	*Degree of Plasticity*	*Plasticity Index*
Under 2	Very Soft	Under 0.25	None to slight	0 – 4
3 to 4	Soft	0.25-0.49	Slight	5 – 7
5 to 8	Medium Stiff	0.50-0.99	Medium	8 – 22
9 to 15	Stiff	1.00-1.99	High to Very High	Over 22
16 to 30	Very Stiff	2.00-3.00		
31 to 50	Hard	4.00–8.00		
Over 51	Very Hard	Over 8.00		

III. Water Level Measurement Symbols

WL	Water Level	BCR	Before Casing Removal	DCI	Dry Cave-In
WS	While Sampling	ACR	After Casing Removal	WCI	Wet Cave-In
WD	While Drilling	▽	Est. Groundwater Level	▼	Est. Seasonal High GWT

The water levels are those levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in a granular soil. In clay and plastic silts, the accurate determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally applied.

CLIENT	JOB #	BORING #	SHEET
Sorg & Associates	24129	B-1	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Patrick Henry ES - Expansion/Renovation	

SITE LOCATION
4643 Taney Avenue, Alexandria, City of Alexandria

NORTHING	EASTING	STATION

-O- CALIBRATED PENETROMETER TONS/FT²

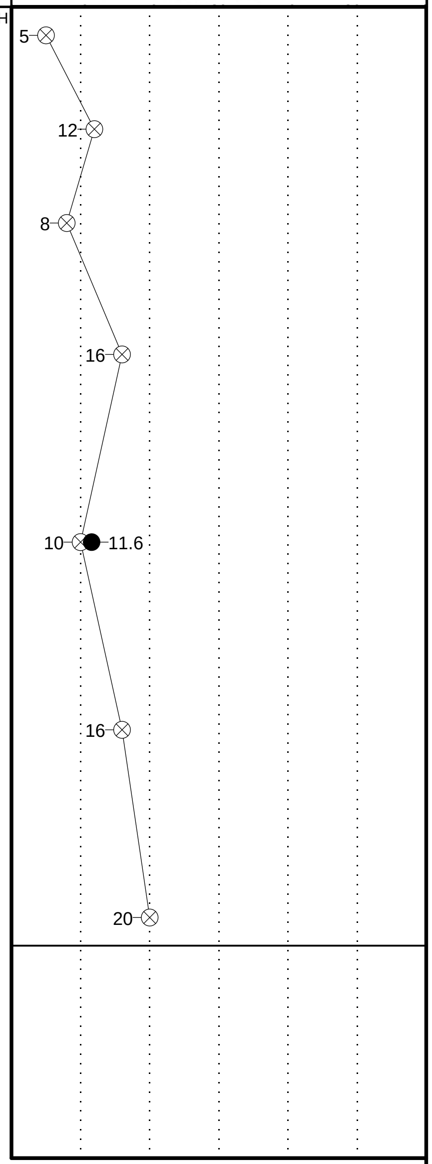
ROCK QUALITY DESIGNATION & RECOVERY: RQD% - - - REC% ———

PLASTIC LIMIT% ✕ — WATER CONTENT% ● — LIQUID LIMIT% △

⊗ STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS
BOTTOM OF CASING — LOSS OF CIRCULATION (100%)
SURFACE ELEVATION 132

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"	SPT (BLOWS/FT)
0	S-1	SS	18	12	Topsoil Depth [7"] (CL FILL) SANDY LEAN CLAY, Contains Roots, Brown, Moist, Medium Stiff		130	WOH 2 3	5
	S-2	SS	18	12	(CL) SANDY LEAN CLAY, Brown, Moist, Stiff			3 5 7	12
5	S-3	SS	18	0	(SP) SAND, Trace Clay, Yellow, Moist, Loose to Medium Dense, Contains trace Quartz Fragments		125	3 4 4	8
10	S-4	SS	18	8			120	5 8 8	16
15	S-5	SS	18	12			115	4 5 5	10 (Water content 11.6)
20	S-6	SS	18	17			110	5 8 8	16
	S-7	SS	18	12	(CL) LEAN CLAY, Trace Sand, Grayish White, Moist, Very Stiff, Contains Trace Quartz Fragments			6 9 11	20
25					END OF BORING @ 25.00'		105		
30									



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL WS ☐ WD ☐	BORING STARTED 03/09/15	
WL(BCR) WL(ACR)	BORING COMPLETED 03/09/15	CAVE IN DEPTH @ 18.00'
WL	RIG 750 ATV FOREMAN DAVID MCLEAN	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
Sorg & Associates	24129	B-2	1 OF 1

PROJECT NAME: Patrick Henry ES - Expansion/Renovation

ARCHITECT-ENGINEER:

SITE LOCATION: 4643 Taney Avenue, Alexandria, City of Alexandria

NORTHING: | EASTING: | STATION:

ECS

—O— CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% — — — REC% ———

PLASTIC LIMIT% × — WATER CONTENT% ● — LIQUID LIMIT% △

⊗ STANDARD PENETRATION BLOWS/FT

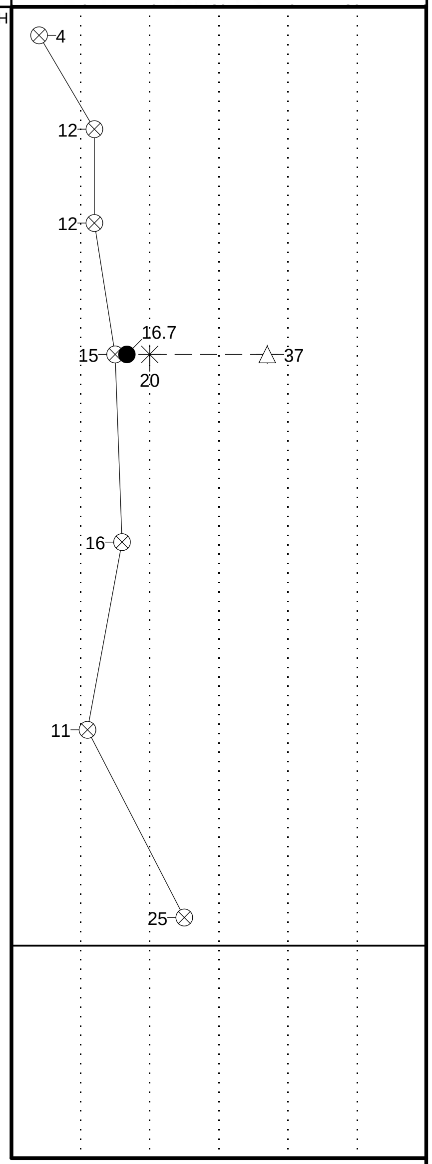
DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION (100%)

SURFACE ELEVATION 130.5

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	BLOWS/6"	STANDARD PENETRATION BLOWS/FT
0	S-1	SS	18	6	WOH 2 2	4
	S-2	SS	18	12	3 5 7	12
5	S-3	SS	18	11	6 4 8	12
	S-4	SS	18	12	7 8 7	15 (Plastic Limit 20, Water Content 16.7, Liquid Limit 37)
15	S-5	SS	18	8	6 7 9	16
20	S-6	SS	18	12	4 6 5	11
25	S-7	SS	18	11	9 11 14	25

DEPTH (FT)	DESCRIPTION OF MATERIAL	ELEVATION (FT)
0	Topsoil Depth [7"]	130
	(CL FILL) LEAN CLAY, Contains Roots, Brown, Moist, Soft	
	(CL) SANDY LEAN CLAY, Brown and Gray, Moist, Stiff	
	(SC) CLAYEY SAND, Yellowish Brown, Moist, Medium Dense	125 / 120 / 115
	(CL) SANDY LEAN CLAY, Orange and Gray, Moist, Stiff	110
	(CL) LEAN CLAY, Trace Sand, Orange and Gray, Moist, Very Stiff	
25	END OF BORING @ 25.00'	105 / 100



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL — WS ☐ WD ☐	BORING STARTED 03/09/15	
WL(BCR) — WL(ACR)	BORING COMPLETED 03/09/15	CAVE IN DEPTH @ 17.50'
WL	RIG 750 ATV — FOREMAN DAVID MCLEAN	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
Sorg & Associates	24129	B-3	1 OF 1

PROJECT NAME: Patrick Henry ES - Expansion/Renovation

ARCHITECT-ENGINEER:

SITE LOCATION: 4643 Taney Avenue, Alexandria, City of Alexandria

NORTHING: | EASTING: | STATION:

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION

SURFACE ELEVATION 132.5

CALIBRATED PENETROMETER TONS/FT²

ROCK QUALITY DESIGNATION & RECOVERY — RQD% — REC%

PLASTIC LIMIT% — WATER CONTENT% — LIQUID LIMIT%

STANDARD PENETRATION BLOWS/FT

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	BLOWS/6"	SPT BLOWS/FT	WATER CONTENT%
0	S-1	SS	18	11	Topsoil Depth [18"]		WOH, 2, 4	6	
					(SC) CLAYEY SAND, Brown, Moist, Loose	130			
	S-2	SS	18	14			2, 4, 4	8	
5					(CL) LEAN CLAY, Gray, Moist, Stiff				
	S-3	SS	18	8			2, 5, 5	10	35.7
					(SP) SAND, Brown, Moist, Medium Dense	125			
	S-4	SS	18	12			5, 7, 4	11	
10									
					(SP) SAND, Trace Clay, Yellow, Moist, Medium Dense	120			
	S-5	SS	18	12			5, 7, 8	15	
15						115			
	S-6	SS	18	12			8, 9, 7	16	
20						110			
	S-7	SS	18	12			7, 9, 9	18	
25					END OF BORING @ 25.00'				
						105			
30									

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL — WS ☐ — WD ☐	BORING STARTED 03/09/15	
WL(BCR) — WL(ACR)	BORING COMPLETED 03/09/15	CAVE IN DEPTH @ 19.70'
WL	RIG 750 ATV — FOREMAN DAVID MCLEAN	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
Sorg & Associates	24129	B-4	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Patrick Henry ES - Expansion/Renovation	

SITE LOCATION

4643 Taney Avenue, Alexandria, City of Alexandria

NORTHING	EASTING	STATION

-O- CALIBRATED PENETROMETER TONS/FT²

ROCK QUALITY DESIGNATION & RECOVERY

RQD% – — – REC% ———

PLASTIC LIMIT% — WATER CONTENT% — LIQUID LIMIT%

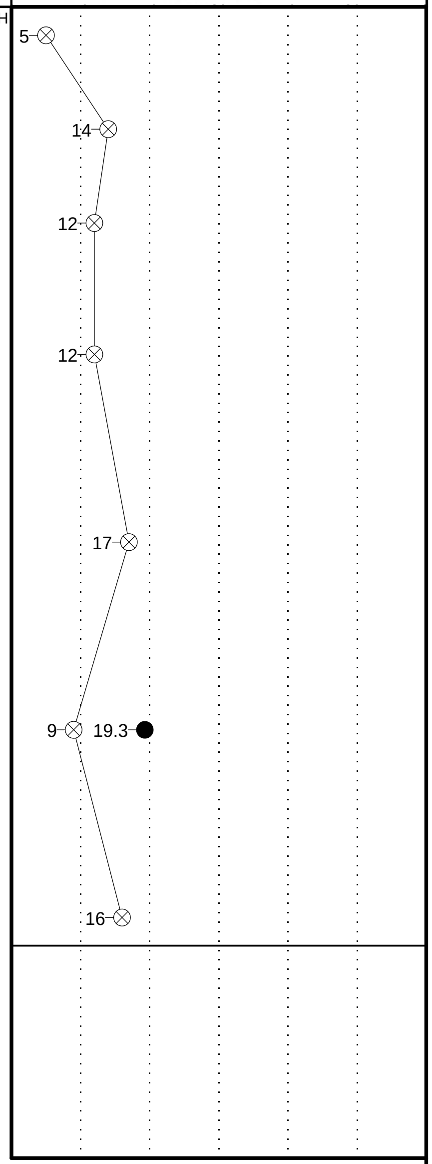
⊗ STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION 128

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"	SPT N (BLOWS/FT)
0	S-1	SS	18	12	Topsoil Depth [7"] (CL FILL) LEAN CLAY, Contains Roots, Brown, Moist, Medium Stiff			WOH 2 3	5
	S-2	SS	18	14	(SC) CLAYEY SAND, Yellowish Brown, Moist, Medium Dense		125	4 7 7	14
5	S-3	SS	18	12	(CL) SANDY LEAN CLAY, Contains Slight Roots, Brown and Red, Moist, Stiff			4 7 5	12
	S-4	SS	18	12	(SP) SAND, Trace Clay, Yellow, Moist, Loose to Medium Dense		120	5 7 5	12
10							115		
15	S-5	SS	18	18				4 6 11	17
20	S-6	SS	18	14			110	3 4 5	9 (Water content 19.3)
	S-7	SS	18	12	(SC) CLAYEY SAND, Gray and Brown, Moist, Medium Dense		105	3 6 10	16
25					END OF BORING @ 25.00'				
30							100		



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL — WS ☐ — WD ☐	BORING STARTED 03/09/15	
WL(BCR) — WL(ACR)	BORING COMPLETED 03/09/15	CAVE IN DEPTH @ 18.00'
WL	RIG 750 ATV — FOREMAN DAVID MCLEAN	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
Sorg & Associates	24129	B-5	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Patrick Henry ES - Expansion/Renovation	

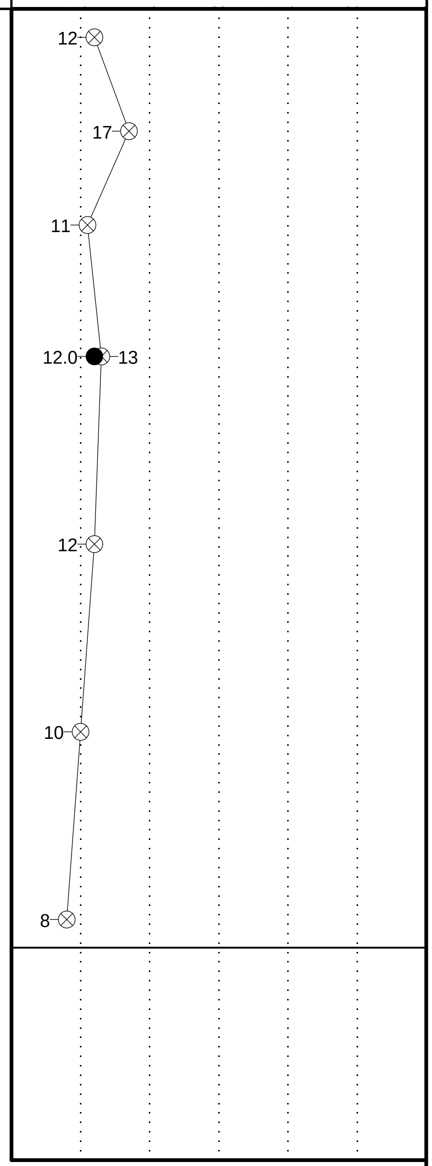
SITE LOCATION
4643 Taney Avenue, Alexandria, City of Alexandria

NORTHING	EASTING	STATION

-O- CALIBRATED PENETROMETER TONS/FT²
ROCK QUALITY DESIGNATION & RECOVERY
RQD% - - - REC% ———
PLASTIC LIMIT% X — WATER CONTENT% ● — LIQUID LIMIT% △
⊗ STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS
BOTTOM OF CASING — LOSS OF CIRCULATION 100%
SURFACE ELEVATION 136.5

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"	SPT (BLOWS/FT)
0	S-1	SS	18	10	Topsoil Depth [7"] (CL FILL) SANDY LEAN CLAY, Brown, Moist, Stiff		135	3 5 7	12
	S-2	SS	18	18	(SC) CLAYEY SAND, Reddish Brown, Moist, Medium Dense			5 8 9	17
5	S-3	SS	18	18	(SP) SAND, Yellow, Moist, Medium Dense		130	6 5 6	11
10	S-4	SS	18	12			125	4 4 9	13 (12.0)
15	S-5	SS	18	18			120	4 5 7	12
20	S-6	SS	18	18	(SP) SAND, Trace Clay, Brownish Yellow, Moist, Loose		115	3 5 5	10
25	S-7	SS	18	18	(CL) LEAN CLAY, Trace Sand, Gray and Orange, Moist, Medium Stiff			3 4 4	8
					END OF BORING @ 25.00'		110		
30									



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL WS☐ WD☐	BORING STARTED 03/06/15	
WL(BCR) WL(ACR)	BORING COMPLETED 03/06/15	CAVE IN DEPTH @ 18.00'
WL	RIG 750 ATV FOREMAN DAVID MCLEAN	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
Sorg & Associates	24129	B-6	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Patrick Henry ES - Expansion/Renovation	

SITE LOCATION

4643 Taney Avenue, Alexandria, City of Alexandria

NORTHING	EASTING	STATION

–○– CALIBRATED PENETROMETER TONS/FT²

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% — WATER CONTENT% — LIQUID LIMIT%

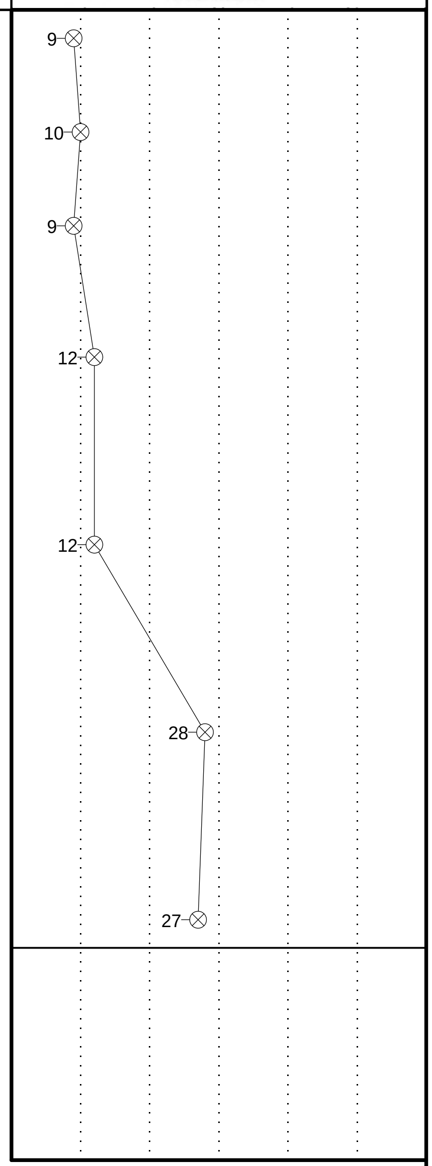
⊗ STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION 136

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	18	18	Topsoil Depth [6"] (SP) SAND, Trace Clay, Yellow, Moist, Loose		135	2 3 6
	S-2	SS	18	18	(SP) SAND, Trace Clay, Grayish White, Moist, Loose			3 5 5
5	S-3	SS	18	18			130	4 5 4
	S-4	SS	18	18	(SP) SAND, Trace Clay, Yellow, Moist, Medium Dense			4 5 7
10							125	
	S-5	SS	18	18				5 5 7
15							120	
	S-6	SS	18	18				8 12 16
20							115	
	S-7	SS	18	18	(SP-SC) SAND WITH CLAY, Yellow, Moist, Medium Dense			11 12 15
25					END OF BORING @ 25.00'		110	
30								



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL — WS ☐ WD ☐	BORING STARTED 03/06/15	
WL(BCR) — WL(ACR)	BORING COMPLETED 03/06/15	CAVE IN DEPTH @ 18.00'
WL	RIG 750 ATV — FOREMAN DAVID MCLEAN	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
Sorg & Associates	24129	B-7	1 OF 1

PROJECT NAME: Patrick Henry ES - Expansion/Renovation

ARCHITECT-ENGINEER:

SITE LOCATION: 4643 Taney Avenue, Alexandria, City of Alexandria

NORTHING: | EASTING: | STATION:

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION 140

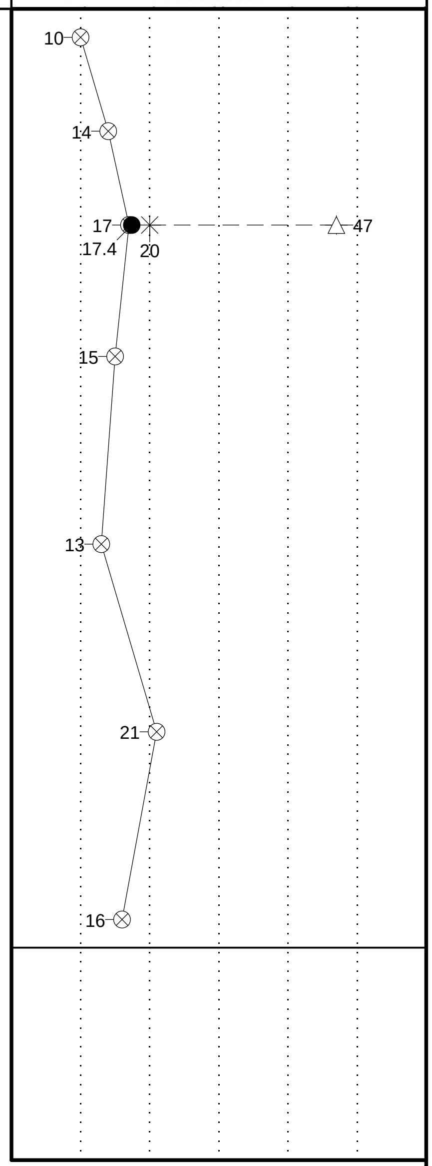
CALIBRATED PENETROMETER TONS/FT²

ROCK QUALITY DESIGNATION & RECOVERY: RQD% - - - REC% ———

PLASTIC LIMIT% — WATER CONTENT% — LIQUID LIMIT%

STANDARD PENETRATION BLOWS/FT

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	18	15	Topsoil Depth [6"] (CL FILL) LEAN CLAY, Brown, Moist, Stiff	140	3 5 5
	S-2	SS	18	11	(CL) SANDY LEAN CLAY, Yellowish Brown, Moist, Stiff to Very Stiff		3 6 8
5	S-3	SS	18	13		135	8 8 9
10	S-4	SS	18	18		130	5 7 8
					(SP) SAND, Yellow, Moist, Medium Dense		
15	S-5	SS	18	18		125	4 6 7
20	S-6	SS	18	14		120	6 10 11
					(SP) SAND, Trace Clay, Yellow, Moist, Medium Dense		
25	S-7	SS	18	12		115	6 7 9
					END OF BORING @ 25.00'		
30						110	



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL WS ☐ WD ☐	BORING STARTED 03/06/15	
WL(BCR) WL(ACR)	BORING COMPLETED 03/06/15	CAVE IN DEPTH @ 17.20'
WL	RIG 750 ATV FOREMAN DAVID MCLEAN	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
Sorg & Associates	24129	B-8	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Patrick Henry ES - Expansion/Renovation	

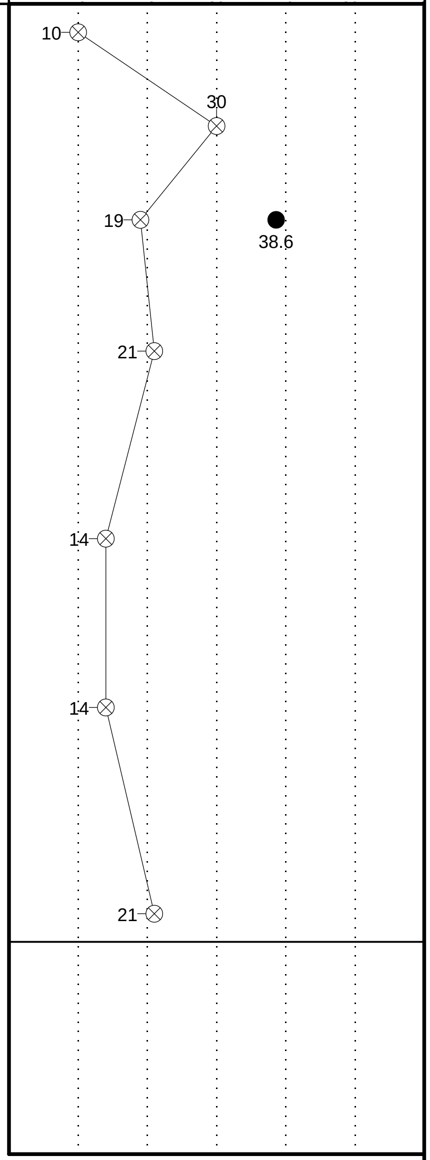
SITE LOCATION
4643 Taney Avenue, Alexandria, City of Alexandria

NORTHING	EASTING	STATION

-O- CALIBRATED PENETROMETER TONS/FT^2
ROCK QUALITY DESIGNATION & RECOVERY
RQD% — — — REC% ———
PLASTIC LIMIT% — WATER CONTENT% — LIQUID LIMIT%
⊗ STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS
BOTTOM OF CASING — LOSS OF CIRCULATION
SURFACE ELEVATION 140.5

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	18	12	Topsoil Depth [7"] (CL) SANDY LEAN CLAY, Gray and Brown, Moist, Stiff		140	1 3 7
	S-2	SS	18	18	(CL) LEAN CLAY, Gray and Brown, Moist, Very Stiff			7 13 17
5	S-3	SS	18	12			135	6 9 10
10	S-4	SS	18	18			130	5 8 13
15	S-5	SS	18	12	(SC) CLAYEY SAND, Contains Slight Mica, Orange and White, Moist, Medium Dense		125	4 6 8
20	S-6	SS	18	14			120	5 7 7
25	S-7	SS	18	18			115	5 9 12
					END OF BORING @ 25.00'			
30							110	



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL WS ☐ WD ☐	BORING STARTED 03/09/15	
WL(BCR) WL(ACR)	BORING COMPLETED 03/09/15	CAVE IN DEPTH @ 19.00'
WL	RIG 750 ATV FOREMAN DAVID MCLEAN	DRILLING METHOD 2.25 HSA

Laboratory Testing Summary

Sample Source	Sample Number	Depth (feet)	MC[1] (%)	Soil Type[2]	Atterberg Limits[3] LL	PL	PI	Percent Passing No. 200 Sieve[4]	Moisture - Density (Corr.)[5] Maximum Density (pcf)	Optimum Moisture (%)	CBR Value[6]	Other
B-1												
	S-5	13.50 - 15.00	11.6									
B-2												
	S-4	8.50 - 10.00	16.7	SC	37	20	17	40.0				
B-3												
	S-3	5.00 - 6.50	35.7									
B-4												
	S-6	18.50 - 20.00	19.3									
B-5												
	S-4	8.50 - 10.00	12.0									
B-7												
	S-3	5.00 - 6.50	17.4	CL	47	20	27	51.8				
B-8												
	S-3	5.00 - 6.50	38.6									

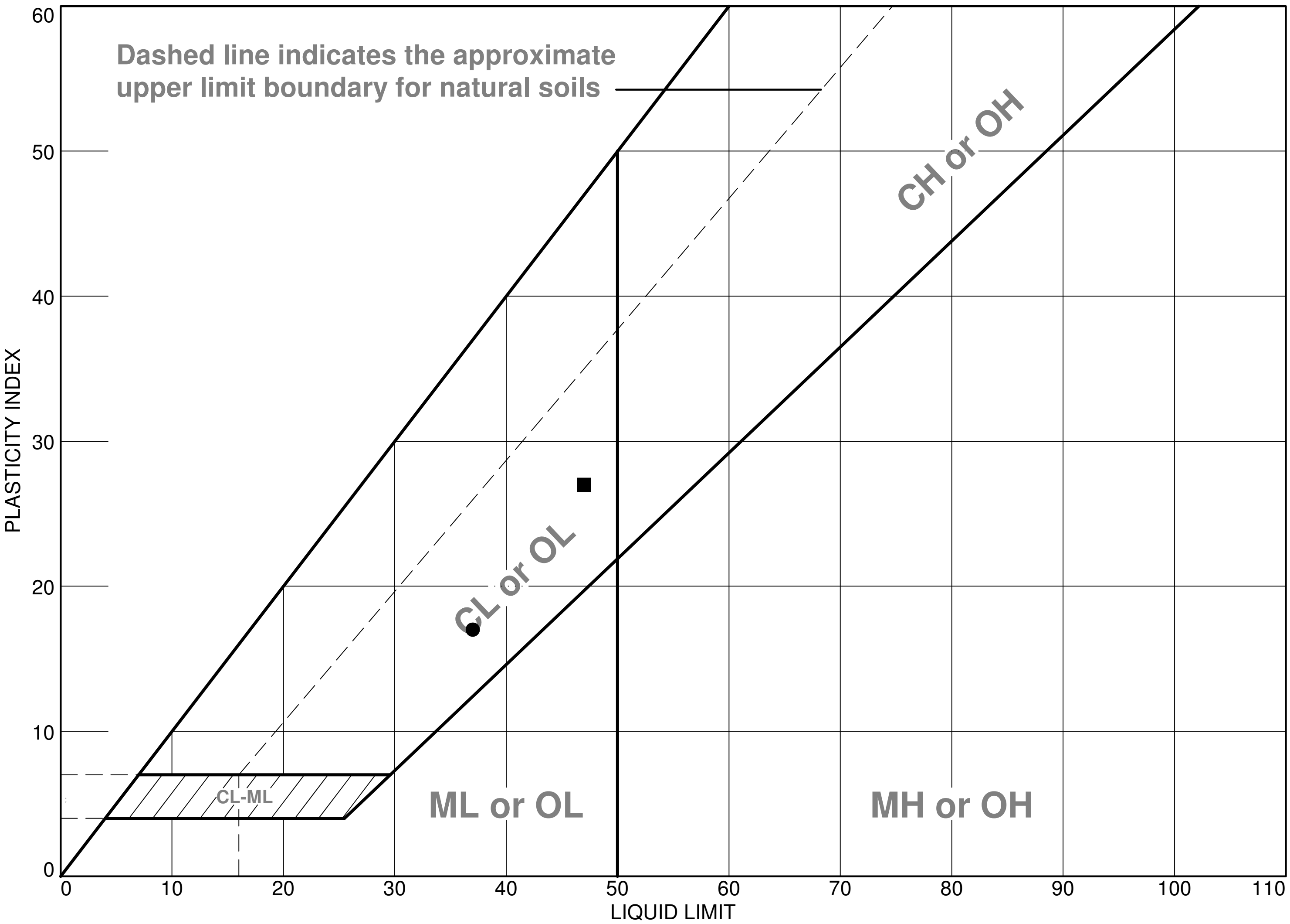
Notes: 1. ASTM D 2216, 2. ASTM D 2487, 3. ASTM D 4318, 4. ASTM D 1140, 5. See test reports for test method, 6. See test reports for test method

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content (ASTM D 2974)

Project No. 24129
Project Name: Patrick Henry ES - Expansion/Renovation
PM: Andy Tao
PE: Bryan C. Layman
Printed On: Wednesday, March 25, 2015

ECS MID-ATLANTIC, LLC
14026 Thunderbolt Place, Suite 100
Chantilly, VA 20151-3232
Phone: (703) 471-8400
Fax: (703) 834-5527

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clayey Sand Yellowish Brown(SC)	37	20	17	83.2	40.0	SC
■	Sandy Lean Clay Yellowish Brown(CL)	47	20	27	70.6	51.8	CL

Project No. 24129 **Client:** Sorg & Associates

Project: Patrick Henry ES - Expansion/Renovation

● **Source of Sample:** B-2 **Depth:** 8.50-10.00 **Sample Number:** S-4

■ **Source of Sample:** B-7 **Depth:** 5.00-6.50 **Sample Number:** S-3

Remarks:

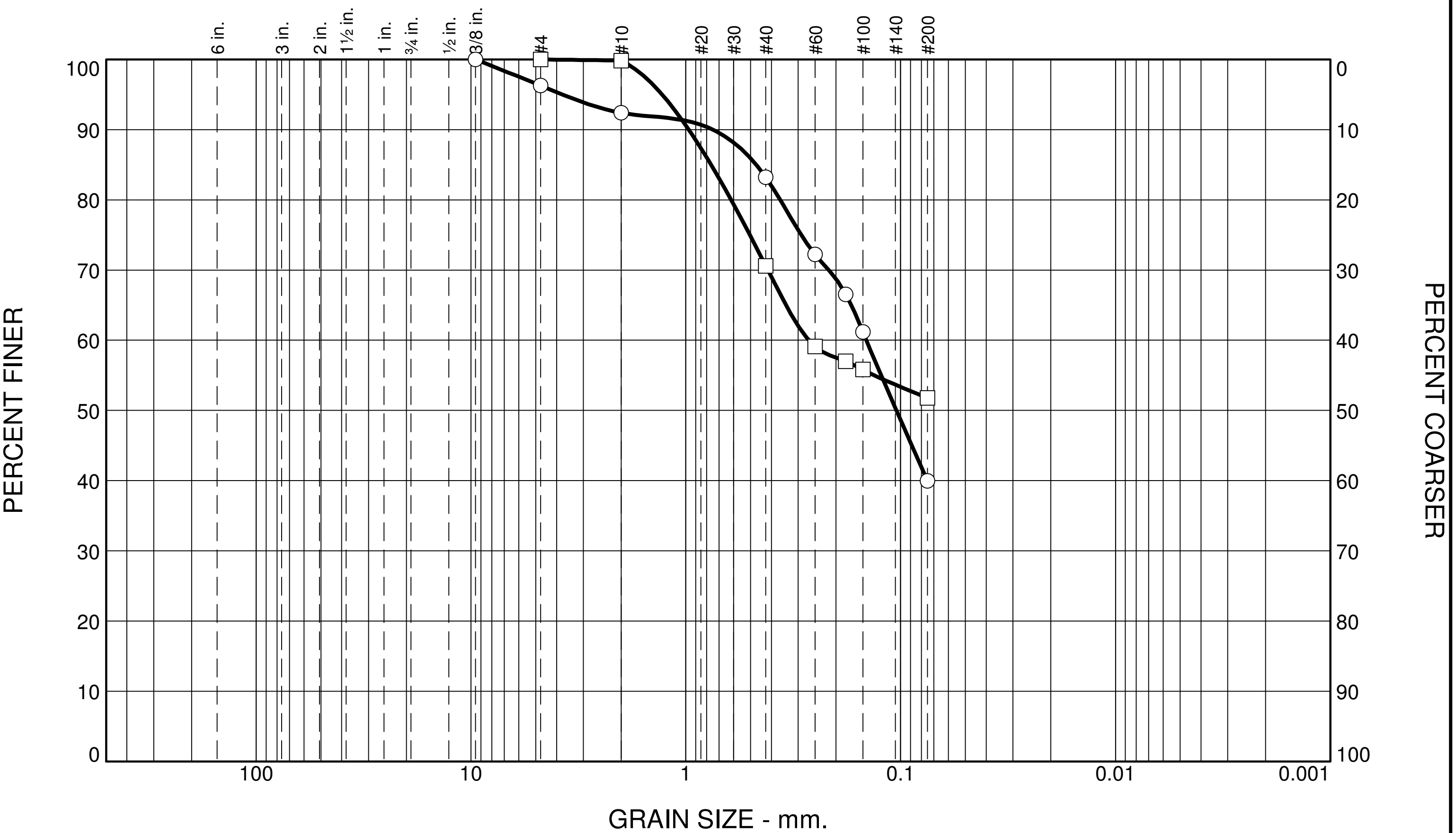
● Data Entered: 3/16/15

ECS MID-ATLANTIC, LLC
14026 Thunderbolt Place, Suite 100
Chantilly, VA 20151-3232
Phone: (703) 471-8400
Fax: (703) 834-5527

Figure

Tested By: HNT **Checked By:** DVT

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	3.7	56.3	40.0		SC	37	20	17
□	0.0	0.0	48.2	51.8		CL	47	20	27

SIEVE inches size	PERCENT FINER ○	□	
0.375	100.0		
	GRAIN SIZE		
D_{60}	0.1444	0.2673	
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	
#4	96.3	100.0	
#10	92.4	99.8	
#40	83.2	70.6	
#60	72.2	59.1	
#80	66.5	57.0	
#100	61.2	55.8	
#200	40.0	51.8	

Material Description

○ Clayey Sand Yellowish Brown(SC)

□ Sandy Lean Clay Yellowish Brown(CL)

REMARKS:

○

□ Data Entered: 3/16/15

○ Source of Sample: B-2 Depth: 8.50-10.00 Sample Number: S-4

□ Source of Sample: B-7 Depth: 5.00-6.50 Sample Number: S-3

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Client: Sorg & Associates

Project: Patrick Henry ES - Expansion/Renovation

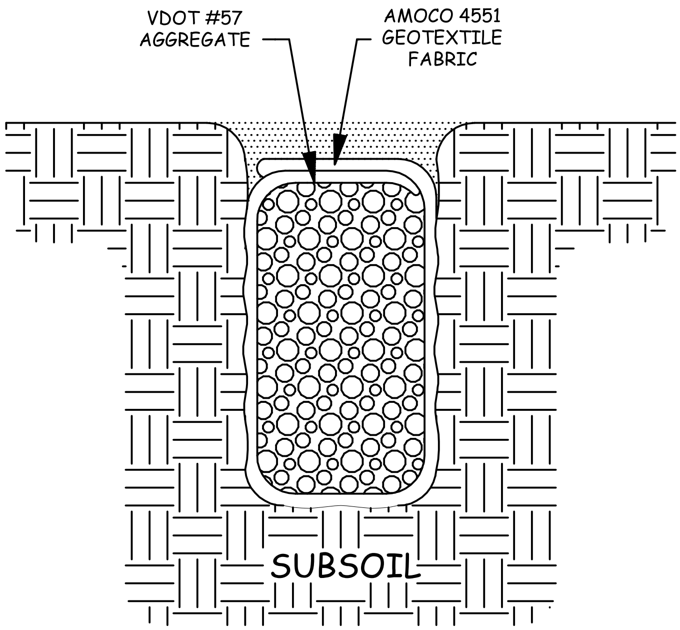
Project No.: 24129 Figure

Tested By: HNT **Checked By:** DVT

FRENCH DRAIN
INSTALLATION PROCEDURE

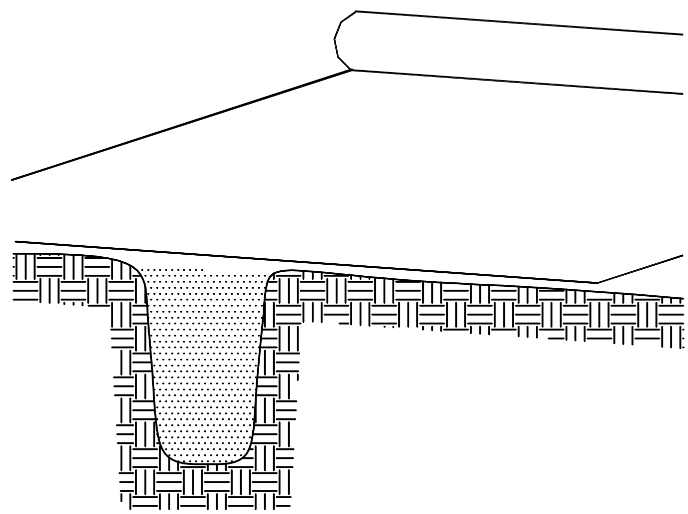
NOT TO SCALE

FINAL CONFIGURATION



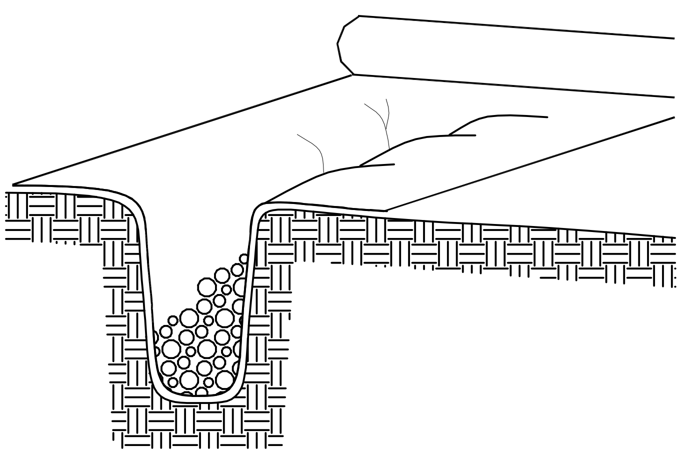
SUBDRAIN USING FILTER FABRIC

STEP 1



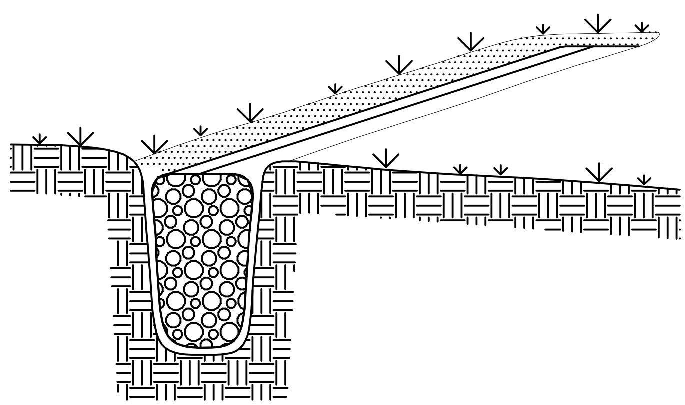
FABRIC IS UNROLLED DIRECTLY OVER TRENCH

STEP 2



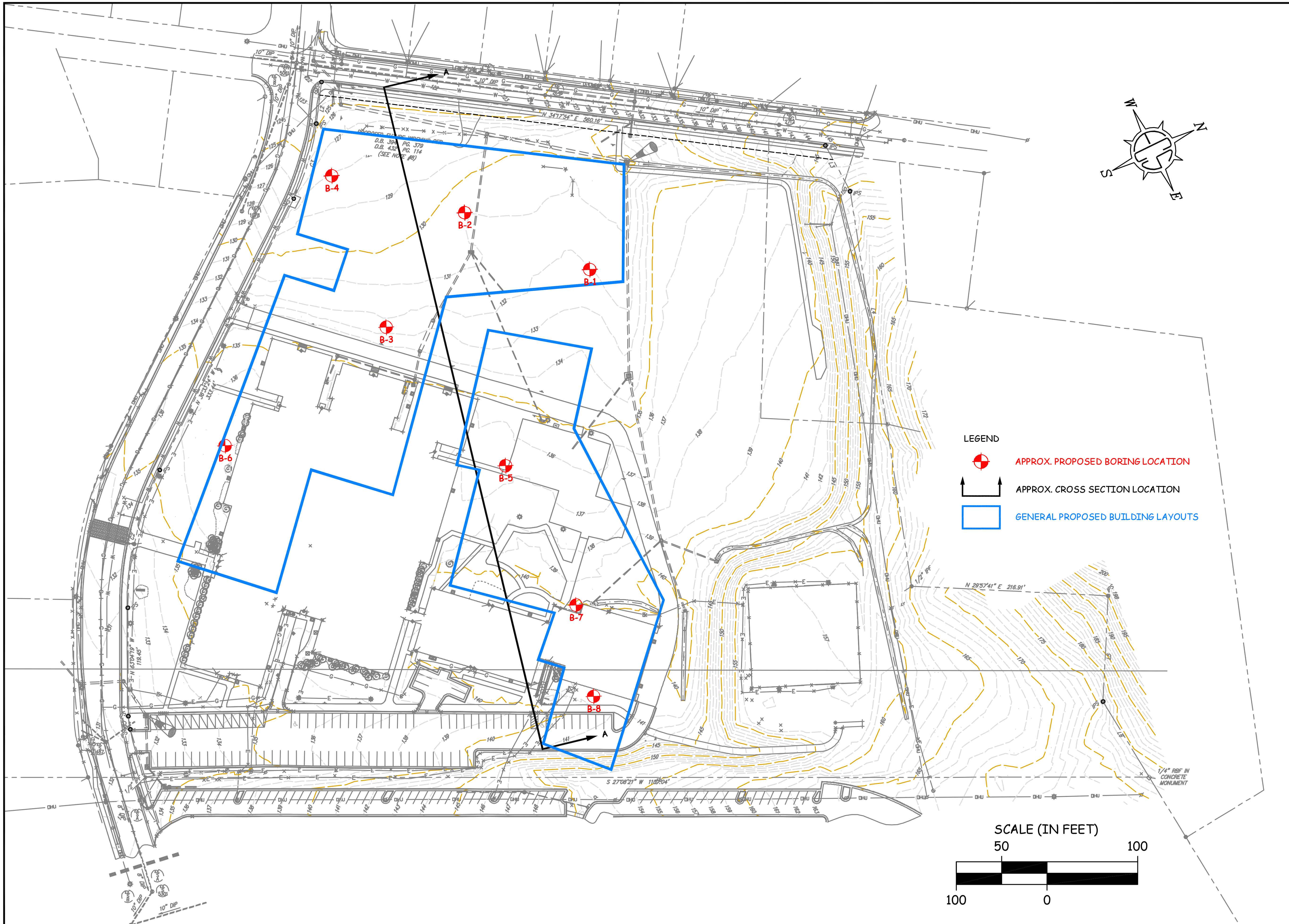
THE TRENCH IS FILLED WITH AGGREGATE

STEP 3



THE FABRIC IS LAPPED CLOSED AND
COVERED WITH BASE STONE

ECS LLC
MID-ATLANTIC



PATRICK HENRY ELEMENTARY SCHOOL

ALEXANDRIA, VA

PROPOSED BORING LOCATION DIAGRAM

ECS REVISIONS	
ENGINEER AT	DRAFTING RAC
SCALE 1"=100'	
PROJECT NO. 24129	
SHEET 1 OF 2	
DATE 03-10-15	

SOIL CLASSIFICATION LEGEND

ST - SHELBY TUBE
RC - ROCK CORE
PM - PRESSURE METER

- GW - WELL GRADED GRAVEL
- GM - SILTY GRAVEL
- GP - POORLY GRADED GRAVEL
- GC - CLAYEY GRAVEL
- SW - WELL GRADED SAND
- ML - LOW PLASTICITY SILT
- CL - LOW PLASTICITY CLAY
- MH - HIGH PLASTICITY SILT
- SM - SILTY SAND
- SP - POORLY GRADED SAND
- SC - CLAYEY SAND
- CH - HIGH PLASTICITY CLAY
- OH - HIGH PLASTICITY ORGANIC SILTS AND CLAYS
- OL - LOW PLASTICITY ORGANIC SILTS AND CLAY
- PT - PEAT
- FILL OF ALL TYPES.
- WEATHERED ROCK
- PROBABLE FILL OF ALL TYPES.
- POSSIBLE FILL OF ALL TYPES.

SURFACE MATERIALS

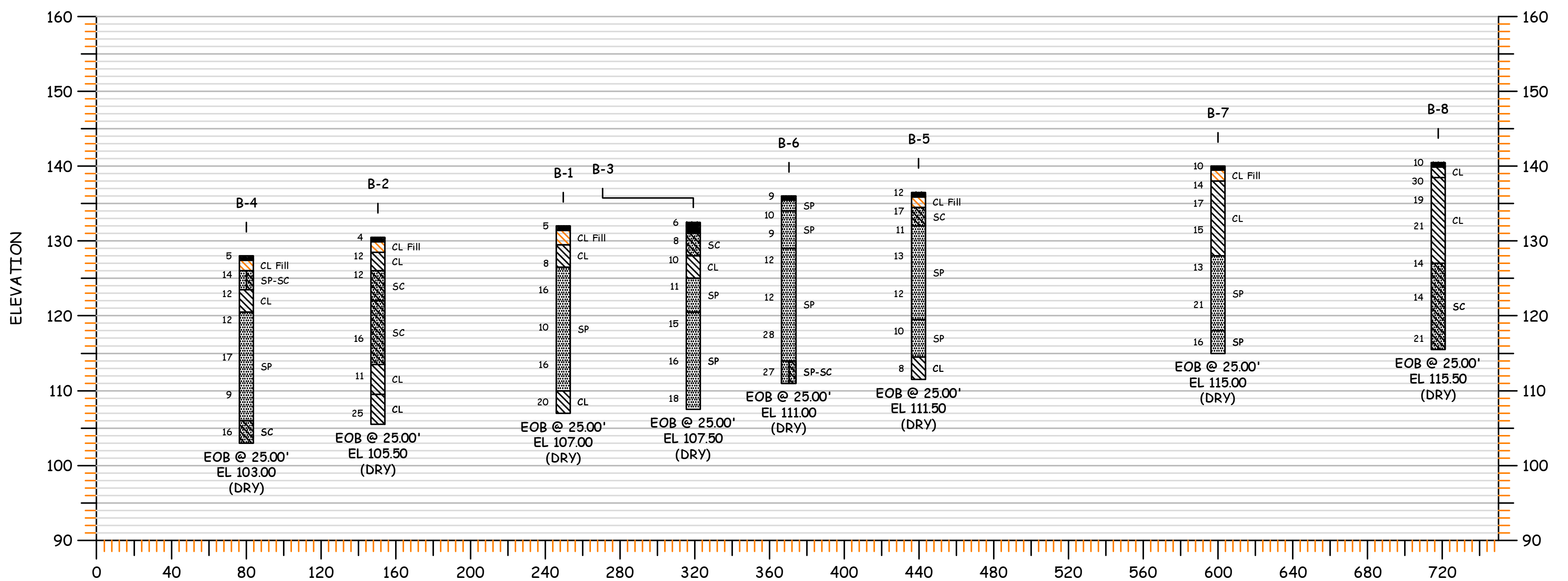
- TOPSOIL
- CONCRETE
- ASPHALT
- VOID
- GRAVEL

ROCK TYPES

- IGNEOUS
- METAMORPHIC
- SEDIMENTARY

SYMBOL LEGEND

- WATER LEVEL - DURING DRILLING/SAMPLING
- WATER LEVEL - BEFORE CASING REMOVAL
- WATER LEVEL - AFTER CASING REMOVAL
- WATER LEVEL - AFTER 24 HOURS



SCALE
VERTICAL SCALE 1"=20'
HORIZONTAL SCALE 1"=80'

PATRICK HENRY ELEMENTARY SCHOOL
ALEXANDRIA, VA

CROSS SECTION A-A

ECS REVISIONS	
ENGINEER AT	DRAFTING RAC
SCALE AS NOTED	
PROJECT NO. 24129	
SHEET 2 OF 2	
DATE 03-26-15	

Sorg Architects

Expansion/Renovation and Reconfiguration of Existing Patrick Henry School

MEP Master Plan

Draft 2 | 8 April 2015

Job number 240471-00

Arup USA, Inc
1120 Connecticut Ave N.W.
Washington
DC 20036
United States of America
www.arup.com

ARUP

Contents

1 MEP Systems Introduction

The existing Alexandria City Patrick Henry School has approximately 63,000 square feet of program space. The proposed program area is approximately 132,000 square feet of program space for the school and approximately 25,000 square feet of Recreation Center program space. There are three options for the project. One option includes renovation and expansion of the existing school. Two options are comprised of a new facility in different configurations on the site. All options include a new Recreation Center on the site.

The MEP systems will be designed and installed to provide the best value, proper functionality, support sustainable practices and the space plan provided for the school and the recreation center appropriately.

2 Elementary School

2.1 Mechanical

2.1.1 Existing Systems

The current mechanical systems are comprised of various types of equipment for the building. The original steam boiler with local classroom unit ventilators has long been removed. Roof Top DX packaged units are located on the original building built in 1952. These packaged units were installed within the past 10-15 years and each unit serves various classrooms. Various split system dx units also serve areas within the original structure. The new addition built in 2011, utilizes air cooled heat pumps for the classrooms. Each classroom has its own dedicated air handling unit in a closet. Cabinet unit heaters are strategically located at each exterior door.

The existing mechanical equipment is nearing the end of the service life. This equipment will soon need replacement. With this new replacement, the equipment will be more energy efficient and energy costs will be reduced.

One of the major factors associated with the existing HVAC systems is zone control. Currently the existing systems are zoned with large expansive areas being grouped together regardless of utilization. The expansion in 2011 provided the appropriate class room zone control, but the systems being utilized provide minimal operating cost savings.

2.1.2 New Systems

2.1.2.1 Renovation

If the school is renovated, the mechanical equipment should be replaced with DX Rooftop Package units. In addition to providing new roof top equipment, new local zone terminal units should be installed to provide the appropriate zoning per classroom. With this zoning, a variable volume system will provide accurate conditioning of the spaces and demand control ventilation can be utilized. New

DX Rooftop Packaged units utilize multiple compressors with variable load capacity reduction.

The existing ductwork can remain and terminal boxes will be installed for each classroom. Local temperature sensors in each classroom will provide accurate control of each terminal box and provide feedback to each Rooftop Unit. Each Rooftop Unit will be controlled appropriately by polling terminal zones. With duct mounted CO^2 sensors, demand control ventilation will be utilized and outdoor air will be modulated as needed.

2.1.2.2 New Building

With new technologies and systems to control HVAC systems, there are numerous opportunities to save energy, reduce operating cost, provide accurate conditioning of spaces and control systems based on usage, occupancy and appropriate utilization.

With new technologies including systems with variable airflow, variable speed compressors and overall increase in system efficiencies, these new systems provide alternative ways of reducing energy and providing the indoor air quality and comfort required per zone as needed.

High Efficient options for this type of school are:

- DX Rooftop Packaged Cooling with Natural Gas Heat
- Water Cooled Chillers with Natural Gas Boilers
- Water Source Heat Pumps with Geothermal Ground Source Piping

2.1.3 Life Cycle Cost Analysis

With the space types and square footage of both the School and the Recreation Center, various system types present different opportunities for energy reduction and environmental conditions. A 25 year life cycle cost analysis has been performed comparing the three system options for the mechanical equipment. This life cycle cost analysis has taken into account initial installation costs, maintenance costs, operating costs and any replacement costs during this 25 year life cycle.

Per the cost estimate provided by the Forella Group, the initial cost of the systems are broken down as:

DX Rooftop Packaged Units	- $5,855,850
Chillers and Boiler Package	- $6,084,000
Water Source Heat Pumps w/Geothermal	- $7,605,000

The life cycle costs analysis takes into account an energy code compliant building and compares mechanical costs only. The envelope, lighting, and miscellaneous electrical loads have all been assumed and remain constant throughout each system type. The LCCA utilizes a cost of $0.08 per kilowatt hour for all systems and the minimum, code compliant, Energy Efficiency Ratio is utilized for each system type. The total energy costs per system type are calculated per year, in addition to the maintenance costs per year for each system type. A 5% escalation of both energy and costs are utilized per year for the Life Cycle Cost Analysis.

The American Society of Heating, Refrigeration and Air Conditioning Engineers provides service life estimates for all equipment types. The life cycle takes into account these estimates in service life for the each option. Packaged Roof Top Units and Water Source Heat Pumps have a 15 year service life. The chilled water/boiler water system has a greater than 25 year service life. Replacement costs, at the end of the 15 year service life, have been included in the LCCA for the Packaged Roof Top Unit option and the Water Source Heat Pump option.

For a 25 year span, the total Life Cycle Costs for each system are as follows:

DX Rooftop Packaged Units	- $8,370,928
Chillers and Boiler Package	- $7,683,312
Water Source Heat Pumps w/Geothermal	- $10,099,783

This life cycle cost does not take into account the 15 yr replacement of the DX Roof Top Unit option and the Water Source Heat Pump option. With these replacement costs, only the equipment, controls and miscellaneous costs are included in the price.

The 15 yr replacement costs are as follows:

DX Rooftop Packaged Units	-$4,175,145
Chillers and Boiler Package	-$3,802,500*
Water Source Heat Pumps w/Geothermal	-$5,171,400

*(30 Year Replacement cost not taken into account in the 25 yr life cycle costs)

These replacement costs will need to be considered and taken into account (added to the 25yr costs) when comparing each system during a 25 yr life cycle. These costs are shown in the attached documents provided for the Life Cycle Costs Analysis.

2.1.3.1 Recommendations

Space differences in regards to each option may play a role in selection. For the DX Rooftop Packaged units, this option requires the least amount of space within the building. Equipment is located on the roof, ductwork is distributed through the school and terminal boxes are located above the ceiling. The chiller/boiler package will required a central mechanical room, and mechanical rooms to house Air Handling Units. Terminal boxes and ductwork will be located above the ceilings. For the Water Source Heat Pump option, the heat pumps will be located above the ceiling with the ductwork. There will be a small mechanical room housing the pumps and piping manifolds.

The Life Cycle Cost Analysis (LCCA) has provide valuable economic data to make an educated recommendation for the HVAC systems. The recommendation for the system is based on sustainability objectives, first costs, and operating costs. Based on the LCCA, Arup views the DX Rooftop Packaged Units as the most economical, sustainable, and overall best package from a value standpoint. This system will provide the required zoning, the best temperature reset, and also provide the energy usage and savings for the school. If high efficient DX Roof Top Units are selected with energy recovery, step down capacity reduction and variable speed fans, these units will provide reliable and dependable systems for the facility.

2.2 Plumbing

2.2.1 Existing Systems

The existing plumbing systems are based on the existing floor plan and provide adequate support for bathroom plumbing fixtures and kitchen appliances. Roof drain leaders provide a pathway for storm water to be dispersed through the building and out to the underground storm sewer system. A domestic water heater is located in the main mechanical room. The domestic water heater was installed in 2011. Natural gas piping routed on the roof supports the kitchen, the domestic water heater and comfort heating furnaces in all packaged roof top units.

2.2.2 New Systems

New efficient plumbing systems shall be utilized to preserve resources and reduce energy usage. Those include but are not limited to:

- Low flow fixtures
- High Efficient Water Heaters
- Domestic Hot Water Circulation Loops

2.3 Fire Protection Systems

2.3.1 Existing System

The existing school building is not sprinklered and not provided with a standpipe system. There is an existing 3-inch domestic water service to the building.

2.3.2 New System

For all options (since the renovation will be a Level 3 alteration), fire areas greater than 20,000 SF are required to be provided with sprinkler protection for the Educational occupancy building. Therefore, it is expected the building will be fully sprinklered. Class I standpipes are required for buildings where the highest floor level is more than 30 feet above the lowest level of fire department response. Therefore, it is expected that standpipes will be provided in the four-story, Option 2 building and will not be provided in the three-story, Option 1 building.

A hydrant flow test will be required from the two hydrants nearest the site to determine flow and pressure characteristics of the existing water service. If the existing flow and pressure are not sufficient to provide the required pressure at the hydraulically most remote point in the building, a fire pump will be required. A fire department connection will be required to be connected to the automatic sprinkler system, and standpipe system if provided. A fire hydrant must be provided within 100 feet of these connections.

A minimum 6-inch water service is expected to be required. Alexandria requires all sprinkler systems to have a testable double check detector backflow prevention device.

2.4 Electrical

2.4.1 Existing Systems

Dominion utility power provides 120/208V, 3phase, 4wire system via utility pole mounted. The electrical service has been routed underground from utility pole mounted transformer to the main electrical room of school. The initial electrical distribution system was built in 1952 and then renovated in 2011. The original electrical distribution design included CT cabinet and main distribution panel sized as 600A. The building has been renovated after that and then the existing electrical system was upgraded into a main 2500A, 120/208V, 3phase, 4wire switchboard with new utility meter. Power is distributed throughout the school from this switchboard via lighting and receptacle panels located in electrical closets throughout the building. It is not clear that the whether building has a dedicated grounding system.

There is not generator for this this building and lighting fixtures for egress path have been provided with battery backup and also there is emergency discharge lighting fixtures at the exit doors.

There are fluorescent lighting fixtures throughout the building which some of them have reached to their life time. There is not centralized lighting control system for the school and each area is controlled individually.

There is existing fire alarm system and also, during the renovation the new fire alarm system had been added and connected to the existing fire alarm system. The system includes horns, bell, strobes, pull stations and audio/ visual devices.

2.4.2 New Systems

According to National Electric Code (NEC), the maximum demand data for a 1-year period for school will be required for all design approaches. If this information is not available, then the maximum demand (measure of average power demand over a 15-minute period) continuously recorded over a minimum 30-day period using power meter connected to the highest loaded phase of the feeder or service will be required.

It is recommended to have the lightning risk assessment for existing and new building. A complete grounding system in accordance with the National Electric Code will be provided. Ground conductors will be run with all feeders, motors and lighting and receptacle branch circuits.

It is recommended to provide LED lighting fixtures everywhere which means retrofit existing fluorescent lighting fixtures and replace them with LED lighting fixtures. A complete system of artificial interior and exterior lighting will be provided for all areas. In general, all interior and exterior lighting will be LED.

Illumination levels will be designed to meet LEED goals by conforming to ASHRAE 90.1. Emergency and exit lighting will be provided for all paths of egress from the buildings with either battery backup or a centralized inverter and batteries.

A complete interior programmable lighting control system including occupancy sensors, switches, time clock and daylight dimming controls where daylight harvesting can contribute to energy saving will be provided to enhance energy efficiency. Exterior lighting will be controlled via a programmable lighting control system.

A new fire alarm system will be required for new building (extension) and also modification and extension to the existing fire alarm system for addition approaches. It is recommended to demolish the older fire alarm system and provide new system connected into the upgraded system. The new fire alarm system will consist of multiple control panels alarmed to a central location via a common communication bus link. Strategically located field processing units will be installed to provide coverage and flexibility needed for such a system.

2.5 Sustainability

The new or renovated Patrick Henry School is envisioned to be a high performance sustainable building. Integrated design will be used throughout the process to create an exemplary green building. The Leadership in Energy and Environmental Design (LEED) for Schools 2009 rating system will be used to provide a recognized benchmark for sustainable achievement. Sustainability goals for the building include meeting the functional requirements of advanced technology while creating a building that has a low carbon footprint, is net zero energy, and is healthy and pleasant to be in. This section discusses the main components we will pursue for achieving a high performance building.

The building will be designed using energy-efficient technologies so that the building’s energy demand will be drastically reduced compared to a conventional building design. It is estimated that a new construction building could reduce energy demand by 30% using a combination of technologies including ground-source heat pumps (i.e. geothermal). A renovated building could achieve a higher energy reduction of 40% simply because the baseline building comparison is the existing building[1], which is assumed to have a poor energy performance.

Net Zero Energy

To achieve a goal of net zero energy, the remainder of energy needed for the building should be supplied by on-site renewable generation. In this region, solar photovoltaics is the only technology that should be considered from a cost and efficiency standpoint. The rooftop and site provides a good opportunity for PV. An energy model will be needed to determine the exact amount of PV needed, though some space for PVs will likely be needed on-site in addition to the rooftop. In order to keep accessible green space, a PV canopy parking system would be recommended.

---

[1] The existing building envelope is used for the baseline, though all mechanical systems will be new in the baseline

2.5.1 Demand Reduction – Building Envelope

2.5.1.1 Increased Insulation

Wall insulation prevents heat from flowing inside or outside the building. In this climate, it is important to provide ample roof, wall and floor insulation to reduce heating and cooling needs.

2.5.1.2 Cool Roof

In a hot climate, preventing solar heat gain is critical. Typical roofs can absorb the sun’s energy during the day, turning it to heat which can then enter the building. Cool roofs use light, solar reflective colors to reflect solar radiation rather than absorbing it at the roof. Cool roofs can be used in combination with solar rooftop photovoltaics (described below).

2.5.1.3 Window to Wall Ratio

Windows are generally the poorest-performing part of a façade. In a hot, humid climate, they contribute to solar heat gains, which must then be removed by the cooling system. Therefore, minimizing the ratio of window to wall area on the façade can help to lower cooling energy usage by minimizing solar heat gains and conduction heat gains.

2.5.1.4 High Performance Glazing

Where glass is specified, it will be also designed to reduce solar heat gains. Tinted glass with a low solar heat gain value will be specified to reject solar heat gain (from the infrared spectrum) while allowing some visible light through for daylighting and views.

2.5.1.5 Shading

The proposed building design will use external shading where possible to further control direct solar heat gains. When possible, the shading can be designed to allow the sun to enter in the winter to provide passive solar heating.

2.5.2 Demand Reduction - Lighting

2.5.2.1 Lighting Efficiency

The use of efficient lighting technology can greatly decrease the demand for electrical energy, as lighting is one of the highest energy demands for commercial buildings. It is proposed that the building will use all-LED lighting (or similar performance).

2.5.2.2 Daylight Sensors

When ample daylight conditions are detected by the daylight sensors (greater than 30 fc), perimeter lights near glazing are automatically dimmed. Lights typically 15-25 ft away can be controlled.

2.5.2.3 Lighting Occupancy Sensors

Lighting can additionally be controlled using occupancy sensors in certain areas such as classrooms, offices, cafeteria, and bathrooms. When spaces are unoccupied for a set amount of time, lighting output can be reduced or turned off.

2.5.3 Plug and Process Loads

2.5.3.1 Energy Efficient Computers

Computers represent a high energy user for schools. If energy-efficient office equipment such as low-energy desktops and LED monitors are procured, the overall equipment power density can be reduced by 10% or greater.

2.5.3.2 Energy-Star Equipment

All other equipment such as commercial appliances, televisions, display screens, etc. will meet the US Energy Star guidelines for low powered and standby energy use. This can significantly reduce equipment plug loads.

2.5.4 Demand Reduction - HVAC

2.5.4.1 Demand Control Ventilation

Ventilation air only needs to be supplied when occupants are physically present in a space. Cooling and heating energy is often needed when outside ventilation air is introduced since it can be warmer or cooler than is desirable. Demand control ventilation uses occupancy or CO_2 sensors to regulate the amount of ventilation air needed for each space at a particular time to minimum allowable by code to save energy.

2.5.5 Energy Recovery Ventilator

Cooling and heating energy is used to cool and heat incoming ventilation air. Normally when that air is exhausted, the energy used to provide cooling/heating is lost. Energy recovery uses an enthalpy wheel or similar technology to pre-cool or pre-heat the incoming air with the exhaust air, without exchanging airstreams. Some energy is therefore “recovered”, lowering the amount of cooling and heating needed.

2.5.6 Temperature Setpoints Controlled by Occupancy Sensors

Occupancy sensors which are installed to control lighting can also be tied to increase the temperature in the room to provide less cooling when occupants are not there. This can save on fan and cooling/heating energy by turning off airflow to spaces that are unoccupied. This is only effective in spaces with transient occupancy during the day and are physically separated from partitions.

2.5.7 Site Sustainable Initiatives

2.5.7.1 Solar Photovoltaics

Virginia provides a good climate to use solar photovoltaic technology for electricity generation. A grid-tied system is recommended so that excess energy is exported to the grid when not needed and vice versa.

The rooftop and site provides a good opportunity for PV. An energy model will be needed to determine the exact amount of PV needed, though some space for PVs will likely be needed on-site in addition to the rooftop. In order to keep accessible green space, a PV canopy parking system would be recommended.

2.5.7.2 Ground-Source Heat Pumps

Ground-source heat pumps (GSHPs, often called geothermal) provide high-efficiency electrical heating in the winter, and cooling in the summer. The technology eliminates the need for natural gas or oil for heat, both greenhouse gases. Since the coefficient of performance (COP) of GSHPs can be three or greater, compared to a boiler efficiency of up to 90%, they are a core strategy for heating energy reduction, which is a large contributor to overall building energy reduction.

The climate of Virginia is well-suited for ground-source heat pumps. Boring tests down to 600 feet are currently underway to determine the suitability of ground conditions for the technology.

2.5.8 LEED Certification

Two schemes were evaluated to determine the preliminary LEED scorecards for the project:

1. Renovation/Expansion
2. New Construction

Both schemes will use the LEED 2009 for K-12 School Projects rating system. Scheme 1 performs slightly better with earning LEED credits since the building structure reuse credits are available, and it should be easier to achieve energy reductions and points with the energy model. Under both schemes, however, more information will be needed to move credits from the ‘maybe’ categories into either a ‘yes’ or a ‘no’. These are early conservative estimates which need to be confirmed as we get further into the design stages.

3 Recreation Center

3.1 Mechanical

3.1.1 Existing Systems

Currently, Roof Top DX packaged units condition the recreation center. This existing mechanical equipment is in fair shape, but is nearing the end of the service life and will soon need replacement. With this new replacement, the efficiency of the equipment will be more energy efficient and energy costs will be reduced. New Systems

3.1.1.1 New Building

The recreation center provides options that may be consistent with systems provided in the school. Depending on the system type, the recreation center can either be connected to the Elementary School mechanical system or can be totally independent.

For the DX Packaged Roof Top Units, the recreation center would be totally separate from the Elementary School system. This system would be independently controlled and operated as needed based on occupancy schedules.

A water cooled chiller with natural gas boiler option would provide energy savings and reduce annual energy costs. The recreation center would be connected to this central energy plant via direct buried piping. Air Handling Units within the Recreation Center would provide local zone control as needed based on occupancy schedules. This system would turn down during unoccupied modes and provide minimal conditioning as needed to maintain unoccupied set points.

Ground Source heat pumps not only provide local zone control, but the connectivity to a ground loop can be separate from the Elementary School or combined for a cost effective Geothermal circuit and to provide energy recovery between the two buildings.

With new technologies including systems with variable airflow, variable speed compressors and overall increase in system efficiencies, these new systems provide alternative ways of reducing energy and providing the indoor air quality and comfort required per zone as needed.

High Efficient options for this Recreation Center similar to the schools are:

- DX Rooftop Packaged Cooling with Natural Gas Heat
- Water Cooled Chillers with Natural Gas Boilers
- Water Source Heat Pumps with Geothermal Ground Source Piping

For the indoor soccer field within the Recreation Center, various options exist based on the environment required in the space. With the proper heat resistant envelope, large propeller fans, and radiant heating, the space can be maintained at a temperature between 80˚F - 85˚F in the summer and 70 ˚F in the winter. To achieve a summer environment within the mid 70˚F temperature range, HVAC systems similar to the school and the remainder of the Recreation Center should be utilized. User and owner preference will be a key factor in the direction and selection of HVAC equipment for the indoor soccer field.

3.1.1.2 Renovation

If the recreation center is renovated, the mechanical equipment should be replaced with DX Rooftop Package units. New DX Rooftop Packaged units utilize multiple compressors with variable load capacity reduction. Demand control ventilation will be utilized to provide energy savings associated with conditioning the larqe quantities of air that are required for a recreation center. This new DX Rooftop Packaged unit will utilize energy recovery to reduce energy usage and to precondition the outdoor air ahead of the heating and cooling coil. The energy recovery module will utilize exhaust air to transfer energy/heat to the outdoor air in the winter or transfer energy/heat from the outdoor air in the summer.

For the indoor soccer field, large propeller fans and radiant heating should be utilized to maintain a temperature between 80˚F - 85˚F in the summer and 70 ˚F in the winter. A DX Packaged Rooftop unit will provide ventilation for the soccer field. With a direct digital control package this system will reduce operating costs during unoccupied periods.

3.2 Plumbing

3.2.1 New Systems

New efficient plumbing systems shall be utilized to preserve resources and reduce energy usage. Those include but are not limited to:

- Low flow fixtures
- High Efficient Water Heaters
- Domestic Hot Water Circulation Loops

3.3 Fire Protection Systems

Fire areas greater than 12,000 SF are required to be provided with sprinkler protection for the Assembly occupancy building. Therefore, it is expected the building will be fully sprinklered. Class I standpipes are required for buildings where the highest floor level is more than 30 feet above the lowest level of fire department response. Therefore, it is not expected that standpipes will be provided in the two-story building.

A hydrant flow test will be required from the two hydrants nearest the site to determine flow and pressure characteristics of the existing water service. If the existing flow and pressure are not sufficient to provide the required pressure at the hydraulically most remote point in the building, a fire pump will be required. A fire department connection will be required to be connected to the automatic sprinkler system. A fire hydrant must be provided within 100 feet of these connections.

A minimum 6-inch water service is expected to be required. Alexandria requires all sprinkler systems to have a testable double check detector backflow prevention device.

3.4 Electrical

3.4.1 New Systems

It is recommended to have the lightning risk assessment for the building. A complete grounding system in accordance with the National Electric Code will be provided. Ground conductors will be run with all feeders, motors and lighting and receptacle branch circuits.

It is recommended to provide LED lighting fixtures everywhere. A complete system of artificial interior and exterior lighting will be provided for all areas. In general, all interior and exterior lighting will be LED. Illumination levels will be designed to meet LEED goals by conforming to ASHRAE 90.1. Emergency and exit lighting will be provided for all paths of egress from the buildings with either battery backup or a centralized inverter and batteries.

A complete interior programmable lighting control system including occupancy sensors, switches, time clock and daylight dimming controls where daylight harvesting can contribute to energy saving will be provided to enhance energy efficiency. Exterior lighting will be controlled via a programmable lighting control system.

A new fire alarm system will be required for the building. The new fire alarm system will consist of multiple control panels alarmed to a central location via a common communication bus link. Strategically located field processing units will be installed to provide coverage and flexibility needed for such a system.

3.5 Sustainability

The Leadership in Energy and Environmental Design (LEED) for New Construction and Major Renovations 2009 rating system will be used to provide a recognized benchmark for sustainable achievement. Sustainability goals for the building include meeting the functional requirements of advanced technology while creating a building that has a low carbon footprint, is net zero energy, and is healthy and pleasant to be in. This section discusses the main components we will pursue for achieving a high performance building.

The building will be designed using energy-efficient technologies so that the building's energy demand will be drastically reduced compared to a conventional building design. It is estimated that a new construction building could reduce energy demand by 30% using a combination of technologies including ground-source heat pumps (i.e. geothermal). A renovated building could achieve a higher energy reduction of 40% simply because the baseline building comparison is the existing building[2], which is assumed to have a poor energy performance.

[2] The existing building envelope is used for the baseline, though all mechanical systems will be new in the baseline

Net Zero Energy

To achieve a goal of net zero energy, the remainder of energy needed for the building should be supplied by on-site renewable generation. In this region, solar photovoltaics is the only technology that should be considered from a cost and efficiency standpoint. The rooftop and site provides a good opportunity for PV. An energy model will be needed to determine the exact amount of PV needed, though some space for PVs will likely be needed on-site in addition to the rooftop. In order to keep accessible green space, a PV canopy parking system would be recommended.

3.5.1 Demand Reduction – Building Envelope

3.5.1.1 Increased Insulation

Wall insulation prevents heat from flowing inside or outside the building. In this climate, it is important to provide ample roof, wall and floor insulation to reduce heating and cooling needs.

3.5.1.2 Cool Roof

In a hot climate, preventing solar heat gain is critical. Typical roofs can absorb the sun's energy during the day, turning it to heat which can then enter the building. Cool roofs use light, solar reflective colors to reflect solar radiation rather than absorbing it at the roof. Cool roofs can be used in combination with solar rooftop photovoltaics (described below).

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Windows are generally the poorest-performing part of a façade. In a hot, humid climate, they contribute to solar heat gains, which must then be removed by the cooling system. Therefore, minimizing the ratio of window to wall area on the façade can help to lower cooling energy usage by minimizing solar heat gains and conduction heat gains.

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Where glass is specified, it will be also designed to reduce solar heat gains. Tinted glass with a low solar heat gain value will be specified to reject solar heat gain (from the infrared spectrum) while allowing some visible light through for daylighting and views.

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When ample daylight conditions are detected by the daylight sensors (greater than 30 fc), perimeter lights near glazing are automatically dimmed. Lights typically 15-25 ft away can be controlled.

3.5.2.3 Lighting Occupancy Sensors

Lighting can additionally be controlled using occupancy sensors in certain areas such as the gymnasium, locker rooms, and media center. When spaces are unoccupied for a set amount of time, lighting output can be reduced or turned off.

3.5.3 Plug and Process Loads

3.5.3.1 Energy-Star Equipment

All other equipment such as commercial appliances, televisions, display screens, etc. will meet the US Energy Star guidelines for low powered and standby energy use. This can significantly reduce equipment plug loads.

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Ventilation air only needs to be supplied when occupants are physically present in a space. Cooling and heating energy is often needed when outside ventilation air is introduced since it can be warmer or cooler than is desirable. Demand control ventilation uses occupancy or CO_2 sensors to regulate the amount of ventilation air needed for each space at a particular time to minimum allowable by code to save energy.

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Virginia provides a good climate to use solar photovoltaic technology for electricity generation. A grid-tied system is recommended so that excess energy is exported to the grid when not needed and vice versa.

The rooftop and site provides a good opportunity for PV. An energy model will be needed to determine the exact amount of PV needed, though some space for PVs will likely be needed on-site in addition to the rooftop. In order to keep accessible green space, a PV canopy parking system would be recommended.

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The climate of Virginia is well-suited for ground-source heat pumps. Boring tests down to 600 feet are currently underway to determine the suitability of ground conditions for the technology.

3.5.8 LEED Certification

LEED certification for the Recreation Center will be similar to the school. If it is desired to register the building as a separate project, it will likely used the LEED 2009 for New Construction and Major Renovation rating system. Since the projects are both on the same site, they could use the LEED Campus Certification scheme.

The LEED Campus Certification option is intended to reduce costs and streamline the certification process for projects that share a site and are owned by a single entity. As part of a Campus Certification, certain prerequisites and credits are reviewed and pre-approved as campus credits. All prerequisites and credits earned as part of the campus “master site” can be claimed by all LEED projects within that master site, thereby reducing documentation requirements, saving time and costs. It is important to note that the master site will not receive a LEED Certification: only individual projects within the master site earn certifications.

There are additional costs for the Campus Certification approach, but individual projects located within the master site receive discounts off of standard fees.

8.2 Cost Estimate Report

Estimate of Probable Cost
Feasibility Study

FORELLA GROUP LLC
CONSTRUCTION CONSULTANTS & ADVISORS

Alexandria City Public Schools

Project:

Patrick Henry K-8 School & Recreation Center

Location:

Alexandria, Virginia

Owner:

Alexandria City Public Schools

Client:

Sorg Architects

Date:

April 30, 2015

Section A

Introduction

FORELLA GROUP LLC
CONSTRUCTION CONSULTANTS & ADVISORS

Submission Date:
04/30/2015

Introduction

Project Summary:

Patrick Henry K-8 School & Recreation Center Feasibility Study

Feasibility study of three options to expand Patrick Henry K-8 School & Recreation Center

GSF: n/a

Site: 13 acres

Overview

We are pleased to provide the enclosed estimate of probable cost for the feasibility study of the Patrick Henry K-8 School & Recreation Center project located in Alexandria, VA. Our work is based on the Feasibility Study Documents and information provided by Sorg Architects. If there are any questions, please do not hesitate to contact Mr. Aguero, at (703) 560-2200 or Israel@forellagroup.com

The subject submission provides estimates of hard construction costs. Given the progress nature of the information provided, technical scope interpretations have been made in order to account for all of the costs necessary to deliver a completed facility.

We have assumed construction operations will be confined to the contract limits of the subject property. We have added a *Design Contingency* to budget for unidentified scope requirements not yet delineated. There are numerous *soft costs* and *secondary scope* issues with cost implications, for further information on these, please refer to the Additional Notes and Clarifications section of this report.

Table of Contents

KEY DESIGN ASSUMPTIONS

Our estimated costs include the following key design assumptions:

- Exclusions:
  - Hazmat abatement
  - Offsite costs
  - Traffic controls
  - Temporary utilities
  - Special foundations
  - Architecturally exposed structural steel
- Temporary Swing Scope:
  - Temporary Trailers: Install, remove, rental contract.
  - Temporary Trailer Site Preparations: Grading, temporary water, sanitary, SWM, power, communications, erosion controls, removals.
  - Safety and Access: Temporary walks, lights, protections, removals.
- General Phasing, Logistics:
  - Overall general conditions and schedule impact.
  - Site logistics: Mob, demob, operational trade contractor staging.
  - Renovation logistics: MEP preparations, dust walls, floor protections, window protections, other temporary protections.
- Escalation:
  - Our estimates for all options are based on current market conditions. However, we anticipate the following cost impact due to the effect of inflationary factors for projects with approximate construction midpoint:
    - 2 Years from April 2015 – 6% Add
    - 3 Years from April 2015 – 9.2% Add
    - 4 Years from April 2015 – 12.5% Add
    - 5 Years from April 2015 – 15.9% Add
- Structural & Pre-Engineered Metal Building:
  - Foundations: Conventional spread footing design.
  - School Building: Steel frame, steel columns, composite beam floor assembly, metal roof decking.

- Recreation Center:
  - Multipurpose Field: pre-engineered metal building, rigid frame, long span truss roof framing, standing seam metal roof system, exterior insulated metal wall system, and required basic finishes and accessories.
  - 2-Story Facility Space: Steel frame, perimeter columns, composite beam assembly, metal roof deck.

- Exterior Envelope:
  - School Building: 30% / 70%: glazing, wall assembly distribution
    - Glazing will be comprised of: 50% window units and 50% storefront assemblies
    - Wall Assembly: 70% brick and 30% uninsulated metal panels, masonry back-up, insulation and vapor barrier.
  - Recreation Center 2-Story Facility: Uninsulated metal panels on masonry back-up, insulation and vapor barrier.
- Low Slope Roofing Assembly:
  - 30% Green Roof: Rubberized asphalt membrane, root barrier, polystyrene insulation, drainage layer, filter fabric, growing medium, pavers as required. Exclude drip irrigation, and leak detection.
  - 70% membrane roofing: Roofing membrane, cover board, polyisocynurate insulation.
- Indoor field turf:
  - 2-1/2" synthetic infill turf
  - Organic/plastic infill
  - 1" Shock pad/impact board
  - Exclude perimeter mow strip
- Mechanical System:
  - School Building: DX rooftop package cooling with natural gas fired heat, plenum return, DDC controls.
  - Recreation Center:
    - Multipurpose Field: Propeller fan system.
    - 2-Story Facility Space: DX rooftop package cooling with natural gas boiler fired heat, plenum return, DDC controls.
- Site work:
    - Site costs are split 70% = School Building and 30% Recreation since all outdoor amenities, including parking are to be shared. As such, the costs are allocated proportionately to its building size.

Section B

Building Cost Summary

PROGRAMMATIC COST STUDY			FORELLA GROUP, LLC		Prepared By:	pf/atb	Job #:		Revisions
Proj Name: Patric Henry K-8 and Rec Center			9495 Silver King Court		Approved By:	pf	File:	Feasibility Study	4/30/2015
Project Owner: Alexandria City Public School			Suite A				Email:	Design	
Project Location: Alexandria, VA			Fairfax, VA 22031-4713				Report Date:	Reference Date Stamp	

Scheme and Location Ref	Uniformat System Heading	Item Code #		Descriptions, Specification & Notes		Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals

EXECUTIVE SUMMARY

NEW BUILDING OPTION 1

SCHOOL BUILDING

BUILDING ………………………………………………………………………………	34,612,658.63
BUILDING DEMOLITION ………………………………………………………………	518,130.00
SITEWORK ………………………………………………………………………………	3,883,725.20
OUTDOOR MULTIPURPOSE FIELD …………………………………………………	224,200.00
TOTAL	**39,238,713.84**

NEW BUILDING OPTION 1B**

** Reference Option 1 for detailed cost breakdown.

SCHOOL BUILDING

BUILDING ……………………………… Swing space incl 40 class rms + dining + admin ………………	37,112,658.63
BUILDING DEMOLITION ………………………………………………………………	518,130.00
SITEWORK ………………………………………………………………………………	3,883,725.20
OUTDOOR MULTIPURPOSE FIELD …………………………………………………	224,200.00
TOTAL	**41,738,713.84**

NEW BUILDING OPTION 2

SCHOOL BUILDING

BUILDING ………………………………………………………………………………	33,880,962.07
BUILDING DEMOLITION ………………………………………………………………	518,130.00
SITEWORK ………………………………………………………………………………	3,883,725.20
OUTDOOR MULTIPURPOSE FIELD …………………………………………………	224,200.00
TOTAL	**38,507,017.27**

ADDITION-RENOVATION OPTION 3

SCHOOL BUILDING

BUILDING ……………………………… Addition + Renovation ………………………………	33,331,150.29
BUILDING DEMOLITION ………………………………………………………………	238,672.50
SITEWORK ………………………………………………………………………………	3,883,725.20
OUTDOOR MULTIPURPOSE FIELD …………………………………………………	224,200.00
TOTAL	**37,677,747.99**

Estimate of Probable Cost

FORELLA GROUP LLC
CONSTRUCTION CONSULTANTS & ADVISORS

PROGRAMMATIC COST STUDY			FORELLA GROUP, LLC		Prepared By:	pf/atb	Job #:		Revisions
Proj Name: Patric Henry K-8 and Rec Center			9495 Silver King Court		Approved By:	pf	File:	Feasibility Study	4/30/2015
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Scheme and Location Ref	Uniformat System Heading	Item Code #		Descriptions, Specification & Notes		Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals

COST SUMMARY: NEW BUILDING OPTION 1: SCHOOL BUILDING

HARD CONSTRUCTION COSTS		***BUILDINGS***					
	1	SCHOOL BUILDING	134,850	GSF	215.22	29,021,988.07	29,021,988.07
		MARK-UPS & CONTINGENCIES					
	4	GC OH&P		4.00%		1,160,879.52	30,182,867.59
	5	CONSTRUCTION CONTINGENCY		3.00%		905,486.03	31,088,353.62
	6	BONDS, INSURANCE		1.50%		466,325.30	31,554,678.92
	7	DESIGN CONTINGENCY	Per direction Sorg	7.00%		2,208,827.52	33,763,506.45
	8	GENERAL LOGISTICS: mob/de mob, site staging etc.		1.00%		337,635.06	34,101,141.51
	9	SWING COSTS: 11 CR Temp Trailers, etc.		1.50%		511,517.12	34,612,658.63
		SUBTOTAL [CUMULATIVE]					34,612,658.63
PROGRAM TOTAL							**34,612,658.63**

Option 1: SCHOOL BUILDING

0.00	PROJECT DATA	CATEGORIES	GSF	Ext. perim LF	Wall Ht	Wall Area
		Footprint Square Feet	58,750.00	1,446.00		
		Total Roof Area	73,750.00			
		Green Roof Area, 30%	22,125.00			
		Basement: Concrete Walls	0.00	0.00	0.00	0.00
		1st Fl	58,750.00	1,446.00	18.00	26,028.00
		2nd Fl	36,250.00	1,135.00	16.00	18,160.00
		3rd Fl	14,400.00	729.00	16.00	11,664.00
		4th Fl	25,450.00	727.00	16.00	11,632.00
		Total GSF	134,850.00			
		Total Supported SF	76,100.00			
		Below Grade Wall SF				0.00
		Above Grade Wall SF				67,484.00
		Perim, demising wall		0.00	0.00	0.00

Scheme and Location Ref	Uniformat System Heading	Item Code #	Descriptions, Specification & Notes	Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals
A	**SUBSTRUCTURE**	0.00	***System Subtotal***	134,850.00	GSF	7.36		992,430.98
New Building			***Lower Level Assemblies***					
New Building		1.00	Concrete spread footing foundations	979.17	CY	500.00	489,583.33	
New Building		2.00	Special foundations		Excluded			
New Building		3.00	Foundation drainage	1,590.60	LF	14.00	22,268.40	
New Building		4.00	Concrete SOG std capacity	58,750.00	FLSF	7.50	440,625.00	
New Building		5.00	Loading dock slab, incl walls & footings	1,410.15	FLSF	25.00	35,253.75	
New Building		6.00	Loading dock backfill	313.37	CY	15.00	4,700.50	
New Building		7.00	Basement concrete walls	0.00	WSF	45.00	0.00	
New Building		8.00	Basement conc wall WP	0.00	WSF	7.00	0.00	

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B	**SHELL**		***System Subtotal***	134,850.00		56.52		7,621,251.43
New Building			***Supported Floor Structure***					
New Building		1.00	Supported floor frame & columns	342.45	Tons	3,000.00	1,027,350.00	
New Building		2.00	Metal deck assembly	76,100.00	SF	2.50	190,250.00	
New Building		3.00	Slab on deck	76,100.00	SF	6.00	456,600.00	
New Building		4.00	Fireproofing, limited	76,100.00	SF	0.75	57,075.00	
New Building								
New Building			***Roof Structure***					
New Building		1.00	Roof: Horizontal steel framing & columns	258.13	Tons	3,000.00	774,375.00	
New Building		2.00	Metal deck assembly	73,750.00	SF	2.25	165,937.50	
New Building		3.00	Fireproofing, limited	73,750.00	GSF	0.70	51,625.00	
New Building								
New Building			***Miscellaneous Metals***					
New Building		1.00	Stairs		Ref Stairs & Railings, below			
New Building		2.00	Miscellaneous fabrications	134,850.00	SF	2.00	269,700.00	
New Building		3.00	Expansion jts assemblies & covers	134,850.00	SF	0.25	33,712.50	
New Building								
New Building			***Exterior Enclosure Assemblies***					
New Building		1.00	Brick on cmu bu incl insul, & vb	31,650.00	Wall SF	39.00	1,234,349.84	
New Building		2.00	Uninsul metal panels, cmu bu incl insul, & vb	15,588.80	Wall SF	47.00	732,673.79	
New Building		3.00	Canopy at entrance		Ref site			

Scheme and Location Ref	Uniformat System Heading	Item Code #	Descriptions, Specification & Notes	Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals
B	**SHELL, continued**		***Exterior Fenestration Assemblies***					
		1.00	Windows	10,122.60	SF	48.00	485,884.80	
New Building		2.00	Storefront glazing	10,122.60	SF	55.00	556,743.00	
New Building		3.00	Curtain Wall		None per direction Sorg			
New Building								
New Building			***Exterior Door Assemblies***					
New Building		1.00	Exterior storefront door assemblies, double	8.00	Pair	5,500.00	44,000.00	
New Building		2.00	Exterior storefront door assemblies, single	2.00	Leaf	2,750.00	5,500.00	
New Building		3.00	Exterior door assemblies, double	2.00	Pair	2,700.00	5,400.00	
New Building		4.00	Exterior door assemblies, single	6.00	Leafs	1,400.00	8,400.00	
New Building		5.00	OH Doors: Insulated, powered	140.00	DR SF	70.00	9,800.00	
New Building								
New Building			***Roofing Assemblies***					
New Building		1.00	Standing seam, insul., flashing, acc. etc	0.00	RSF	35.00	0.00	
New Building		2.00	Membrane, insul., flashing, acc., par., etc	51,625.00	RSF	13.00	671,125.00	
New Building		3.00	Green roofing & plantings: Premium Add	22,125.00	RSF	38.00	840,750.00	
New Building		4.00	Skylight assemblies		None indicated			

PROGRAMMATIC COST STUDY			FORELLA GROUP, LLC		Prepared By:	pf/atb	Job #:		Revisions
Proj Name: Patric Henry K-8 and Rec Center			9495 Silver King Court		Approved By:	pf	File:	Feasibility Study	4/30/2015
Project Owner: Alexandria City Public School			Suite A				Email:	Design	
Project Location: Alexandria, VA			Fairfax, VA 22031-4713				Report Date:	Reference Date Stamp	

Scheme and Location Ref	Uniformat System Heading	Item Code #	Descriptions, Specification & Notes	Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals
C	**INTERIORS**		***System Subtotal***	134,850.00	GSF	39.27		5,295,330.60
New Building			***Partition Assemblies***					
New Building		1.00	Interior partitions	145,638.00	WallSF	10.00	1,456,380.00	
New Building		2.00	GWB + mtl furring, int face ext walls		Ref Ext Enclosure Assemblies			
New Building		3.00	Interior glass	16,182.00	WallSF	40.00	647,280.00	
New Building								
New Building			***Door, Frame & Hardware Assemblies***					
New Building		1.00	Door assm, single	200.00	Leaf	1,400.00	280,000.00	
New Building		2.00	Door assm, dbl	40.00	Pair	2,700.00	108,000.00	
New Building		3.00	storefront door assemblies, single	16.00	Leaf	2,750.00	44,000.00	
New Building		4.00	storefront door assemblies, double	8.00	Pair	5,500.00	44,000.00	
New Building								
New Building			***Finish Assemblies***					
New Building		1.00	Floor finishes: VCT, 60%	80,910.00	SF	4.50	364,095.00	
New Building		2.00	Floor finishes: carpet, 20%	26,970.00	SF	4.50	121,365.00	
New Building		3.00	Floor finishes: ceramic tile, 10%	13,485.00	SF	9.00	121,365.00	
New Building		4.00	Floor finishes: special finish, 10%	13,485.00	SF	25.00	337,125.00	
New Building		5.00	Ceilings	134,850.00	SF	5.00	674,250.00	
New Building		6.00	GWB bulkheads	134,850.00	SF	0.50	67,425.00	
New Building		7.00	CT walls	14,563.80	WSF	12.00	174,765.60	
New Building		8.00	Paint, interior & exterior	134,850.00	SF	1.50	202,275.00	
New Building		9.00	Special coatings	134,850.00	SF	0.30	40,455.00	
New Building								
New Building			***Stairs & Railings Assemblies***					
New Building		1.00	Conc on metal pan: Stairs, landgs, railings, basic finishes	13.00	Flts	16,000.00	208,000.00	
New Building								
New Building			***Miscellaneous Specialties***					
New Building		1.00	Toil acc., entr mats & frames, signage,					
New Building			fire ext., jan acc., etc.	134,850.00	GSF	2.00	269,700.00	
New Building		2.00	Rough carpentry	134,850.00	GSF	1.00	134,850.00	

PROGRAMMATIC COST STUDY		FORELLA GROUP, LLC	Prepared By:	pf/atb	Job #:		Revisions
Proj Name: Patric Henry K-8 and Rec Center		9495 Silver King Court	Approved By:	pf	File:	Feasibility Study	4/30/2015
Project Owner: Alexandria City Public School		Suite A			Email:	Design	
Project Location: Alexandria, VA		Fairfax, VA 22031-4713			Report Date:	Reference Date Stamp	

Scheme and Location Ref	Uniformat System Heading	Item Code #	Descriptions, Specification & Notes	Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals
D	**SERVICES**		***System Subtotal***	134,850.00	SF	83.38		11,243,412.50
New Building			***Conveying Systems***					
New Building		1.00	Hydraulic elevator	4.00	Stops	38,000.00	152,000.00	
New Building								
New Building			***HVAC***	DX rooftop package cooling with natural gas fired heat				
New Building		1.00	Equipment	134,850.00	GSF	17.00	2,292,450.00	
New Building		2.00	Air Distribution	134,850.00	GSF	11.00	1,483,350.00	
New Building		3.00	Piping	134,850.00	GSF	4.00	539,400.00	
New Building		4.00	Controls (sole sourced)	134,850.00	GSF	5.00	674,250.00	
New Building		5.00	Miscellaneous	134,850.00	GSF	1.50	202,275.00	
New Building								
New Building			***Plumbing***					
New Building		1.00	Bathroom fixtures, water, san sewer serv.,	134,850.00	GSF	9.50	1,281,075.00	
New Building		2.00	floor & roof drainage					
New Building								
New Building			***Fire Protection***					
New Building		1.00	Fire protection, incl fire pump	134,850.00	GSF	3.00	404,550.00	
New Building								
New Building			***Electrical Systems***					
New Building		1.00	Service & distribution	134,850.00	GSF	7.00	943,950.00	
New Building		2.00	Lighting & controls, incl LED	134,850.00	GSF	15.00	2,022,750.00	
New Building		3.00	Branch power devices & wiring	134,850.00	GSF	1.75	235,987.50	
New Building		4.00	AV/Communication RI only	134,850.00	GSF	2.00	269,700.00	
New Building		5.00	Fire alarm	134,850.00	GSF	2.50	337,125.00	
New Building		6.00	Security system	134,850.00	GSF	3.00	404,550.00	

PROGRAMMATIC COST STUDY	FORELLA GROUP, LLC	Prepared By:	pf/atb	Job #:		Revisions
Proj Name: Patric Henry K-8 and Rec Center	9495 Silver King Court	Approved By:	pf	File:	Feasibility Study	4/30/2015
Project Owner: Alexandria City Public School	Suite A			Email:	Design	
Project Location: Alexandria, VA	Fairfax, VA 22031-4713			Report Date:	Reference Date Stamp	

Scheme and Location Ref	Uniformat System Heading	Item Code #	Descriptions, Specification & Notes	Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals
E	**EQ & FURNISHINGS**		***System Subtotal***	134,850.00	SF	9.13		1,231,200.00
New Building			***Basics***					
New Building		1.00	Lockers / cubbies	900.00	EA	250.00	225,000.00	
New Building		2.00	Casework, millwork, etc.	134,850.00	GSF	4.00	539,400.00	
New Building		3.00	Drymarker boards and tack boards	60.00	Rooms	1,440.00	86,400.00	
New Building								
New Building			***Special***					
New Building		1.00	Food service	1.00	LS	300,000.00	300,000.00	
New Building		2.00	Gymnasium equipment	4,200.00	Gym SF	12.00	50,400.00	
New Building		3.00	Science lab equipment	1.00	LS	30,000.00	30,000.00	
F	**SPECIAL**		***System Subtotal***				Not used	
Z	**GENERAL**		***Subtotal A-F***					26,383,625.52
New Building		1.00	Field Overhead				2,638,362.55	
New Building		2.00	Subtotal				29,021,988.07	
New Building		3.00	GC OH&P, ref Summary				0.00	
New Building		4.00	Subtotal				29,021,988.07	
New Building		5.00	Bonds & Insurance, ref Summary				0.00	
New Building			**SUBTOTAL**	134,850.00	GSF	215.22		**29,021,988.07**

PROGRAMMATIC COST STUDY				FORELLA GROUP, LLC		Prepared By:	pf/atb	Job #:		Revisions
Proj Name: Patric Henry K-8 and Rec Center				9495 Silver King Court		Approved By:	pf	File:	Feasibility Study	4/30/2015
Project Owner: Alexandria City Public School				Suite A				Email:	Design	
Project Location: Alexandria, VA				Fairfax, VA 22031-4713				Report Date:	Reference Date Stamp	

Scheme and Location Ref	Uniformat System Heading	Item Code #		Descriptions, Specification & Notes		Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals

COST SUMMARY: NEW BUILDING OPTION 2: SCHOOL BUILDING

HARD CONSTRUCTION COSTS		***BUILDINGS***					
	1	SCHOOL BUILDING	138,190	GSF	208.66	28,834,602.99	28,834,602.99
		MARK-UPS & CONTINGENCIES					
	4	GC OH&P		4.00%		1,153,384.12	29,987,987.10
	5	CONSTRUCTION CONTINGENCY		3.00%		899,639.61	30,887,626.72
	6	BONDS, INSURANCE		1.50%		463,314.40	31,350,941.12
	7	DESIGN CONTINGENCY	Per direction Sorg	7.00%		2,194,565.88	33,545,507.00
	8	GENERAL LOGISTICS: General phasing, logistics		1.00%		335,455.07	33,880,962.07
	9	SWING COSTS: 11 CR Temp Trailers, etc.		0.00%		0.00	33,880,962.07
		SUBTOTAL [CUMULATIVE]					33,880,962.07
PROGRAM TOTAL							**33,880,962.07**

Option 2: SCHOOL BUILDING

0.00	PROJECT DATA	CATEGORIES	GSF	Ext. perim LF	Wall Ht	Wall Area
		Footprint Square Feet	65,790.00	1,446.00		
		Total Roof Area	65,790.00			
		Green Roof Area	19,737.00			
		Basement: Concrete Walls	0.00	0.00	0.00	0.00
		1st Fl	65,790.00	1,524.00	18.00	27,432.00
		2nd Fl	47,400.00	1,499.00	16.00	23,984.00
		3rd Fl	25,000.00	775.00	16.00	12,400.00
		4th Fl	0.00	0.00	16.00	0.00
		Total GSF	138,190.00			
		Total Supported SF	72,400.00			
		Below Grade Wall SF				0.00
		Above Grade Wall SF				63,816.00
		Perim, demising wall		0.00	0.00	0.00

PROGRAMMATIC COST STUDY			FORELLA GROUP, LLC	Prepared By:	pf/atb	Job #:		Revisions
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Project Owner: Alexandria City Public School			Suite A			Email:	Design	
Project Location: Alexandria, VA			Fairfax, VA 22031-4713			Report Date:	Reference Date Stamp	

Scheme and Location Ref	Uniformat System Heading	Item Code #	Descriptions, Specification & Notes	Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals
A	**SUBSTRUCTURE**	0.00	***System Subtotal***	138,190.00	GSF	7.18		992,826.73
New Building			***Lower Level Assemblies***					
New Building		1.00	Concrete spread footing foundations	925.93	CY	500.00	462,966.67	
New Building		2.00	Special foundations		Excluded			
New Building		3.00	Foundation drainage	1,590.60	LF	14.00	22,268.40	
New Building		4.00	Concrete SOG std capacity	65,790.00	FLSF	7.50	493,425.00	
New Building		5.00	Loading dock slab, incl walls & footings	500.00	FLSF	25.00	12,500.00	
New Building		6.00	Loading dock backfill	111.11	CY	15.00	1,666.67	
New Building		7.00	Basement concrete walls	0.00	WSF	45.00	0.00	
New Building		8.00	Basement conc wall WP	0.00	WSF	7.00	0.00	
B	**SHELL**		***System Subtotal***	138,190.00		50.89		7,031,815.97
New Building			***Supported Floor Structure***					
New Building		1.00	Supported floor frame & columns	325.80	Tons	3,000.00	977,400.00	
New Building		2.00	Metal deck assembly	72,400.00	SF	2.50	181,000.00	
New Building		3.00	Slab on deck	72,400.00	SF	6.00	434,400.00	
New Building		4.00	Fireproofing, limited	72,400.00	SF	0.75	54,300.00	
New Building								
New Building			***Roof Structure***					
New Building		1.00	Roof: Horizontal steel framing & columns	203.95	Tons	3,000.00	611,847.00	
New Building		2.00	Metal deck assembly	65,790.00	SF	2.25	148,027.50	
New Building		3.00	Fireproofing, limited	65,790.00	GSF	0.70	46,053.00	
New Building								
New Building			***Miscellaneous Metals***					
New Building		1.00	Stairs		Ref Stairs & Railings, below			
New Building		2.00	Miscellaneous fabrications	138,190.00	SF	2.00	276,380.00	
New Building		3.00	Expansion jts assemblies & covers	138,190.00	SF	0.25	34,547.50	
New Building								
New Building			***Exterior Enclosure Assemblies***					
New Building		1.00	Brick on cmu bu incl insul, & vb	29,929.70	Wall SF	39.00	1,167,258.46	
New Building		2.00	Uninsul metal panels, cmu bu incl insul, & vb	14,741.50	Wall SF	47.00	692,850.31	
New Building		3.00	Canopy at entrance		Ref site			

Scheme and Location Ref	Uniformat System Heading	Item Code #	Descriptions, Specification & Notes	Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals
B	**SHELL, continued**		***Exterior Fenestration Assemblies***					
		1.00	Windows	9,572.40	SF	48.00	459,475.20	
New Building		2.00	Storefront glazing	9,572.40	SF	55.00	526,482.00	
New Building		3.00	Curtain Wall		None per direction Sorg			
New Building								
New Building			***Exterior Door Assemblies***					
New Building		1.00	Exterior storefront door assemblies, double	8.00	Pair	5,500.00	44,000.00	
New Building		2.00	Exterior storefront door assemblies, single	2.00	Leaf	2,750.00	5,500.00	
New Building		3.00	Exterior door assemblies, double	2.00	Pair	2,700.00	5,400.00	
New Building		4.00	Exterior door assemblies, single	6.00	Leafs	1,400.00	8,400.00	
New Building		5.00	OH Doors: Insulated, powered	140.00	DR SF	70.00	9,800.00	
New Building								
New Building			***Roofing Assemblies***					
New Building		1.00	Standing seam, insul., flashing, acc. etc	0.00	RSF	35.00	0.00	
New Building		2.00	Membrane, insul., flashing, acc., par., etc	46,053.00	RSF	13.00	598,689.00	
New Building		3.00	Green roofing & plantings: Premium Add	19,737.00	RSF	38.00	750,006.00	
New Building		4.00	Skylight assemblies		None indicated			

PROGRAMMATIC COST STUDY		FORELLA GROUP, LLC	Prepared By:	pf/atb	Job #:		Revisions
Proj Name: Patric Henry K-8 and Rec Center		9495 Silver King Court	Approved By:	pf	File:	Feasibility Study	4/30/2015
Project Owner: Alexandria City Public School		Suite A			Email:	Design	
Project Location: Alexandria, VA		Fairfax, VA 22031-4713			Report Date:	Reference Date Stamp	

Scheme and Location Ref	Uniformat System Heading	Item Code #	Descriptions, Specification & Notes	Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals
C	**INTERIORS**		***System Subtotal***	138,190.00	GSF	38.57		5,329,545.24
New Building			***Partition Assemblies***					
New Building		1.00	Interior partitions	149,245.20	WallSF	10.00	1,492,452.00	
New Building		2.00	GWB + mtl furring, int face ext walls		Ref Ext Enclosure Assemblies			
New Building		3.00	Interior glass	16,582.80	WallSF	40.00	663,312.00	
New Building								
New Building			***Door, Frame & Hardware Assemblies***					
New Building		1.00	Door assm, single	200.00	Leaf	1,400.00	280,000.00	
New Building		2.00	Door assm, dbl	40.00	Pair	2,700.00	108,000.00	
New Building		3.00	storefront door assemblies, single	16.00	Leaf	2,750.00	44,000.00	
New Building		4.00	storefront door assemblies, double	8.00	Pair	5,500.00	44,000.00	
New Building								
New Building			***Finish Assemblies***					
New Building		1.00	Floor finishes: VCT, 60%	82,914.00	SF	4.50	373,113.00	
New Building		2.00	Floor finishes: carpet, 20%	27,638.00	SF	4.50	124,371.00	
New Building		3.00	Floor finishes: ceramic tile, 10%	13,819.00	SF	9.00	124,371.00	
New Building		4.00	Floor finishes: special finish, 10%	13,819.00	SF	25.00	345,475.00	
New Building		5.00	Ceilings	138,190.00	SF	5.00	690,950.00	
New Building		6.00	GWB bulkheads	138,190.00	SF	0.50	69,095.00	
New Building		7.00	CT walls	14,924.52	WSF	12.00	179,094.24	
New Building		8.00	Paint, interior & exterior	138,190.00	SF	1.50	207,285.00	
New Building		9.00	Special coatings	138,190.00	SF	0.30	41,457.00	
New Building								
New Building			***Stairs & Railings Assemblies***					
New Building		1.00	Conc on metal pan: Stairs, landgs, railings, basic finishes	8.00	Flts	16,000.00	128,000.00	
New Building								
New Building			***Miscellaneous Specialties***					
New Building		1.00	Toil acc., entr mats & frames, signage,					
New Building			fire ext., jan acc., etc.	138,190.00	GSF	2.00	276,380.00	
New Building		2.00	Rough carpentry	138,190.00	GSF	1.00	138,190.00	

PROGRAMMATIC COST STUDY			FORELLA GROUP, LLC		Prepared By:	pf/atb	Job #:		Revisions
Proj Name: Patric Henry K-8 and Rec Center			9495 Silver King Court		Approved By:	pf	File:	Feasibility Study	4/30/2015
Project Owner: Alexandria City Public School			Suite A				Email:	Design	
Project Location: Alexandria, VA			Fairfax, VA 22031-4713				Report Date:	Reference Date Stamp	

Scheme and Location Ref	Uniformat System Heading	Item Code #	Descriptions, Specification & Notes	Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals
D	**SERVICES**		***System Subtotal***	138,190.00	SF	83.07		11,480,127.50
New Building			***Conveying Systems***					
New Building		1.00	Hydraulic elevator	3.00	Stops	38,000.00	114,000.00	
New Building								
New Building			***HVAC***	DX rooftop package cooling with natural gas fired heat				
New Building		1.00	Equipment	138,190.00	GSF	17.00	2,349,230.00	
New Building		2.00	Air Distribution	138,190.00	GSF	11.00	1,520,090.00	
New Building		3.00	Piping	138,190.00	GSF	4.00	552,760.00	
New Building		4.00	Controls (sole sourced)	138,190.00	GSF	5.00	690,950.00	
New Building		5.00	Miscellaneous	138,190.00	GSF	1.50	207,285.00	
New Building								
New Building			***Plumbing***					
New Building		1.00	Bathroom fixtures, water, san sewer serv.,	138,190.00	GSF	9.50	1,312,805.00	
New Building		2.00	floor & roof drainage					
New Building								
New Building			***Fire Protection***					
New Building		1.00	Fire protection, incl fire pump	138,190.00	GSF	3.00	414,570.00	
New Building								
New Building			***Electrical Systems***					
New Building		1.00	Service & distribution	138,190.00	GSF	7.00	967,330.00	
New Building		2.00	Lighting & controls, incl LED	138,190.00	GSF	15.00	2,072,850.00	
New Building		3.00	Branch power devices & wiring	138,190.00	GSF	1.75	241,832.50	
New Building		4.00	AV/Communication RI only	138,190.00	GSF	2.00	276,380.00	
New Building		5.00	Fire alarm	138,190.00	GSF	2.50	345,475.00	
New Building		6.00	Security system	138,190.00	GSF	3.00	414,570.00	

Scheme and Location Ref	Uniformat System Heading	Item Code #	Descriptions, Specification & Notes	Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals
E	**EQ & FURNISHINGS**		***System Subtotal***	138,190.00	SF	9.98		1,378,960.00
New Building			***Basics***					
New Building		1.00	Lockers / cubbies	900.00	EA	250.00	225,000.00	
New Building		2.00	Casework, millwork, etc.	138,190.00	GSF	4.00	552,760.00	
New Building		3.00	Drymarker boards and tack boards	60.00	Rooms	1,440.00	86,400.00	
New Building								
New Building			***Special***					
New Building		1.00	Pre-engineered gym	4,200.00	SF	32.00	134,400.00	
New Building		2.00	Food service	1.00	LS	300,000.00	300,000.00	
New Building		3.00	Gymnasium equipment	4,200.00	Gym SF	12.00	50,400.00	
New Building		4.00	Science lab equipment	1.00	LS	30,000.00	30,000.00	
F	**SPECIAL**		***System Subtotal***				Not used	
Z	**GENERAL**		***Subtotal A-F***					26,213,275.44
New Building		1.00	Field Overhead				2,621,327.54	
New Building		2.00	Subtotal				28,834,602.99	
New Building		3.00	GC OH&P, ref Summary				0.00	
New Building		4.00	Subtotal				28,834,602.99	
New Building		5.00	Bonds & Insurance, ref Summary				0.00	
New Building			**SUBTOTAL**	138,190.00	GSF	208.66		**28,834,602.99**

PROGRAMMATIC COST STUDY			FORELLA GROUP, LLC		Prepared By:	pf/atb	Job #:		Revisions
Proj Name: Patric Henry K-8 and Rec Center			9495 Silver King Court		Approved By:	pf	File:	Feasibility Study	4/30/2015
Project Owner: Alexandria City Public School			Suite A				Email:	Design	
Project Location: Alexandria, VA			Fairfax, VA 22031-4713				Report Date:	Reference Date Stamp	

Scheme and Location Ref	Uniformat System Heading	Item Code #		Descriptions, Specification & Notes		Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals

COST SUMMARY: RENOVATION-ADDITION OPTION 3: ADDITION

HARD CONSTRUCTION COSTS		***BUILDINGS***					
	1	ADDITION	90,428	GSF	214.47	19,393,855.76	19,393,855.76
		MARK-UPS & CONTINGENCIES					
	4	GC OH&P		4.00%		775,754.23	20,169,609.99
	5	CONSTRUCTION CONTINGENCY		3.00%		605,088.30	20,774,698.29
	6	BONDS, INSURANCE		1.50%		311,620.47	21,086,318.77
	7	DESIGN CONTINGENCY	Per direction Sorg	7.00%		1,476,042.31	22,562,361.08
	8	GENERAL LOGISTICS: General phasing, logistics		1.00%		225,623.61	22,787,984.69
	9	SWING COSTS: 11 CR Temp Trailers, etc.		1.50%		341,819.77	23,129,804.46
		SUBTOTAL [CUMULATIVE]					23,129,804.46
PROGRAM TOTAL							**23,129,804.46**

Option 3: ADDITION

			GSF	Ext. perim LF	Wall Ht	Wall Area
0.00	**PROJECT DATA**	**CATEGORIES**				
		Footprint Square Feet	50,005.00	997.00		
		Total Roof Area	50,005.00			
		Green Roof Area	15,001.50			
		Basement: Concrete Walls	0.00	0.00	0.00	0.00
		1st Fl	50,005.00	556.00	18.00	10,008.00
		2nd Fl	19,008.00	757.00	16.00	12,112.00
		3rd Fl	21,415.00	800.00	16.00	12,800.00
		4th Fl	0.00	727.00	16.00	11,632.00
		Total GSF	90,428.00			
		Total Supported SF	40,423.00			
		Below Grade Wall SF				0.00
		Above Grade Wall SF				46,552.00
		Perim, demising wall		441.00	18.00	7,938.00

PROGRAMMATIC COST STUDY			FORELLA GROUP, LLC		Prepared By:	pf/atb	Job #:		Revisions
Proj Name: Patric Henry K-8 and Rec Center			9495 Silver King Court		Approved By:	pf	File:	Feasibility Study	4/30/2015
Project Owner: Alexandria City Public School			Suite A				Email:	Design	
Project Location: Alexandria, VA			Fairfax, VA 22031-4713				Report Date:	Reference Date Stamp	

Scheme and Location Ref	Uniformat System Heading	Item Code #	Descriptions, Specification & Notes	Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals
A	**SUBSTRUCTURE**	0.00	***System Subtotal***	90,428.00	GSF	8.62		779,319.08
Additions			***Lower Level Assemblies***					
New Building		1.00	Concrete spread footing foundations	777.86	CY	500.00	388,927.78	
New Building		2.00	Special foundations		Excluded			
New Building		3.00	Foundation drainage	1,096.70	LF	14.00	15,353.80	
New Building		4.00	Concrete SOG std capacity	50,005.00	FLSF	7.50	375,037.50	
New Building		5.00	Loading dock slab, incl walls & footings	0.00	FLSF	25.00	0.00	
New Building		6.00	Loading dock backfill	0.00	CY	15.00	0.00	
New Building		7.00	Basement concrete walls	0.00	WSF	45.00	0.00	
New Building		8.00	Basement conc wall WP	0.00	WSF	7.00	0.00	
B	**SHELL**		***System Subtotal***	90,428.00		57.77		5,224,348.00
New Building			***Supported Floor Structure***					
New Building		1.00	Supported floor frame & columns	181.90	Tons	3,000.00	545,710.50	
New Building		2.00	Metal deck assembly	40,423.00	SF	2.50	101,057.50	
New Building		3.00	Slab on deck	40,423.00	SF	6.00	242,538.00	
New Building		4.00	Fireproofing, limited	40,423.00	SF	0.75	30,317.25	
New Building								
New Building			***Roof Structure***					
New Building		1.00	Roof: Horizontal steel framing & columns	155.02	Tons	3,000.00	465,046.50	
New Building		2.00	Metal deck assembly	50,005.00	SF	2.25	112,511.25	
New Building		3.00	Fireproofing, limited	50,005.00	GSF	0.70	35,003.50	
New Building								
New Building			***Miscellaneous Metals***					
New Building		1.00	Stairs		Ref Stairs & Railings, below			
New Building		2.00	Miscellaneous fabrications	90,428.00	SF	2.00	180,856.00	
New Building		3.00	Expansion jts assemblies & covers	90,428.00	SF	0.25	22,607.00	
New Building								
New Building			***Exterior Enclosure Assemblies***					
New Building		1.00	Brick on cmu bu incl insul, & vb	32,586.40	Wall SF	39.00	1,270,869.60	
New Building		2.00	Canopy at entrance		Ref site			

Scheme and Location Ref	Uniformat System Heading	Item Code #	Descriptions, Specification & Notes	Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals
B	**SHELL, continued**		***Exterior Fenestration Assemblies***					
		1.00	Windows	6,982.80	SF	48.00	335,174.40	
New Building		2.00	Storefront glazing	6,982.80	SF	55.00	384,054.00	
New Building		3.00	Curtain Wall		None per direction Sorg			
New Building								
New Building			***Exterior Door Assemblies***					
New Building		1.00	Exterior storefront door assemblies, double	4.00	Pair	5,500.00	22,000.00	
New Building		2.00	Exterior storefront door assemblies, single	2.00	Leaf	2,750.00	5,500.00	
New Building		3.00	Exterior door assemblies, double	2.00	Pair	2,700.00	5,400.00	
New Building		4.00	Exterior door assemblies, single	4.00	Leafs	1,400.00	5,600.00	
New Building		5.00	OH Doors: Insulated, powered	100.00	DR SF	70.00	7,000.00	
New Building								
New Building			***Roofing Assemblies***					
New Building		1.00	Standing seam, insul., flashing, acc. etc	0.00	RSF	35.00	0.00	
New Building		2.00	Membrane, insul., flashing, acc., par., etc	31,003.50	RSF	13.00	403,045.50	
New Building		3.00	Green roofing & plantings: Premium Add	15,001.50	RSF	38.00	570,057.00	
New Building		4.00	Glass roof system	4,000.00	SF	120.00	480,000.00	

PROGRAMMATIC COST STUDY		FORELLA GROUP, LLC	Prepared By:	pf/atb	Job #:		Revisions
Proj Name: Patric Henry K-8 and Rec Center		9495 Silver King Court	Approved By:	pf	File:	Feasibility Study	4/30/2015
Project Owner: Alexandria City Public School		Suite A			Email:	Design	
Project Location: Alexandria, VA		Fairfax, VA 22031-4713			Report Date:	Reference Date Stamp	

Scheme and Location Ref	Uniformat System Heading	Item Code #	Descriptions, Specification & Notes	Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals
C	**INTERIORS**		***System Subtotal***	90,428.00	GSF	36.59		3,308,575.89
New Building			***Partition Assemblies***					
New Building		1.00	Interior partitions	97,662.24	WallSF	10.00	976,622.40	
New Building		2.00	GWB + mtl furring, int face ext walls		Ref Ext Enclosure Assemblies			
New Building		3.00	Interior glass	10,851.36	WallSF	40.00	434,054.40	
New Building								
New Building			***Door, Frame & Hardware Assemblies***					
New Building		1.00	Door assm, single	12.00	Leaf	1,400.00	16,800.00	
New Building		2.00	Door assm, dbl	20.00	Pair	2,700.00	54,000.00	
New Building		3.00	storefront door assemblies, single	10.00	Leaf	2,750.00	27,500.00	
New Building		4.00	storefront door assemblies, double	4.00	Pair	5,500.00	22,000.00	
New Building								
New Building			***Finish Assemblies***					
New Building		1.00	Floor finishes: VCT, 60%	54,256.80	SF	4.50	244,155.60	
New Building		2.00	Floor finishes: carpet, 20%	18,085.60	SF	4.50	81,385.20	
New Building		3.00	Floor finishes: ceramic tile, 10%	9,042.80	SF	9.00	81,385.20	
New Building		4.00	Floor finishes: special finish, 10%	9,042.80	SF	25.00	226,070.00	
New Building		5.00	Ceilings	90,428.00	SF	5.00	452,140.00	
New Building		6.00	GWB bulkheads	90,428.00	SF	0.50	45,214.00	
New Building		7.00	CT walls	9,766.22	WSF	12.00	117,194.69	
New Building		8.00	Paint, interior & exterior	90,428.00	SF	1.50	135,642.00	
New Building		9.00	Special coatings	90,428.00	SF	0.30	27,128.40	
New Building								
New Building			***Stairs & Railings Assemblies***					
New Building		1.00	Conc on metal pan: Stairs, landgs, railings, basic finishes	6.00	Flts	16,000.00	96,000.00	
New Building								
New Building			***Miscellaneous Specialties***					
New Building		1.00	Toil acc., entr mats & frames, signage,					
New Building			fire ext., jan acc., etc.	90,428.00	GSF	2.00	180,856.00	
New Building		2.00	Rough carpentry	90,428.00	GSF	1.00	90,428.00	

PROGRAMMATIC COST STUDY			FORELLA GROUP, LLC		Prepared By:	pf/atb	Job #:		Revisions
Proj Name: Patric Henry K-8 and Rec Center			9495 Silver King Court		Approved By:	pf	File:	Feasibility Study	4/30/2015
Project Owner: Alexandria City Public School			Suite A				Email:	Design	
Project Location: Alexandria, VA			Fairfax, VA 22031-4713				Report Date:	Reference Date Stamp	

Scheme and Location Ref	Uniformat System Heading	Item Code #	Descriptions, Specification & Notes	Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals
D	**SERVICES**		***System Subtotal***	90,428.00	SF	83.51		7,551,703.00
New Building			***Conveying Systems***					
New Building		1.00	Hydraulic elevator	3.00	Stops	38,000.00	114,000.00	
New Building								
New Building			***HVAC***	DX rooftop package cooling with natural gas fired heat				
New Building		1.00	Equipment	90,428.00	GSF	17.00	1,537,276.00	
New Building		2.00	Air Distribution	90,428.00	GSF	11.00	994,708.00	
New Building		3.00	Piping	90,428.00	GSF	4.00	361,712.00	
New Building		4.00	Controls (sole sourced)	90,428.00	GSF	5.00	452,140.00	
New Building		5.00	Miscellaneous	90,428.00	GSF	1.50	135,642.00	
New Building								
New Building			***Plumbing***					
New Building		1.00	Bathroom fixtures, water, san sewer serv.,	90,428.00	GSF	9.50	859,066.00	
New Building		2.00	floor & roof drainage					
New Building								
New Building			***Fire Protection***					
New Building		1.00	Fire protection, incl fire pump	90,428.00	GSF	3.00	271,284.00	
New Building								
New Building			***Electrical Systems***					
New Building		1.00	Service & distribution	90,428.00	GSF	7.00	632,996.00	
New Building		2.00	Lighting & controls, incl LED	90,428.00	GSF	15.00	1,356,420.00	
New Building		3.00	Branch power devices & wiring	90,428.00	GSF	1.75	158,249.00	
New Building		4.00	AV/Communication RI only	90,428.00	GSF	2.00	180,856.00	
New Building		5.00	Fire alarm	90,428.00	GSF	2.50	226,070.00	
New Building		6.00	Security system	90,428.00	GSF	3.00	271,284.00	

PROGRAMMATIC COST STUDY			FORELLA GROUP, LLC		Prepared By:	pf/atb	Job #:		Revisions
Proj Name: Patric Henry K-8 and Rec Center			9495 Silver King Court		Approved By:	pf	File:	Feasibility Study	4/30/2015
Project Owner: Alexandria City Public School			Suite A				Email:	Design	
Project Location: Alexandria, VA			Fairfax, VA 22031-4713				Report Date:	Reference Date Stamp	

Scheme and Location Ref	Uniformat System Heading	Item Code #	Descriptions, Specification & Notes	Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals
E	**EQ & FURNISHINGS**		***System Subtotal***	90,428.00	SF	8.48		766,832.00
New Building			***Basics***					
New Building		1.00	Lockers / cubbies	600.00	EA	250.00	150,000.00	
New Building		2.00	Casework, millwork, etc.	90,428.00	GSF	4.00	361,712.00	
New Building		3.00	Drymarker boards and tack boards	28.00	Rooms	1,440.00	40,320.00	
New Building								
New Building			***Special***					
New Building		1.00	Pre-engineered gym	4,200.00	SF	32.00	134,400.00	
New Building		2.00	Food service		Ref Renovation			
New Building		3.00	Gymnasium equipment	4,200.00	Gym SF	12.00	50,400.00	
New Building		4.00	Science lab equipment	1.00	LS	30,000.00	30,000.00	
F	**SPECIAL**		***System Subtotal***				Not used	
Z	**GENERAL**		***Subtotal A-F***					17,630,777.97
New Building		1.00	Field Overhead				1,763,077.80	
New Building		2.00	Subtotal				19,393,855.76	
New Building		3.00	GC OH&P, ref Summary				0.00	
New Building		4.00	Subtotal				19,393,855.76	
New Building		5.00	Bonds & Insurance, ref Summary				0.00	
New Building			**SUBTOTAL**	90,428.00	GSF	214.47		**19,393,855.76**

PROGRAMMATIC COST STUDY			FORELLA GROUP, LLC		Prepared By:	pf/atb	Job #:		Revisions
Proj Name: Patric Henry K-8 and Rec Center			9495 Silver King Court		Approved By:	pf	File:	Feasibility Study	4/30/2015
Project Owner: Alexandria City Public School			Suite A				Email:	Design	
Project Location: Alexandria, VA			Fairfax, VA 22031-4713				Report Date:	Reference Date Stamp	

Scheme and Location Ref	Uniformat System Heading	Item Code #	Descriptions, Specification & Notes		Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals

COST SUMMARY: RENOVATION-ADDITION OPTION 3: RENOVATION

HARD CONSTRUCTION COSTS		***BUILDINGS***					
	3	RENOVATION	44,937	GSF	182.99	8,223,063.57	8,223,063.57
		MARK-UPS & CONTINGENCIES					
	4	GC OH&P		4.00%		328,922.54	8,551,986.11
	5	CONSTRUCTION CONTINGENCY		3.00%		256,559.58	8,808,545.70
	6	UNFORSEEN CONDITIONS CONTINGENCY		3.00%		264,256.37	9,072,802.07
	7	BONDS, INSURANCE		1.50%		136,092.03	9,208,894.10
	8	DESIGN CONTINGENCY	Per direction Sorg	7.00%		644,622.59	9,853,516.69
	9	GENERAL LOGISTICS: General phasing, logistics		2.00%		197,070.33	10,050,587.02
	10	SWING COSTS: 11 CR Temp Trailers, etc.		1.50%		150,758.81	10,201,345.82
		SUBTOTAL [CUMULATIVE]					10,201,345.82
PROGRAM TOTAL							**10,201,345.82**

Option 3: RENOVATION

			GSF	Perim LF	Wall Ht	Wall Area
0.00	**PROJECT DATA**	**CATEGORIES**				
		Footprint Square Feet	44,937.00	1,712.00		
		Total Roof Area	44,937.00			
		Green Roof Area		None Indicated		
		Basement: Concrete Walls		0.00	0.00	0.00
		1st Fl	44,937.00	1,307.00	18.00	23,526.00
		Total GSF	44,937.00			
		Total Supported SF		None Indicated		
		Above Grade Wall SF				23,526.00
		Perim, demising wall		405.00	18.00	7,290.00

PROGRAMMATIC COST STUDY				FORELLA GROUP, LLC		Prepared By:	pf/atb	Job #:		Revisions
Proj Name: Patric Henry K-8 and Rec Center				9495 Silver King Court		Approved By:	pf	File:	Feasibility Study	4/30/2015
Project Owner: Alexandria City Public School				Suite A				Email:	Design	
Project Location: Alexandria, VA				Fairfax, VA 22031-4713				Report Date:	Reference Date Stamp	

Scheme and Location Ref	Uniformat System Heading	Item Code #	Descriptions, Specification & Notes	Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals
A	**SUBSTRUCTURE**	0.00	***System Subtotal***	44,937.00	GSF	1.39		62,282.42
Renovation			***Lower Level Assemblies***					
Renovation		1.00	Concrete spread footing foundations	104.02	CY	500.00	52,010.42	
Renovation		2.00	Special foundations		Excluded			
Renovation		3.00	Foundation drainage	513.60	LF	20.00	10,272.00	
B	**SHELL**		***System Subtotal***	44,937.00		32.88		1,477,668.40
Renovation			***Supported Floor Structure***		None indicated			
Renovation								
Renovation			***Roof Structure***					
Renovation		1.00	General modifications & repairs	44,937.00	SF	7.00	314,559.00	
Renovation		2.00	Metal deck assembly		Existing to remain			
Renovation		3.00	Fireproofing, limited	44,937.00	GSF	0.20	8,987.40	
Renovation								
Renovation			***Miscellaneous Metals***					
Renovation		1.00	Stairs		Ref Stairs & Railings, below			
Renovation		2.00	Miscellaneous fabrications	44,937.00	SF	2.00	89,874.00	
Renovation		3.00	Expansion jts assemblies & covers	44,937.00	SF	0.25	11,234.25	
Renovation								
Renovation			***Exterior Enclosure Assemblies***					
Renovation		1.00	Repairs, tuck pointing & power wash	17,644.50	Wall SF	4.50	79,400.25	
Renovation		2.00	New insul/, int face ext. walls for energy upgr		Assume not required			
Renovation		3.00	Canopy at entrance		Ref site			

PROGRAMMATIC COST STUDY			FORELLA GROUP, LLC		Prepared By:	pf/atb	Job #:		Revisions
Proj Name: Patric Henry K-8 and Rec Center			9495 Silver King Court		Approved By:	pf	File:	Feasibility Study	4/30/2015
Project Owner: Alexandria City Public School			Suite A				Email:	Design	
Project Location: Alexandria, VA			Fairfax, VA 22031-4713				Report Date:	Reference Date Stamp	

Scheme and Location Ref	Uniformat System Heading	Item Code #	Descriptions, Specification & Notes	Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals
B	**SHELL, continued**		***Exterior Fenestration Assemblies***					
		1.00	Fenestration	5,881.50	SF	55.00	323,482.50	
Renovation								
Renovation			***Exterior Door Assemblies***					
Renovation		1.00	Exterior storefront door assemblies, double	5.00	Pair	5,500.00	27,500.00	
Renovation		2.00	Exterior storefront door assemblies, single	3.00	Leaf	2,750.00	8,250.00	
Renovation		3.00	Exterior door assemblies, double	6.00	Pair	2,700.00	16,200.00	
Renovation		4.00	Exterior door assemblies, single	3.00	Leafs	1,400.00	4,200.00	
Renovation		5.00	OH Doors: Insulated, powered	140.00	DR SF	70.00	9,800.00	
Renovation								
Renovation			***Roofing Assemblies***					
Renovation		1.00	Standing seam metal, insul., flashing etc. ETR		None indicated			
Renovation		2.00	Membrane, insul., flashing, acc., par., etc	44,937.00	RSF	13.00	584,181.00	
Renovation		3.00	Green roofing & plantings: Premium Add		None indicated			
Renovation		4.00	Skylight assemblies		None indicated			

Scheme and Location Ref	Uniformat System Heading	Item Code #	Descriptions, Specification & Notes	Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals
C	**INTERIORS**		***System Subtotal***	44,937.00	GSF	35.87		1,611,815.27
Renovation			***Partition Assemblies***					
Renovation		1.00	Interior partitions	40,443.30	WallSF	10.00	404,433.00	
Renovation		2.00	GWB + mtl furring, int face ext walls		Ref Ext Enclosure Assemblies			
Renovation		3.00	Interior glass	4,493.70	WallSF	40.00	179,748.00	
Renovation								
Renovation			***Door, Frame & Hardware Assemblies***					
Renovation		1.00	Door assm, single	50.00	Leafs	1,400.00	70,000.00	
Renovation		2.00	Door assm, dbl	26.00	Pair	2,700.00	70,200.00	
Renovation		3.00	Storefront door assemblies, single	8.00	Leafs	3,200.00	25,600.00	
Renovation		4.00	storefront door assemblies, double	12.00	Pair	5,500.00	66,000.00	
Renovation								
Renovation			***Finish Assemblies***					
Renovation		1.00	Floor finishes: VCT, 60%	26,962.20	SF	4.50	121,329.90	
Renovation		2.00	Floor finishes: carpet, 20%	8,987.40	SF	4.50	40,443.30	
Renovation		3.00	Floor finishes: ceramic tile, 10%	4,493.70	SF	9.00	40,443.30	
Renovation		4.00	Floor finishes: special finish, 10%	4,493.70	SF	25.00	112,342.50	
Renovation		4.00	Ceilings	44,937.00	SF	5.00	224,685.00	
Renovation		5.00	GWB bulkheads	44,937.00	SF	0.40	17,974.80	
Renovation		6.00	CT walls	3,033.25	WSF	12.00	36,398.97	
Renovation		7.00	Paint, interior & exterior	44,937.00	SF	1.50	67,405.50	
Renovation		8.00	Special coatings	44,937.00	SF	0.30	13,481.10	
Renovation								
Renovation			***Stairs & Railings Assemblies***		None indicated			
Renovation								
Renovation			***Miscellaneous Specialties***					
Renovation		1.00	Toil acc., entr mats & frames, signage,					
Renovation			fire ext., jan acc., etc.	44,937.00	GSF	2.00	89,874.00	
Renovation		2.00	Rough carpentry	44,937.00	GSF	0.70	31,455.90	

Scheme and Location Ref	Uniformat System Heading	Item Code #	Descriptions, Specification & Notes	Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals
D	**SERVICES**		***System Subtotal***	44,937.00	SF	82.47		3,706,068.25
Renovation			***Conveying Systems***					
Renovation		1.00	Elevator		None indicated			
Renovation								
Renovation			***HVAC***	DX rooftop package cooling with natural gas fired heat				
Renovation		1.00	Equipment	44,937.00	GSF	17.00	763,929.00	
Renovation		2.00	Air Distribution	44,937.00	GSF	11.00	494,307.00	
Renovation		3.00	Piping	44,937.00	GSF	4.00	179,748.00	
Renovation		4.00	Controls (sole sourced)	44,937.00	GSF	5.00	224,685.00	
Renovation		5.00	Miscellaneous	44,937.00	GSF	1.50	67,405.50	
Renovation								
Renovation			***Plumbing***					
Renovation		1.00	Plumbing system, water, san sewer serv.,	44,937.00	GSF	9.50	426,901.50	
Renovation		2.00	floor & roof drainage, equipment, fixtures					
Renovation								
Renovation			***Fire Protection***					
Renovation		1.00	Fire protection, excl fire pump	44,937.00	GSF	3.00	134,811.00	
Renovation		2.00	Fire pump / jockey pump	1.00	EA	10,000.00	10,000.00	
Renovation								
Renovation			***Electrical Systems***					
Renovation		1.00	Service & distribution	44,937.00	GSF	7.00	314,559.00	
Renovation		2.00	Lighting & controls, incl LED	44,937.00	GSF	15.00	674,055.00	
Renovation		3.00	Branch power devices & wiring	44,937.00	GSF	1.75	78,639.75	
Renovation		4.00	AV/Communication RI only	44,937.00	GSF	2.00	89,874.00	
Renovation		5.00	Fire alarm	44,937.00	GSF	2.50	112,342.50	
Renovation		6.00	Security system	44,937.00	GSF	3.00	134,811.00	

Scheme and Location Ref	Uniformat System Heading	Item Code #	Descriptions, Specification & Notes	Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals
E	**EQ & FURNISHINGS**		***System Subtotal***	44,937.00	SF	13.75		617,678.00
Renovation			***Basics***					
Renovation		1.00	Lockers / cubbies	425.00	EA	250.00	106,250.00	
Renovation		2.00	Casework, millwork, etc.	44,937.00	GSF	4.00	179,748.00	
Renovation		3.00	Drymarker boards and tack boards	22.00	CR	1,440.00	31,680.00	
Renovation								
Renovation			***Special***					
Renovation		1.00	Food service	1.00	LS	300,000.00	300,000.00	
Renovation		2.00	Gymnasium equipment		Ref Addition			
Renovation		3.00	Science lab equipment		None indicated			
F	**SPECIAL**		***System Subtotal***				Not used	
Z	**GENERAL**		***Subtotal A-F***					7,475,512.34
Renovation		1.00	Field Overhead				747,551.23	
Renovation		2.00	Subtotal				8,223,063.57	
Renovation		3.00	GC OH&P, ref Summary				0.00	
Renovation		4.00	Subtotal				8,223,063.57	
Renovation		5.00	Bonds & Insurance, ref Summary				0.00	
Renovation			**SUBTOTAL**	44,937.00	GSF	182.99		**8,223,063.57**

PROGRAMMATIC COST STUDY			FORELLA GROUP, LLC		Prepared By:	pf/atb	Job #:		Revisions
Proj Name: Patric Henry K-8 and Rec Center			9495 Silver King Court		Approved By:	pf	File:	Feasibility Study	4/30/2015
Project Owner: Alexandria City Public School			Suite A				Email:	Design	
Project Location: Alexandria, VA			Fairfax, VA 22031-4713				Report Date:	Reference Date Stamp	

Scheme and Location Ref	Uniformat System Heading	Item Code #	Descriptions, Specification & Notes		Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals

COST SUMMARY: SITE ANALYSIS: ALL OPTIONS

HARD CONSTRUCTION COSTS		***BUILDINGS***				
	1	SITEWORK	1	LS	4,721,812.05	4,721,812.05
		MARK-UPS & CONTINGENCIES				
	2	GC OH&P		4.00%	188,872.48	4,910,684.53
	3	CONSTRUCTION CONTINGENCY		3.00%	147,320.54	5,058,005.06
	4	BONDS, INSURANCE		1.50%	75,870.08	5,133,875.14
	5	DESIGN CONTINGENCY	Per direction Sorg	7.00%	359,371.26	5,493,246.40
	6	GENERAL LOGISTICS: mob/de mob, site staging etc.		1.00%	54,932.46	5,548,178.86
		SUBTOTAL [CUMULATIVE]				5,548,178.86
PROGRAM TOTAL						**5,548,178.86**

PROGRAMMATIC COST STUDY			FORELLA GROUP, LLC	Prepared By:	pf/atb	Job #:		Revisions	
Proj Name: Patric Henry K-8 and Rec Center			9495 Silver King Court	Approved By:	pf	File:	Feasibility Study	4/30/2015	
Project Owner: Alexandria City Public School			Suite A			Email:	Design		
Project Location: Alexandria, VA			Fairfax, VA 22031-4713			Report Date:	Reference Date Stamp		

Scheme and Location Ref	Uniformat System Heading	Item Code #	Descriptions, Specification & Notes	Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals
			SITEWORK					
0.00	**DATA BOX**		**Site Statistics**					
			Disturbed area work zones	509,652.00	SF	11.70	Acres	
			Total site [published area]	566,280.00	SF	13.00	Acres	
Sitework	**ENVIRONMENTAL**	1.00	Erosion, sedimentary cntrls, disturbed area	11.70	AC	5,500.00	64,350.00	64,350.00
Sitework	**CONTROLS**							
Sitework								
Sitework	**SITE DEMO**	1.00	General site demolition	509,652.00	SF	0.50	254,826.00	254,826.00
Sitework	**EARTHWORK**	1.00	General grading	509,652.00	SF	0.55	280,308.60	280,308.60
Sitework		3.00	Rock or unsuitable soils		Excluded			
Sitework								
Sitework	**PRIMARY UTILITIES: WET**	1.00	Water, sanitary sewer	1.00	LS	409,500.00	409,500.00	409,500.00
Sitework								
Sitework	**PRIMARY UTILITIES and**	1.00	Incoming service	1.00	LS	100,000.00	100,000.00	611,000.00
Sitework	**SERVICES: DRY**	2.00	Incoming communications ductbanks	1.00	LS	50,000.00	50,000.00	
Sitework		3.00	Incoming gas		Assume brought to meter by gas company			
Sitework		4.00	Emrgncy generator, WP enclosure, fuel tank	1.00	LS	250,000.00	250,000.00	
Sitework		5.00	General site ltg lamp, pole, foundns, circuitg	42.00	EA	3,500.00	147,000.00	
Sitework		6.00	Athletic field night lighting		Excluded			
Sitework		7.00	Walking path lighting	32.00	EA	2,000.00	64,000.00	
Sitework								
Sitework	**SWM**	1.00	SWM: Detention / retention, piping, struc-	1.00	LS	877,500.00	877,500.00	877,500.00
Sitework		2.00	tures, filtration, bio swales					
Sitework								
Sitework	**SITE CONCRETE**	1.00	Sidewalks, new	47,108.25	SF	7.00	329,757.75	862,252.75
Sitework		2.00	Concrete ramps	4.00	LOC	5,000.00	20,000.00	
Sitework		3.00	Concrete steps	210.00	LF	50.00	10,500.00	
Sitework		4.00	Amphitheatre paving	13,965.00	SF	8.00	111,720.00	
Sitework		5.00	Amphitheatre tiered seating	472.50	LF	150.00	70,875.00	
Sitework		6.00	Outdoor classroom		Included with green roof			
Sitework		7.00	Retaining wall allowance	1.00	LS	80,000.00	80,000.00	
Sitework		8.00	Walking paths, concrete	4,200.00	SF	7.00	29,400.00	
Sitework		9.00	Paved play area	21,000.00	SF	10.00	210,000.00	
Sitework								
Sitework	**BITUMINOUS PVMNT includin**	1.00	Mill, overlay existing bituminous paving	0.00	SY	35.00	0.00	522,640.00

PROGRAMMATIC COST STUDY			FORELLA GROUP, LLC		Prepared By:	pf/atb	Job #:		Revisions
Proj Name: Patric Henry K-8 and Rec Center			9495 Silver King Court		Approved By:	pf	File:	Feasibility Study	4/30/2015
Project Owner: Alexandria City Public School			Suite A				Email:	Design	
Project Location: Alexandria, VA			Fairfax, VA 22031-4713				Report Date:	Reference Date Stamp	

Scheme and Location Ref	Uniformat System Heading	Item Code #	Descriptions, Specification & Notes	Computed Quantity [US]	Unit of Meas	Mat+Lab+Equip Loaded Unit	Line Extension	Subtotals
Sitework	**C&G**	2.00	New paving	10,066.00	SY	40.00	402,640.00	
Sitework		3.00	C&G	6,000.00	LF	20.00	120,000.00	
Sitework								
Sitework	**LANDSCAPING**	1.00	Plant materials	1.00	LS	120,000.00	120,000.00	202,679.06
Sitework		2.00	Seed and sod	23,722.86	SY	2.00	47,445.72	
Sitework		3.00	Soccer field	8,808.33	SY	4.00	35,233.33	
Sitework								
Sitework	**MISCELLANEOUS**	1.00	Canopy at entrance		None indicated			207,500.00
Sitework		2.00	Signage/bollards/misc, etc.	1.00	LS	50,000.00	50,000.00	
Sitework		3.00	Field equip	1.00	LS	40,000.00	40,000.00	
Sitework		4.00	Site furnishings: benches, bike racks, etc.	35.00	EA	2,000.00	70,000.00	
Sitework		5.00	Waste receptacles	10.00	EA	750.00	7,500.00	
Sitework		6.00	Play area equipment	1.00	LS	40,000.00	40,000.00	
Sitework		7.00	Offsite		Excluded			
Sitework								
Sitework		1.00	Subtotal					4,292,556.41
Sitework		2.00	Field Overhead Incl Phasing Premium				429,255.64	
Sitework		3.00	Subtotal				4,721,812.05	
Sitework		4.00	CM Fee, ref Summary				0.00	
Sitework		5.00	Subtotal				4,721,812.05	
Sitework		6.00	Bonds & Insurance, ref Summary				0.00	
Sitework		7.00	**SUBTOTAL**				1.10	**4,721,812.05**

NOTES

Important Note: Forella Group, LLC disclaims any warranties expressed or implied with respect to this estimate and any information or data contained herein.

Additional Notes and Clarifications

ADDITIONAL NOTES & EXCLUSIONS

There are numerous *soft costs* and *secondary scope* issues with cost implications associated with a construction project today. The following can be a useful way to help verify that all of your project costs have been addressed. Unless noted otherwise, none of the costs listed below have been included in our computations.

A. REAL ESTATE ACQUISITIONS & LEASING

[] Due diligence fees and expenses

[] Real estate acquisitions and/or leases, including those pertaining to any necessary easements and rights of way.

[] Settlement charges, fees, taxes, transfer and/or recordation fees

[] Brokerage commissions

B. PROJECT & CONTRACT MANAGEMENT

[] Development fees

[] Project / contract management costs and expenses

[] Communications, telephones, cell phones, web services, facsimile expenses, e-mail, long distance telephone expenses, etc.

[] Travel, parking, courier services, office equipment, office supplies, security fees and expenses

[] Reprographics expenses

[] Messenger and overnight expenses

C. FINANCIAL

[] Financial feasibility analyses

[] Construction and interim financing fees, expenses and interest

[] Permanent financing fees, expenses, interest, bonds

[] Fees and expenses related to special government programs

[] Accounting both internal and external

[] Appraisal fees

[] Start-up working capital to cover initial operating deficit

D. INSURANCE

Insurance premiums purchased at appropriate limits for the following categories. Note that we recommend that the A.M. Best Company ratings be A [minus] or above.

[] General liability insurance*

[] Professional liability insurance*

[] Excess liability or umbrella insurance

[] Bonds, builder's risk insurance*

[] Moving and storage insurance

[] Title insurance

[] Worker's compensation insurance*

[] Auto insurance

[] Pollution, hazardous materials liability insurance

***** Construction Managers insurance has been included in our cost estimate

E. LEGAL

[] Legal services related to acquisitions and title

[] Legal services related to zoning, subdivisioning, use and proffers

[] Legal services related to partnership and joint venture agreement preparations and reviews

[] Legal services related to financing

[] Legal services related to contract preparation and reviews

[] Legal services related to leasing document preparation and reviews

F. REGULATORY PROCESSES

[] Site and building permit fees & expenses

[] Fees and expenses pertaining to special zoning and uses

[] Primary water, sewer, gas, power, communications fees and expenses

[] State and local highway fees, bonds

[] On and off site improvements or contributions mandated by regulatory agencies as a condition of their approvals.

G. DESIGN FEES & EXPENSES

[] Field surveys [note: lenders may have certification standards regarding field surveys]

[] Civil engineering fees and expenses

[] Architectural fees and expenses

[] Structural engineering fees and expenses

[] Mechanical engineering fees and expenses

[] Electrical engineering fees and expenses

[] Traffic consultant's fees and expenses

[] Acoustical engineering fees and expenses

[] Lighting consultant's fees and expenses

[] Testing & inspections

[] Permit expeditor

H. PROPERTY MANAGEMENT, OPERATIONS & MAINTENANCE

[] Property management fees and expenses

[] Operations and maintenance costs

I. MARKETING, PUBLIC RELATIONS & ADVERTISING

[] Consultant's fees for market analyses, strategies, public relations, advertising and merchandizing

[] Expenses related to promotional photography, graphics, artwork, reproduction, postage, signage, etc.

[] Promotional events, hearings, fundraisers, etc.

J. MOVING & STORAGE COSTS

[] Moving and storage fees and expenses

[] Hauling and disposal expenses that can occur during and following a move

K. TEMPORARY FACILITIES

[] Temporary owner/user office facility leases or purchases

[] Temporary owner/user utilities fees and charges, etc.

[] Temporary owner/user furniture, fixture & equipment

L. MISCELLANEOUS

[] *Construction Contingency*: This contingency budgets for change orders and / or additional costs charged by the contractor after the construction contract award.

[] *Owner Paid Inspections and Testing:* We have not included inspections and testing costs called for in the specifications. Owners can require additional inspections and testing over and above those required of the contractor.

[] *Undelineated Issues:* Unless noted otherwise, we have not included costs that have not be specified or delineated on the subject documents.

[] *Existing Conditions:* Unless noted otherwise, we have not included costs pertaining to wetland issues, geotechnical issues, archeological finds or hazardous materials.

[] *Furniture, fixtures & equipment [F.F. and E.]:* We have not included owner or user required items that are not permanently attached or fastened to the facility or part of the general contract for construction.

OPINION OF PROBABLE COST

Controlling cost, schedule and quality requires on going processes that commence at the programmatic phase and continue through to final acceptance and building occupancy. It should be noted that we exercise no control over fluctuating market conditions. We have employed our best judgment in analyzing the subject project. We cannot, however, guarantee that actual costs will not vary from the opinions we have provided.

8.3 Meeting Minutes

Location: Cafeteria
Meeting Date: 17 December 2014
Meeting Time: 6:00 pm
Subject: Community Meeting
Project: Patrick Henry Elementary School & Recreation Center
Project #: 1417

Attending:

Mark Eisenhour (ME)	ACPS	meisenho@acps.k12.va.us	703 772 1072
Bill Conkley (BC)	Sorg	Billc@sorgarchitects.com	202 393 6445
Clair Wholean (CW)	Sorg	Clairw@sorgarchitects.com	202 393 6445

Meeting Minutes

1. Introduction

1.1. ME introduced the project and Sorg Architects to the group. The project is in the early stages of a feasibility study to determine the needs of the school and recreation center. An outreach process is ongoing with the school staff, administration and the community to obtain feedback. Two meetings with teachers have been held and this is the first community meeting.

2. Project Goal

2.1. ME explained the project goal is to house a K-8 school and a recreation center in either a renovation of the existing building, demolition of existing building and construction of a new building, or some combination of renovation and addition. The future school is estimated to house 800 students and the recreation center is for use by the broader community. The feasibility study will evaluate the options along with associated costs and impact to the operation of the school. The study will be completed by Sorg architects in May 2015. ACPS will then review the study and make a decision on which option to move forward with. Design will take about a year, followed by construction anticipated to be a year and a half.

2.2. An attendee inquired if students would stay in the existing school or be relocated during construction. ME explained that this would depend on which option is pursued, and impact to the students will be carefully considered. A phasing strategy will be developed as part of the study.

2.3. An attendee inquired if the school and recreation center would be one building or two, and if they would be built simultaneously. ME stated that the goal is for them to be one project constructed at the same time.

2.4. ME explained that the Recreation Center will be funded separately, through RPCA. ACPS and RPCA are coordinating to determine **separate budgets are set for both parts of the project**.

3. Design Team Update

3.1. BC gave an overview of the observations of the existing building architecture, structure, and MEP systems.

3.2. BC described two teacher meetings held recently and feedback generated from those meetings about the program for the school. An architectural program describes what functional spaces are included in a building, and things like which rooms are near each other, and how many people use each room. Teacher feedback as well as community feedback will be incorporated into the program.

4. Community Visioning Activity: Meaning and Friendship

4.1. CW introduced an activity where participants fill out a handout with questions about what is meaningful in their community and where they meet friends. Participants then discussed the topic and shared their ideas with the large group.

4.2. There was a great variety of responses, but some comments were unanimous. The following ideas were largely agreed on by the group.

- Identify 3 things about your community that are meaningful to you.
  - Diversity
  - Neighbors/family to family relationships/tight-knit community
  - Library
  - Parks

- Identify 3 things about your community that you'd like to change.
  - Traffic
  - Safe Playground for all ages
  - Improve Rec Facilities/Add locations/extend hours
  - Walkability/pedestrian friendly/ Sidewalks/trails
  - Community Meeting Place

- Name a place that you met a friend, or your child met a friend, in your community.
  - Library
  - School
  - Playground
  - Park

5. Community Visioning Activity: Local Inspiration

5.1. Following the same process, participants filled out a handout with questions about what is inspirational in their community and where they meet friends. Participants then discussed the topic and shared their ideas with the large group.

5.2. Attendees were inspired by a wide variety of places and events in their community. Here are a few answers that capture the essence of the conversation:

- Name a place in your community that inspires you.
  - Families playing together
  - When the children are happy
  - Being Healthy
  - Preschool
  - Harbor/Old Town
  - Bike Trails/Nature/Trees
  - Brennan Pond Turtle Park/Cameron Park
  - Cultural: Masonic Temple/Alexandria Birthday/Lyceum/Torpedo Factory

- What quality or qualities makes Alexandria special?
  - Diversity
  - Location
  - Own identity
  - History

- Name a quality of another place you have lived or visited that you would enjoy seeing in Alexandria.
  - Traffic calming
  - Walkability
  - Community Building Activities

- What qualities would an ideal school have?
  - Modern Buildings with technology
  - Community Activities/Involvement

6. Community Visioning Activity: Public Places in and Around the School

6.1. CW and BC asked participants to share what they envision for public spaces within and around the school, such as the Lobby, Main Office, Playground, Outdoor Spaces, and Parent Pick-Up area. It was recorded on the white board and discussed. A list of the ideas generated follows below. Sorg architects will consider this information to inform the design.

7. Wrap-Up

7.1. ME invited participants to continue in this process. There will be about one meeting per month for the duration of the study. ME also invited the community to attend a tour of the Southern Region Technology and Recreation Complex, a project recently completed by Sorg Architects, on January 14th at 6pm. A group will meet at 5pm at the Patrick Henry Cafeteria and travel together to the building.

Qualities of Public Spaces in and Around the School

Lobby/ Main Office
Ample size
Welcoming
Inviting
Open
Bright
Security
Good PA system
Colorful
Kiosk/information desk
Displays
Efficient
Visibility/transparency

Playground
All-purpose playing fields
Picnic area
Shared amenities
Separate play areas by age groups
Age-appropriate play areas
Secure
Outdoor restroom
Lights
Trees/green space
Eco-friendly materials
Trails

Outdoor Spaces
Increase bikability
Increase walkability
Parking area
Separate entrance for Pre-K
Turnarounds
Clear, organized traffic patterns
Separate Bus & Car areas

Parent Pick-Up
Safe
Lighting
Logical traffic flow
Turnaround

Recreation Areas
Adequate size
Age-appropriate
Pool
Gathering space/amphitheater
Turf

- END OF MEETING -

Errors and omissions should be brought to our attention within ten business days so as to be made a part of this record.

Recorded by: Clair Wholean

Copies to: Attendees

Meeting Minutes

Location: RPCA Lee Center – White Board Room
Meeting Date: 03 February 2015
Meeting Time: 4:00 pm
Subject: Recreation Program Meeting
Project: Patrick Henry Elementary School & Recreation Center
Project #: 1417

Attending:

Mark Eisenhour (ME)	ACPS	meisenho@acps.k12.va.us	703 772 1072
Beth Znidersic (BE)	RPCA	Bethany.Znidersic@alexandriava.gov	703 746 5492
Ron Kagawa (RK)	RPCA	ron.kagawa@alexandriava.gov	703 746 5489
Adrian King (AK)	Alexandria DGS	Adrian.King@alexandriava.gov	703 746 4770
Dana Wedeles (DW)	RPCA	dana.wedeles@alexandriava.gov	703 746 5491
William Chesley (WC)	RPCA	william.chesley@alexandriava.gov	703 746 4343
Bill Conkley (BC)	Sorg	Billc@sorgarchitects.com	202 393 6445
Clair Wholean (CW)	Sorg	Clairw@sorgarchitects.com	202 393 6445

Meeting Minutes

1. Needs Assessment

1.1. DW introduced the findings from a needs assessment survey done for residents immediately surrounding Patrick Henry. 86% of respondents do not use the current facility, so there is clearly need for something new. There is stronger need for individual uses rather than group uses, especially space for running, walking, and passive outdoor recreation. In order of preference, the top desired outdoor amenities are trails, a track, and natural open space. The most wanted indoor facilities are a pool, exercise space, and a track. A pool is not in the budget for this project, but the other amenities can definitely be included in the project.

1.2. Operationally, the goal is for Patrick Henry to recover 80% of its cost. A blend of amenities that are revenue generating and non-revenue generating will accomplish this. RPCA is in the process of doing a study with Brailsford & Dunlavey to determine what this could be. RK stated that a copy of the study, which includes a list of programmatic functions, will be shared with Sorg for their use in developing an architectural program.

1.3. Beyond the top 3 amenities, the needs assessment survey identified many other possible activities, such as a culinary arts center, indoor performance space, spinning studio, martial arts, etc. An indoor multipurpose space that could accommodate many of these possibilities would be ideal.

1.4. The needs assessment survey identified a need for indoor and outdoor tracks or trails. The outdoor track need not be a traditional 1/4 mile running track, it could be any type of looped path that has a measurement and signs posted for the distance, i.e. 10 loops = 1 mile, similar to the track in Sorg's Tech Rec project around the gym. Dana noted that there is a naturalist that works with DGS that Sorg can speak to about the outdoor trails.

2. Recreation Program

2.1. Fields were discussed. Currently there are not enough fields, but by 2020 the city will meet its needs for turf fields. For this project, RPCA would like an indoor field with a track around it, as well as an outdoor field. Both fields would be 100' x 120', and would be split in half so that so two games could be played simultaneously. The indoor field could have a lightweight structure such as steel joists. A rigid structure is preferred to a bubble structure.

2.2. The indoor track could be elevated or on ground level, depending if an elevator is feasible.

2.3. In summary, a list of indoor spaces is as follows:

- Indoor soccer field 100' x 120'
- Indoor track around soccer field with measured distance
- fitness area
- lockers (possibly shared with school)
- gymnasium (shared with school)
- office
- toilets
- storage
- multipurpose indoor hard-surface court 1/4 size of soccer field
- indoor rental space for parties/events
- indoor multipurpose activity space

Outdoor spaces include:

- turf court 1/4 size of soccer field
- paved court 1/4 size of soccer field
- soccer field, grass, 210'x 360'
- looped track or trail with measured distance

2.4. BC inquired about construction sequencing. RPCA would like the existing Rec center to stay operational during construction. Ideally, the new Rec center would be built at the same time as the school and open at the same time as the school.

2.5. RPCA would like the existing tennis courts to be demolished.

2.6. RK explained that ideally, the Rec center and the school would be separate buildings. Sorg described the cost and space savings that would result from shared space between the two facilities. A common atrium or connecting space can be provided, so that there is access between the school and Rec center, but also a separate, secure entrance for each. RK noted that operation and maintenance for the Rec center needs to be independent from the school, so building systems should be separate.

2.7. Visual surveillance of the Rec center is a priority – the building should be arranged so that there is a single point of entrance that has visual connection to all other spaces.

2.8. RK inquired about the comments to the architectural program for the school that were given to Sorg. BC is coordinating with ME and will respond by 2/11.

3. Next Steps

3.1. At the next core group meeting, there will be a schedule and program update, and the preliminary Rec center program will be shared with the core group.

3.2. The group may go on some field trips of indoor fields to look at precedent projects.

3.3. Sorg will provide an updated schedule for the feasibility study.

3.4. Sorg will respond to comments to the school program.

3.5. The recreation center program is in progress by Sorg, pending further information- RPCA to provide a copy of the study by Brailsford & Dunlavey.

- END OF MEETING -

Errors and omissions should be brought to our attention within ten business days so as to be made a part of this record.

Recorded by: Clair Wholean

Copies to: Mark Eisenhour, Ron Kagawa, Bill Conkey

Meeting Minutes

Location: Sorg Architects
Meeting Date: February 18, 2015
Meeting Time: 9:00 am
Subject: Patrick Henry Design Charrette
Project: Patrick Henry School and Recreation Center
Project #: 1417

Attending:

Mark Eisenhour (ME)	ACPS	Meisenho@acps.k12.va.us	703 965 3418
Laurel Hamming (LH)	ACPS	Laurel.hammig@acps.k12.va.us	703 619 8298
Ingrid Bynum (IB)	Alexandria PHES	Ingrid.bynum@acps.k12.va.us	240 354 4859
Ron Kagawa (RK)	Alexandria RPCA	Ron.kagawa@alexandriava.gov	703 746 5489
Beth Znidersic (BZ)	Alexandria RPCA	Bethany.znidersic@alexandriava.gov	703 746 5492
Tan Cross (TC)	Alexandria GIS	Titania.cross@alexandriava.gov	703 746 3203
Adrian King (AK)	Alexandria GSA	Adrian.king@alexandriava.gov	571 215 5345
Suman Sorg (SS)	Sorg	SumanS@sorgarchitects.com	202 393 6445
Bob Widger (BW)	Sorg	BobW@sorgarchitects.com	202 393 6445
Bill Conkey (BC)	Sorg	BillC@sorgarchitects.com	202 393 6445
Rachel Chung (RC)	Sorg	RachelC@sorgarchitects.com	202 393 6445
Sehee Kim (SK)	Sorg	SeheeK@sorgarchitects.com	202 393 6445
Clair Wholean (CW)	Sorg	Clairw@sorgarchitects.com	202 393 6445

Meeting held to review the preliminary design options for the Patrick Henry School and Recreation Center.

Meeting Minutes

1. Introductions

1.1. BC introduced all attendees.

1.2. The project is currently in feasibility stage. Sorg has evaluated existing conditions and developed the program for the school and recreation center with input from the client. The programming process is nearly complete, and master planning is in progress. Sorg has developed four concepts, two renovations and two new buildings. The purpose of the charrette is to review these design options and select 3 to develop further, consistent with the scope of work for the feasibility study.

2. Existing Conditions

2.1. CW presented diagrams of existing conditions on the site, microclimate, vegetation, topography, site access, adjacent land use and zoning. The following is a summary of site opportunities and constraints:

Site Opportunities

- Wooded open space to north of site provides views, natural recreation
- South facing warm slope on north end of site
- Street frontage along Taney
- Connection to greenspace through adjacent bike paths
- Local enrollment encourages walking to school
- Shared program with Rec makes site a focal point in community

Site Constraints

- Traffic flow
- Access to rear of site
- Zoning of POS
- Location and size of existing building
- Small scale of adjacent single family homes

2.2. The program was described along with a graphic comparison of relative sizes of spaces.

3. Design Charette

3.1. SS presented an overview of each design, shown by a site plan, bubble diagram, and axonometric view. One of the key design decisions for the renovation schemes is which part of the existing building to demolish. There are only a few "hinges" in the existing building where a wing can be cleanly demolished. In both renovation concepts, the existing boiler room remains. The following items describe the discussion of pros and cons of each concept.

3.2. **Renovation Option 1**

New 3 story, compact addition wing connects to an atrium which fills the area formerly occupied by modular classrooms. An addition is also constructed along Taney Avenue. This concept keeps most of the existing school. Modular classrooms are relocated off-site. The gymnasium wing and Pre-K classroom wing are demolished. This scheme keeps at least 75% of the existing school.

PROS

- New face to school along Taney Ave
- Close relationship between Rec & School
- Rec Center is close to field
- Building massing most prominent along Taney Ave – gives presence to community
- Soft edges - there is less building massing along the perimeter of the site – sensitive to neighbors

CONS

- Requires swinging kids off-site to renovate existing building
- Earthwork needed to flatten tennis courts for soccer field
- Geotechnical analysis of tennis courts needed – possibly filled with debris
- Requires phasing by contractor – longer construction duration
- Large building footprint – less open space on site
- Power lines may need to be relocated for soccer field
- Some mature trees on Taney avenue in front of the school would be lost
- No clear identification of Recreation Center from street

Renovation Option 2

The classroom wing nearest Taney Ave is demolished to allow for a new 3-story addition. Modular classrooms are relocated off-site and the area is infilled with an atrium. The recreation center is positioned at the corner of N. Latham Street and Taney Ave. This scheme keeps about 75% of the existing school. Based on comments at the meeting, this scheme will be modified to switch the Recreation center and the parking. This option is the preferred renovation concept.

PROS

- New face to school along Taney Ave
- Rec & school each have own presence to community
- Rec has street frontage, own identity
- Bus parking
- Most building volume positioned along Taney Ave

CONS

- Requires off-site swinging space during renovation of existing building
- Earthwork needed to flatten tennis courts for soccer field
- Large shared parking could create traffic congestion on Latham, takes up a lot of space, and unfriendly to neighbors
- Parking located along street frontage on N. Latham
- Large building footprint – less open space on site
- Bus drop off alongside Taney Ave – ACPS prefers off of road

3.3. **New Building Option 1**

The new building is located to allow the existing building to remain in operation during construction. The building volumes are arranged around an active green forecourt, along Taney Ave, to be built upon demolition of the existing school building.

PROS

- Compact building massing frees up green space on site
- No swing space required
- Perspective view of building set back from street
- Massing with outdoor terraced classroom space
- Minimal earthwork required
- Activate street with green space

CONS

- 3-story building massing adjacent to single family homes on N. Latham
- Building volume disconnects program spaces into two blocks

3.4. New Building Option 2

The new building is arranged in an L-shape to anchor the corner of Taney Ave and N. Latham. The building is split into a 2-story volume along N. Latham and a 4-story volume along Taney Ave, opening its arms to the play fields in the center of the site. This concept requires removal of 1/3 of the existing building before construction. This option is the design team's preferred new building concept.

PROS

- School massing activates corner while still set back from street
- Plentiful open space on site – soccer forecourt and central play area balance building volumes, greenspace flows to wooded hill
- 2-story volume along N. Latham sensitive to neighbors
- 3-story along Taney activates street frontage
- Bus loop along N. Latham provides a buffer between building and street
- Large volume of Rec in back of site
- Sheltered play area large enough for multiple age groups

CONS

- Swing necessary for part of existing building
- Recreation parking adjacent to field
- Moving Rec building to back of site cuts up contiguous green space

4. Open Discussion

SITE CONSIDERATIONS

4.1. The question of recreation and school as separate buildings or connected was discussed. The city prefers separate buildings for simpler operations, but there is a functional advantage to creating a connection between the two for shared access. SS noted that all of the schemes could potentially be connected or separate. If connected, the connection should not be a conditioned space.

4.2. The volume of the recreation center will be large, since the indoor field needs a 40'-0" ceiling height. This is in the range of a 3-story volume, with a blocky square massing. Appropriately positioning this volume on the site is key to the design.

4.3. Soccer field also used for lacrosse, field hockey.

4.4. Parking landscape guidelines require 1 tree per 10 parking spaces. This will be considered.

4.5. Dispersed parking preferred.

4.6. Bus parking takes up a lot of space. It was agreed that the number of buses will be reduced to 13-15 instead of 20, and combining the bus loop with recreation center parking or with Pre-K drop off will be explored. ACPS confirmed that during dismissal, all buses are on the site at the same time.

4.7. Curb cuts were discussed as they relate to adjacent streets and pedestrian access. Distances between curb cuts will be considered for each concept.

4.8. ME noted that the school currently has two existing fields, and the concepts all have one field. This is in response to the site program. The recreation center will provide a second field, indoors.

4.9. The service entrance location was discussed. This will be considered for each concept.

4.10. The location of the school entrance depends on where the bus drop off is located.

4.11. Avoid bus drop off on street, especially on Taney.

4.12. All schemes allow for simultaneous construction of School and Rec center.

4.13. Maximize placement of the school for urban design response to neighborhood.

4.14. Needs of different age groups for playgrounds and site access will be considered.

BUILDING DESIGN

4.15. All schemes are using a double-loaded corridor for maximum efficiency.

4.16. With a multi-floor school, there is increased need for outdoor space. Sorg is exploring design possibilities of outdoor classroom areas integral to the building.

4.17. There was concern about the use of atrium space. SS explained that the area would contain program spaces that are appropriate in a large volume – it would not be wasted space.

OTHER CONSIDERATIONS

4.18. None of the options are just a renovation. The program is approximately 160,000 SF which doesn't fit into the 86,000 SF existing building.

4.19. School and Recreation have different occupant populations, this will be taken into consideration.
4.20. IB commented that new building options are strongly preferred to renovations.

QUESTIONS

4.21. Question of soccer field being turf – how does this relate to Alexandria RPCA's long term plans?
4.22. Question of relationship between school and recreation center, school and outdoor soccer. Should the school be a quiet zone away from these playful, active areas? Or should the school embrace them?
4.23. For renovation options, how much capacity could the existing building support while the addition is under construction? Sorg will identify this and include it in the study.

BUDGET

4.24. TC inquired about how the concepts work with the budget. SS responded that budget is a major consideration for all options, and that both new building options could cost the same. If at any point the budget is unrealistic Sorg will bring this up for discussion. SS remarked that the budget must be spent wisely – use money where it has the most impact on the kids, not on moving earth.
4.25. Federal funding could be potentially used for this project, such as Department of Energy, DOE grants, Gates Program, or HUD Resilient Design.

SUMMARY - MAJOR FACTORS DRIVING THE DESIGN FOR ALL OPTIONS

- Emphasize corner of N. Latham and Taney
- Activate Taney Ave through greenspace or building frontage
- Massing set back from N. Latham, be sensitive to neighbors
- Appropriate location of Rec Center massing
- Minimize hardscape, maximize open space
- Budget

NEXT STEPS

4.26. There is a programming meeting for the recreation center scheduled for Monday Feb 23 at 4pm.
4.27. A design meeting for the interior of the school layout will be held Thursday Feb 26 11am-3pm.
4.28. Sorg will follow up by sending the presentation electronically, with changes incorporated.
4.29. It was agreed that Sorg will develop 1 renovation scheme (Renovation Option 2 modified with parking away from the corner) and 2 new building schemes.

- END OF MEETING -

Errors and omissions should be brought to our attention within ten business days so as to be made a part of this record.

Recorded by: Clair Wholean

Copies to: Attendees

Meeting Minutes

Location: ACPS Conference Room
Meeting Date: February 26, 2015
Meeting Time: 11:00 am
Subject: Patrick Henry Design Charrette
Project: Patrick Henry School and Recreation Center
Project #: 1417

Attending:

Mark Eisenhour (ME)	ACPS	Meisenho@acps.k12.va.us	703 965 3418
Laurel Hamming (LH)	ACPS	Laurel.hammig@acps.k12.va.us	703 619 8298
Ron Kagawa (RK)	Alexandria RPCA	Ron.kagawa@alexandriava.gov	703 746 5489
Tan Cross (TC)	Alexandria GIS	Titania.cross@alexandriava.gov	703 746 3203
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Suman Sorg	Sorg	SumanS@sorgarchitects.com	202 393 6445
Bill Conkey (BC)	Sorg	BillC@sorgarchitects.com	202 393 6445
Sehee Kim (SK)	Sorg	SeheeK@sorgarchitects.com	202 393 6445
Clair Wholean (CW)	Sorg	Clairw@sorgarchitects.com	202 393 6445

Meeting held to review the preliminary interior layouts for the design options for the Patrick Henry School, and the updated program for the Recreation Center.

Meeting Minutes

1. Introductions

1.1. BC introduced all attendees and described the status of the project. Sorg is developing interior layouts for the design options, and finalizing the Recreation Center program.

2. Design

2.1. SS explained that the goal for these layouts is to identify the ideal adjacencies and stacking of the program. For now, the two new building options have been developed with an interior layout. Once adjacencies and stacking are determined, a layout for the renovation/addition scheme will be developed.

3. Discussion of School Layout

3.1. ME commented that special education should be integrated into the academic areas of the school, including the autism classrooms. The design will be revised to reflect this. OT & PT should be centrally located.

3.2. Shared spaces should have close proximity to the Recreation Center. This includes the Gym and Black Box or Auditorium, which would be used for cultural activities. These public spaces need to be able to be isolated from the rest of the school during the evening. At 4pm the Gym is used by the Rec center. People check in at the Rec center and then go to the gym.

3.3. In new building option 1, shared spaces will be moved closer to the Rec Center.

3.4. ME brought up the location of seating in the gym, especially when a screen is dropped. For assemblies, a U-shape bleacher arrangement may work well, so the gym could be used as an auditorium.

3.5. For a K-8 school with 10 grades, ideally there are 3 spaces for PE – a gym which can be subdivided and a multipurpose room. Currently the program does not include a multipurpose room.

3.6. Multipurpose Space can be used for dance, recess, and floor hockey, among other things. When accessible to the community, this would be accessed through the Rec center.

3.7. Media center would ideally go on the second floor.

3.8. Location of the art rooms should be distributed since kids of most grades travel to it. Since there are two rooms, they should be split up on different floors, such as on 2nd and 3rd floors.

3.9. Music room is ideally on a higher floor since it is easier to isolate sound.

3.10. ELA's should have proximity to the kitchen both vertically and horizontally.

3.11. Elevator must be next to kitchen.

3.12. Black Box and Gym go on ground floor for connection to Rec Center and community.

3.13. Service to buildings should be from an interior parking lot, not from the street, and be adjacent to the kitchen. The site should have a service lane which provides access to the Rec building and school.

3.14. The number of entrances was discussed. LH noted that ACPS would prefer to have all visitors pass through a single main entrance with security. This includes staff, parents, and kids. However, multiple entrances could work for arrival, since so many people are arriving at once. Sorg will look at how the student entrance works with security.

3.15. Pre-K Head Start starts 30 minutes after school, this helps with congestion of the entrance in the morning.

3.16. For new building option 2, the wing containing public spaces could be shifted closer to the Rec center, while still having the building anchor the corner.

3.17. The outdoor terrace on new building option 2 provides plentiful space for outdoor learning. Service access to this space will be considered.

3.18. Art & CTE do not need to be next to each other – ideally distributed throughout the academic areas.

3.19. Current designs have 14 buses on the site – this could be reduced to 10 or 12 if necessary.

4. Discussion of Recreation Program

4.1. BC presented the current Recreation program and explained changes in response to RPCA input.
4.2. The indoor soccer field would be subdivided into 3 fields for regular use. The size of the field is in question, RK will talk to Brailsford & Dunlavey to confirm the field size.
4.3. The field extension area could be smaller than 2,800 SF, with a portion of it used for storage space.
4.4. The multipurpose rental space would ideally be glass, with a partition to subdivide the space.
4.5. No bleachers are needed.
4.6. The target cost is $175/SF, for 30,000-35,000 SF.
4.7. There may be possible environmental mitigation necessary for the ground below the tennis courts.
4.8. RK commented that everything in the Rec center should be multipurpose – no single-use spaces.
4.9. The architecture of the entrance should create a visual definition, with a 2-story space around the elevator. RK referenced the Greater Richmond Acquatics Center as an example of this.
4.10. Sorg will prepare a layout for the current program.

5. Next Steps

5.1. One more meeting will be held to discuss the layouts for the school design as well as the Recreation center layout. This will be Friday March 6 at 9am in the ACPS Conference Room.
5.2. The next community meeting is scheduled for March 18th.

- END OF MEETING -

Errors and omissions should be brought to our attention within ten business days so as to be made a part of this record.

Recorded by: Clair Wholean
Copies to: Attendees

Meeting Minutes

Location: ACPS Conference Room
Meeting Date: March 9, 2015
Meeting Time: 11:30 am
Subject: Patrick Henry Design Charrette 3
Project: Patrick Henry School and Recreation Center
Project #: 1417

Attending:

Mark Eisenhour (ME)	ACPS	Meisenho@acps.k12.va.us	703 965 3418
Laurel Hamming (LH)	ACPS	Laurel.hammig@acps.k12.va.us	703 619 8298
Ron Kagawa (RK)	Alexandria RPCA	Ron.kagawa@alexandriava.gov	703 746 5489
Elijah **G**ross	ACPS		
Beth Znidersic (BZ)	Alexandria RPCA	Bethany.znidersic@alexandriava.gov	703 746 5492
Tan Cross (TC)	Alexandria GIS	Titania.cross@alexandriava.gov	703 746 3203
Adrian King (AK)	Alexandria GSA	Adrian.king@alexandriava.gov	571 215 5345
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Sehee Kim (SK)	Sorg	SeheeK@sorgarchitects.com	202 393 6445
Clair Wholean (CW)	Sorg	Clairw@sorgarchitects.com	202 393 6445

Meeting held to review the preliminary interior layouts for the design options for the Patrick Henry School and the Recreation Center.

Meeting Minutes

1. Introductions

1.1. BC introduced all attendees and described the status of the project. This meeting is the third design charrette. In the first charrette, Sorg presented four design options for the site as a whole, and three options were selected to be included in the feasibility study, two new building options and one renovation option. In the second charrette, Sorg presented interior layouts for the school and a program for the Recreation Center. Feedback from the discussion at the second charrette was incorporated into the design options, for presentation today at the third charrette.

2. Design

2.1. SS presented a revised design for each option, along with it a layout for the Recreation Center is included. The following describes updates to each option:

NEW BUILDING OPTION 1

- Revised to show multipurpose spaces shared with Recreation near Rec Center on first floor
- Administration is visible from both entrances
- Dining service entrance is included, from the rear
- Atrium with outdoor classrooms
- Building is set back from North Latham St.
- Bridge and covered walkway between second floor of school and Rec Center
- This option is focused around greenspace, buildings surround forecourt

NEW BUILDING OPTION 2

- Revised to show multipurpose spaces shared with Recreation near Rec Center
- Huge opportunity for outdoor learning to drive the design
- This option is focused on anchoring the corner of Taney & North Latham
- Efficiency, security, operations slightly enhanced over Option 1

RENOVATION OPTION

- Multipurpose spaces placed towards the front along Taney Ave
- Placement of large spaces is in addition because existing building doesn't have high enough ceilings. These spaces need height, ground floor, and adjacency to Rec Center.
- Outdoor classrooms off of 3rd floor
- Less efficient because keeps existing building
- Requires swinging kids during renovation of existing building
- Some trees are sacrificed
- Rec Center is placed along N. Latham St.

3. Discussion – All Options

3.1. The program will be revised to reflect the discussion on Special Education and Administration.

3.2. Parking was discussed. Currently the options show 190 parking spaces; this is based on the estimated number of staff at the school and gross square foot area of recreation. The parking layout shown incorporates compact and non-compact parking spaces per zoning requirements. Jefferson Houston has 126 parking spaces. It may be possible to reduce the number of parking spaces for Patrick Henry. Currently, many teachers park on surrounding streets. As parking is taking up a large footprint on the site, the quantity of parking needs to be feasible to fit on the site.

3.3. Sorg will prepare a phasing snapshot for each option, to be included in the feasibility study, with a visual comparison of each option to the original building.

3.4. A comment was made to indicate multiple age playgrounds on the drawings.

3.5. A comment was made to show the raised tennis court area on the drawings.

3.6. The school playground is open to the community during off hours.

3.7. Modular classrooms will be used elsewhere. It was noted that they have screw piles rather than footings.

3.8. The use of the main entrance in the morning and afternoon will be staggered base on arrival and dismissal timing. IB noted that the school would like to keep the same sequence, or similar, in the new building. The current arrival times are:

- 7:30 am Bus riders K-8 (held in auditorium for 10 minutes)
- 7:40 am teachers
- 7:45 am walkers and kiss & ride kids
- Grades 2-5 have breakfast in the classroom
- Kindergarten & 1st grade have breakfast in the cafeteria

3.9. For dismissal, Patrick Henry currently follows this sequence:

- Kindergarten walkers/kindergarten pickups
- Bus Stage 1 – 4 buses
- Bus Stage 2 – 4 buses
- Walkers – parents pick up
- Campanya & Rec after school
- Pre-K – parents pick up at 2 doors

3.10. The most recent budget includes $38M for the school and $5M for the Rec Center. Jefferson Houston was $45M.

3.11. TC commented that it is important to identify which schemes are realistic for the proposed budget. Sorg explained that each option should be as efficient and budget conscious as possible.

3.12. Kiss and Ride is best located on East side of site, to avoid traffic on N. Latham, and should be as close as possible to the school.

3.13. Include footprint of existing building on site diagrams for reference.

3.14. The Rec center will have a lower cost per square foot, compared to the school, because it will be a pre-engineered structure.

3.15. The entrance to the school should be pronounced and highly visible.

3.16. Areas of outdoor open space and outdoor usable recreation space should be included for each option.

3.17. The Rec center does not need a separate playground.

4. Discussion – New Building Option 1

4.1. RK commented that the circulation in Option 1 is more efficient than Option 2.

4.2. Placing the large volumes further back on the site (New Building Option 1) is friendlier to neighbors.

5. Discussion – New Building Option 2

5.1. Placing the kiss and ride near the soccer field was suggested.
5.2. Intersection improvements will likely be required because of the bus loop.
5.3. Flipping the school east-west could be considered.
5.4. ME commented that the main entrance is less clear in this option.
5.5. RK commented that a retaining wall would not be desired behind the recreation center. SS noted that the area of the former tennis courts will be terraced down to the building.
5.6. RK noted that rotating the field in this option pushes the Rec center and turnaround further into the site. The field creates a large open space in front of the building.

6. Discussion – Renovation Option

6.1. ACPS noted that financial analysis may be needed for the renovation option, it may be more expensive to retrofit. Sorg will evaluate this with their cost estimator.
6.2. In the renovation option, the field is positioned in the area most difficult to build in, topographically. Because the existing building takes up a large footprint on the site, placement of the field is constrained. TC suggested rotating the field in the renovation option.
6.3. The kitchen will be larger in the renovation option compared to the new building options.
6.4. The atrium could be a teaching garden.

7. Discussion – Renovation

7.1. The outdoor multipurpose field will be referred to as a multipurpose field, not a soccer field, and it should be drawn without lines shown.
7.2. The Rec center will likely require a traffic management plan through Planning & Zoning, this will drive the hours of operation. It could open at 6am if traffic is managed effectively.
7.3. Recreation layouts could be swapped between the new building options.
7.4. The Recreation Center will have its own address for deliveries.
7.5. Classroom proportions are more variable in this scheme. SS noted that this can be adjusted.

8. Next Steps

8.1. March 12th is the draft submission of the report. Sorg will share the draft Table of Contents with ACPS for review. This will be discussed at the next core group meeting.
8.2. Now that the designs are developed, Sorg will be working on the cost estimate for each option with the cost estimator.
8.3. In the study, ACPS would like to see a comparison of the quantity of outdoor open space and built footprint of the open area on site.

8.4. It was noted that all meeting minutes are subject to change with public input.

8.5. The next community meeting, scheduled for March 18th, will include the following:

- Open house Q & A discussion
- Review of cost recovery, school program, existing site, existing conditions diagrams
- Sorg will describe feasibility study process and schedule
- Introduction of Field House concept for Recreation Program
- Brief Presentation of Design Options

Sorg will prepare the presentation and send to ACPS for review.

- END OF MEETING -

Errors and omissions should be brought to our attention within ten business days so as to be made a part of this record.

Recorded by: Clair Wholean

Copies to: Attendees

Meeting Minutes

Location: Lee Center (RPCA)
Meeting Date: March 23, 2015
Meeting Time: 2:00 pm
Subject: Patrick Henry Design Meeting
Project: Patrick Henry School and Recreation Center
Project #: 1417

Attending:

Mark Eisenhour (ME)	ACPS	Meisenho@acps.k12.va.us	703 965 3418
Laurel Hamming (LH)	ACPS	Laurel.hammig@acps.k12.va.us	703 619 8298
Ron Kagawa (RK)	Alexandria RPCA	Ron.kagawa@alexandriava.gov	703 746 5489
Elijah **G**ross (E**G**)	ACPS	Elijah.gross@acps.k12.va.us	
Beth Znidersic (BZ)	Alexandria RPCA	Bethany.znidersic@alexandriava.gov	703 746 5492
Adrian King (AK)	Alexandria GSA	Adrian.king@alexandriava.gov	571 215 5345
Suman Sorg (SS)	Sorg	SumanS@sorgarchitects.com	202 393 6445
Bill Conkey (BC)	Sorg	BillC@sorgarchitects.com	202 393 6445
Sehee Kim (SK)	Sorg	SeheeK@sorgarchitects.com	202 393 6445

Meeting held to review the preliminary interior layouts for the design options for the Patrick Henry School and the Recreation Center.

Meeting Minutes

1. **Introductions**
   1.1. E**G** introduced the purpose of this meeting. The purpose of this meeting is to review the site plans presented at the community meeting on March 18, 2015 and discuss how these plans can be modified to incorporate the feedback received from the community.
   1.2. ME indicated that the main concern of the community is the proximity of the new buildings to N. Latham St and the impact it might have on the smaller-scale houses across the street. The community is also concerned about the increase in traffic the new construction is expected to create.

2. **Site Plan Discussion**
   2.1. SS presented five site plans for discussion including three site plans that were presented at the community meeting and two modified site plans based on the comments received during the community meeting.

- New Building Option 1A site plan is the New Building Option 1 site plan presented at the community meeting.
- New Building Option 1B site plan is a modified version of New Building Option 1A site plan, where the new school construction will occur on the site of the existing school. This is to incorporate the feedback from the community by placing all the buildings as far from N. Latham St. as possible. It is noted here that this option would require all of the students to be placed into swing spaces as the existing school will have to be completely demolished in advance of the new building construction. Recreation Center retains its location but is rotated to face Latham St instead of Taney Ave to maintain a presence on a street front.
- New Building Option 2A site plan is the New Building Option 2 site plan presented at the community meeting.
- New Building Option 2B site plan is the modified version of New Building Option 2A site plan where the school building is moved away from N. Latham St as much as possible without infringing on the existing school site.
- Renovation + Addition Option site plan is the Renovation + Addition option presented at the community meeting.

2.2. RK outlined the main items that the revised site plans should achieve: strengthen the street front on Taney Ave, move away from N. Latham St as much as possible and more interior parking and traffic circulation to limit traffic congestion on N Latham St.

2.3. New Building Option 1A and Option 1B site plans

- New Building Option 1A can be modified to limit the amount of swing space.
- E**G** stated the need for New Building Option 1B to show that the design team had considered this type of strategy (building on the existing school site) in the comparative analysis as it directly incorporates the feedback from the community. It will be helpful to study the impact of using this strategy compared Option 1A.
- It is noted that New Building Option 1B will require about 40 classroom trailers, administration space trailer and Dining space trailer, a significantly larger number compared to other options.
- It is noted that these trailers can possibly be an investment made by the city for future projects.
- New Building Option 1B is to be developed as a variation of Option 1A. It does not need to be a full-blown scheme and only the site plan and cost are required for comparison.

2.4. New Building Option 2A and Option 2B site plans

- It was agreed that the design team will move forward with New Building Option 2B site plan instead of New Building Option 2A site plan as it better incorporates the feedback from the community. New Building Option 2A can be eliminated.
- It was noted that this option would not require any swing space for the school.

2.5. Renovation + Addition Option site plan

- It was suggested that the Recreation Center be relocated away from N. Latham St and more towards the central area of the site. There was a concern that this would result in the Recreation Center losing its presence on a street front. SS suggested rotating the Recreation Center to face N. Latham St. instead of Taney Ave to maintain a presence on a street front.
- Phasing will be further studied to limit the amount of swing space required for the School.

2.6. In all options, there is a possibility of using a lay-by lane for bus pick-up and drop-off in lieu of an interior bus loop to conserve some site area.

2.7. In all options, perimeter roads should be incorporated to provide more interior traffic circulation to alleviate traffic congestion on the adjacent roads.

3. Feasibility Report 1st Draft Comments

3.1. RK emphasized that the main purpose of this feasibility study is to analyze whether the proposed program fits within the given site and the cost. The report can be more condensed and geared toward these goals.

3.2. RK stated that the separate landscape plan for each option is not necessary and the rendered site plans are sufficient to show the concept. It was suggested that the landscape section in each of the options is eliminated and condensed into a single landscape concept narrative.

3.3. School and Recreation Center should be discussed separately.

3.4. RK is concerned that the feasibility study contains too much information for the school board to review. The options and their respective pros & cons should be highlighted and formatted in a way that can be easily understood by the school board.

3.5. BC suggested having a separate executive summary document, significantly condensed version of the feasibility study, for submission to the school board.

4. Next Steps

4.1. Revised site plans to be sent via email by Sorg for review before the submission of the Feasibility Study – 2nd draft.

4.2. The format of the executive summary document will be included in the 2nd draft submission of the Feasibility Study for review and comments before the final submission.

- END OF MEETING -

Errors and omissions should be brought to our attention within ten business days so as to be made a part of this record.

Recorded by: Sehee Kim

Copies to: Attendees