Site Analysis Report

Patriot Park

Lincoln ▪ Lewis ▪ Vannoy Property -

Willow Springs School Road and Braddock Road
Fairfax, Virginia

Fairfax County Park Authority
February 2015

Owner:

Fairfax County Park Authority
Planning and Development Division
12055 Government Center Parkway, Suite 406 Fairfax, VA 22035
Colleen A. Regotti, Project Manager
703-324-8741

Design Consultants:

Pennoni Associates Inc.
Park Planning ▪ Civil Engineering ▪ Arboriculture ▪ Survey ▪ Transportation
14532 Lee Road Chantilly, Virginia 20151
Elizabeth Fribush, LA, CA
Helman Castro, PE
703-449-6700

Stantec
Environmental Consultant
150 Riverside Parkway, Suite 301 Fredericksburg VA 22406-1094
George Rhodes, LA
540-785-5544

GeoCapitol Engineering LLC
Geotechnical Consultant
19955 Highland Vista Drive, Suite 170 Ashburn, Virginia 20147
Daniel Gradishar, PE
202-375-7900

Site Analysis Narrative

In October 2014, Pennoni Associates Inc. (Pennoni) was retained by the Fairfax County Park Authority (FCPA) to prepare a Site Analysis Study for the Patriot Park Lincoln-Lewis-Vannoy (Patriot Park LLV) site. The property is an assemblage of several parcels, and consists of approximately 57 acres northeast of the intersection of Braddock Road and Willow Springs School Road, and approximately 10 acres west of Willow Springs School Road. The Site Analysis Report will be used by FCPA during the master planning process for their development of an athletic field and recreational facilities park.

This study includes analysis of existing site topography, existing vegetation types, existing soils, and site access and transportation issues. Civil investigation includes research of existing utilities, storm water management (SWM) issues, and analysis of storm drainage divides and outfall. Environmental analysis prepared by STANTEC includes a preliminary review of Resource Protection Areas (RPA's) and wetlands based on field investigation, and recommendations. Geotechnical investigation prepared by GeoConcepts includes results and conclusions based on geotechnical test borings.

This Site Analysis Report is intended for planning purposes. Additional site investigation and survey should be performed at design development phase.

Table of Contents

Executive Summary . . . . . Page 2
Site Context . . . . . Page 4
Existing Parcels . . . . . Page 5
Existing Topography . . . . . Page 6
Existing Vegetation . . . . . Page 8
Tree Inventory . . . . . Page 12
Environmental . . . . . Page 14
Transportation and Access . . . . . Page 19
Utilities and Easements . . . . . Page 21
Drainage Patterns, Outfalls, and
Stormwater Management. . . . . Page 26
Geotechnical . . . . . Page 31
Archeological . . . . . Page 42
Appendix . . . . . Page 43

Executive Summary

The Site Analysis for the Patriot Park LLV site has included analysis of existing site conditions and development issues that would impact the design and development of the future athletic field park. A summary of the findings includes the following:

Site Topography and Existing Uses
The existing topography consists of moderate slopes that do not present significant constraints to development. The existing three baseball fields and associated development were generally constructed on fill of approximately 10-15 foot depth; possibly providing a source of fill material for the future park development. An existing abandoned house and several outbuildings on Parcel 8E would be demolished for the development of the park. An existing family cemetery on Parcel 8D should be documented and preserved.

Existing Vegetation
Stands of existing desirable upland hardwoods that may be considered for preservation include the undeveloped portions of Parcel 4D; areas adjacent to Willow Springs School Road; the area south of the baseball fields and north of Braddock Road; and most of Parcel 4B2. Parcels 8D and 8E contain mostly early successional stands and pioneer and volunteer vegetation; and do not contain highly desirable stands of trees that might impact design decisions.

Environmental
Stantec Consulting Services Inc. (Stantec) found areas of potential jurisdictional features, including forested and emergent wetland, and non-vegetated stream channels. Based upon preliminary investigations, stream channels identified in the southeast and northeast portions of the site were deemed intermittent. Because no on-site perennial streams were identified, it is anticipated that no stream feature, including associated connected and contiguous wetlands will require a 100-foot RPA buffer. Final boundaries of Waters of the US (WOUS), as well as confirmation from the US Army Corps of Engineers, would be determined at later phases of design.

Transportation and Access
The intersection of Braddock Road and Willow Springs School Road was recently improved with construction of a right turn lane and traffic signal. Access to the future park would be from Willow Springs School Road. For improved sight distance, the location of park entrances could be shifted further south than the existing park entrance location. Improvements required to Willow Springs School Road may include a left turn lane and wider road section to accommodate 12 foot wide lanes; as well as possible longer turn lanes at the Braddock Road - Willow Springs School Road intersection. Sidewalks or trails do not currently exist along Willow Springs School Road. Construction of an accessible trail along at least one side of Willow Springs School Road is recommended to provide connectivity to the community and the school.

Utilities and Easements

The subject property is within a non-serviceable sewer district. There is a possibility that sanitary sewer could be extended through the northern boundary; however, additional coordination with the County Wastewater Planning and Monitoring Division would be required to determine if that extension would be permitted by the County. Water Service does not currently exist on-site or in the streets fronting the property; but with a connection to existing adjacent water system, there could be adequate capacity for field irrigation. The existing overlapping 80' Dominion and 50' Colonial Gas easements along the northern property line are in an area that would be used as buffer; so these easements do not present a significant encumbrance to the future park development. The existing AT&T / NOVEC Easement that extends across the northern portion of Parcel 4B2, could be relocated if needed; so does not present a significant constraint to development.

Existing Outfalls and Stormwater Management

Most of the subject property drains in a south and southeastern direction towards an outfall in the southeast corner of the site, where it is conveyed by a triple 30" culvert under Braddock Road. At final engineering, the flood plain limits may need to be determined and the adequacy of this outfall will need to be verified. The northern portions of Parcels 4D and 8E drain towards an intermittent stream in the northeast corner of the site, and towards an off-site farm pond. Drainage and SWM measures should allow for protection of these resources. Stormwater management (SWM) could include Low Impact Development (LID) measures and SWM facilities at the three low areas of the site shown on the Pre-Development Outfall and SWM Plan.

Geotechnical

GeoConcepts Engineering, Inc. performed geotechnical field investigation, soil laboratory testing, and engineering analysis. Groundwater was encountered at depths of 7 to 16 feet below grade, which should be taken into account during future location and design of any footings for structures. Disintegrated rock was not encountered until a depth of 23 feet at boring B-7 (near the former driveway on Parcel 8D); and rock excavation is not expected to be an issue for the future park development. At time of this draft report submission, the soil laboratory testing was not yet complete. Estimated infiltration rates using the USDA soil texture classifications will be presented in the final Site Analysis report submission.

Soils

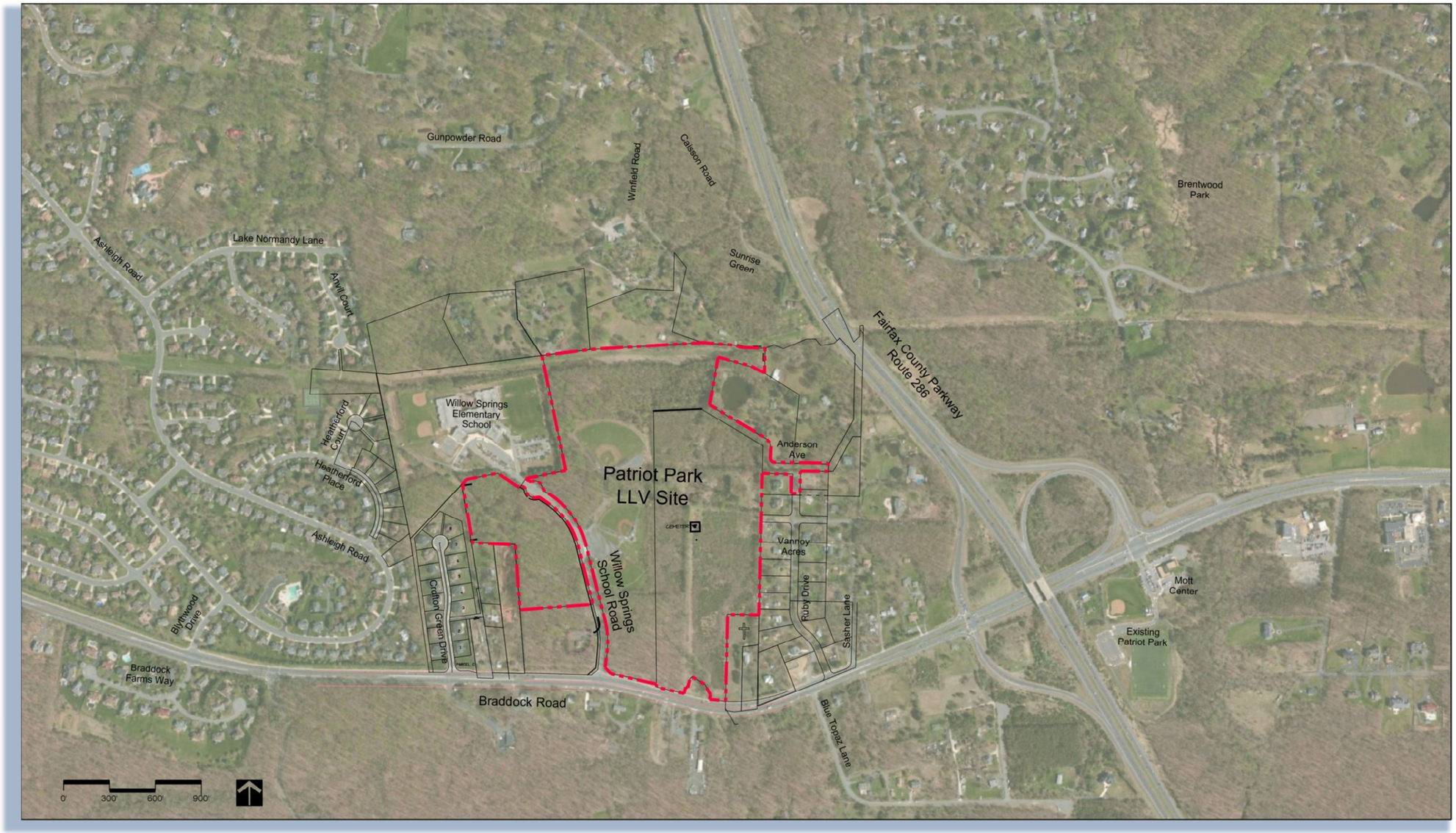
The County soils map indicates several areas of problem soils; see Soil Type Characteristics Chart in the Geotechnical section of this report, and Soils Map in the Environmental portion of this report. Type III soils are found over most of Parcel 8D (soils 59B and 82B); and in the low area at the southern portion of Parcels 4D and 8D (soil 30A). Type IV soils are found at the area disturbed for development of the athletic fields and parking area (soil 102); at the southern locations of Parcel 4B2 (soils 105B and 107B); along the Braddock Road frontage (soil 95); and at the Anderson Avenue area (soil 105B).

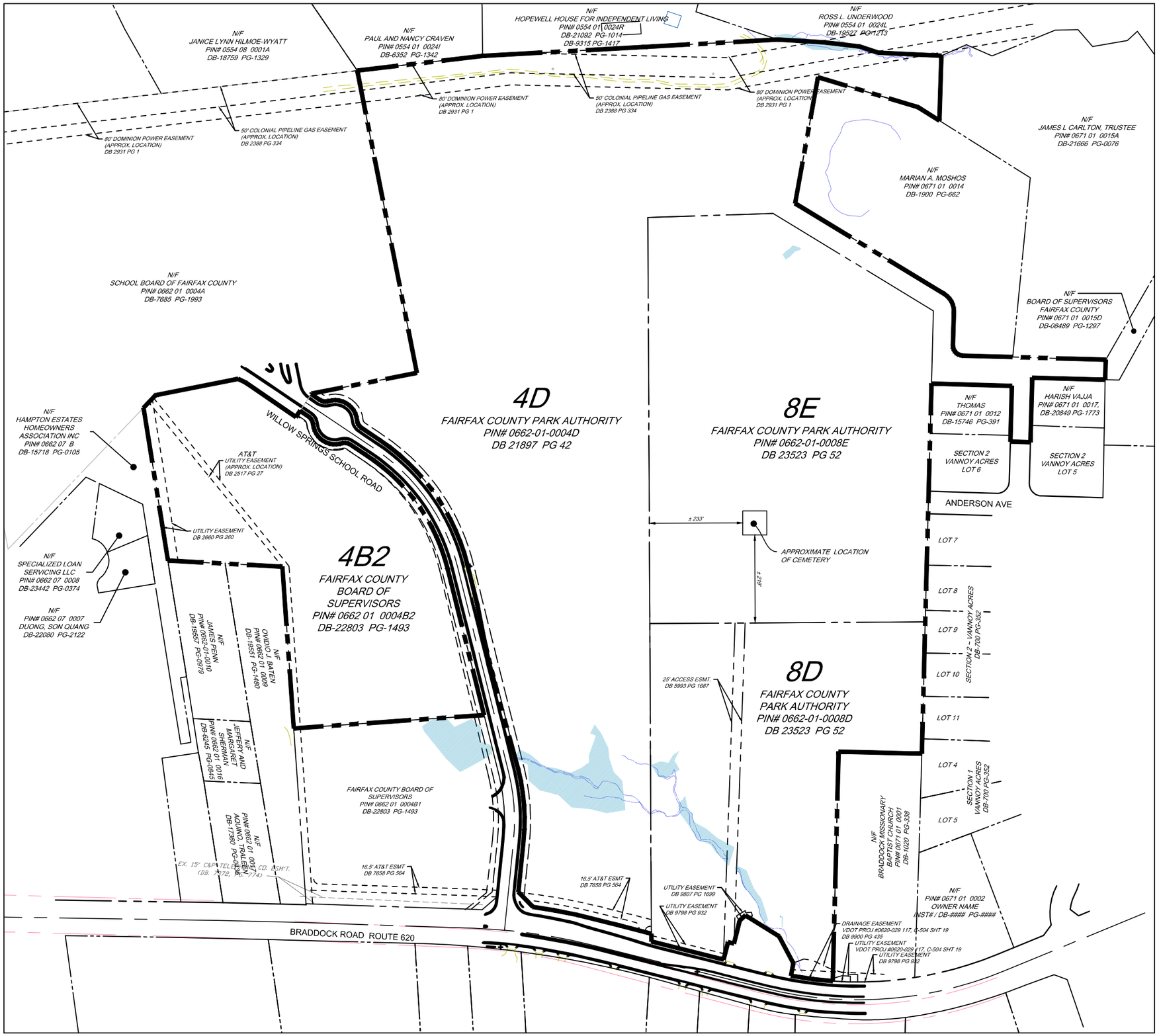
This Site Analysis Report was prepared for planning purposes to be used by FCPA during the master planning process for their development of an athletic field and recreational facilities park. Additional site investigation and survey will need to be performed at future phases of design and engineering.

Site Context

The Patriot Park LLV site consists of approximately 57 acres northeast of the intersection of Braddock Road and Willow Springs School Road, and approximately 10 acres west of Willow Springs School Road. The property is located west of the intersection of Braddock Road and Fairfax County Parkway. The existing first section of Patriot Park is a separate park parcel that is located southeast of the intersection of Braddock Road and Fairfax County Parkway, and south of the Mott Center.

The existing Willow Springs Elementary School is located north and west of the subject property. The elementary school is accessed by Willow Springs School Road which will also be used for access for the future park. Other existing uses adjacent to the site include the Braddock Missionary Baptist Church and single-family detached residences to the east of the site; large residential lots to the north, residential lots to the west, and a sewer pumping station to the southwest. Existing uses to the south of Braddock Road include single-family detached residential lots.





Notes

1. The existing survey was pre`pared October 2014 by Pennoni Associates.
2. Property information shown hereon does not constitute a land boundary survey.
3. Coordinate system is NAD83 VA north. Datum is NGVD29.
4. Aerial photography is based on information provided by McKenzie Snyder, dated April 5, 2014
5. The approximate location of the cemetery is based on an evaluation of a plat at DB 25523, page 52 recorded among the land records of Fairfax County; and an AutoCAD file provided by Fairfax County Park Authority ref 2010lincoln_lewis_vannoy_fy12-15-model.dwg
6. Wetlands limits shown were identified and located by Stantec on October 28, 2014.

Existing Parcels

The Patriot Park LLV Property consist of the following parcels:

Parcel	Tax Map	Zoning	Existing Use	Area
4B2	0662 01 0004B2	R-8 Cluster	Vacant	9.520 ACRES
4D	0662 01 0004D	R-8 Cluster	Athletic Fields	31.972 ACRES
8D	0662 01 0008D	RC- Residential Conservation	Vacant	10.298 ACRES
8E	0662 01 0008E	RC- Residential Conservation	Vacant	15.297 ACRES
Total Site Area				67.087 ACRES

Legend

- PATRIOT PARK LLV (INCLUDING PARCELS 4B2, 4D, 8D, 8E) SITE AREA = 67.12 AC
- PARCEL BOUNDARY
- APPROXIMATE LOCATION OF EXISTING STREAM
- APPROXIMATE LIMITS OF EXISTING WETLANDS

Existing Parcels

Patriot Park

Lincoln • Lewis • Vannoy Property

0' 125' 250' 375'

Existing Topography

Pennoni prepared a topographic survey of site area in October 2014. The topography was based on aerial photogrammetry flown in April 2014 by McKenzie Snyder, Inc. The horizontal and vertical datum for the survey is on NAD 83 and NAVD 29, respectively, in accordance with County requirements and GIS datum. Pennoni compiled field run topography in areas obscured by tree cover and not recovered using the aerial photogrammetry.

The parcels east of Willow Springs School Road, contain moderate slopes of approximately 5% to 15%. A gentle ridgeline extends from the existing Babe Ruth baseball field in an east-west direction towards Anderson Avenue north of the former homestead. The majority of the eastern parcels slope unevenly in a southerly and southeasterly direction from that ridgeline towards the intermittent stream and wooded wetland area. The area north of the ridgeline slopes generally towards the north and northeast towards the northeastern edge of the site. Northeast of the intersection of Willow Springs School Road and Braddock Road, a ridgeline runs approximately 100 feet north of the Braddock Road right-of-way, and slopes down in a northerly and northeasterly direction towards the wetlands area.

Sometime prior to 1998, the three athletic fields, gravel parking area were constructed on Parcel 4D. There is not a Fairfax County record of an approved site plan for construction of these athletic facilities, and the pre-development existing topographic information is not available. It is evident; however, that off-site fill in depths up to 10-15 feet was installed for the construction of the ball fields and 3:1 slopes were used to tie into grade. If this soil is suitable for use as fill material for the future park, then it is anticipated that the proposed grades in the areas of the existing athletic fields would be graded significantly lower, and the cut material generated could provide a more even and gentle slope towards the east.

The Patriot Park LLV site west of Willow Springs School Road contains slopes of approximately 2% to 15%. The highpoints of the site are along the northern boundary and adjacent to the Willow Springs School Road cul-de-sac. The site generally slopes towards the southeastern corner of Parcel 4B2 and towards the wetland area and culvert just southeast of the parcel boundary.

Slope from gravel parking area up to 65’ Little League field

Slope from 65’ Little League field down to second growth wooded area

Uneven slopes characterize the topography in Parcels 8D and 8E

Notes

1. The existing survey was pre`pared October 2014 by Pennoni Associates.
2. Property information shown hereon does not constitute a land boundary survey.
3. Coordinate system is NAD83 VA north. Datum is NGVD29.
4. Aerial photography is based on information provided by McKenzie Snyder, dated April 5, 2014
5. The approximate location of the cemetery is based on an evaluation of a plat at DB 25523, page 52 recorded among the land records of Fairfax County; and an AutoCAD file provided by Fairfax County Park Authority ref 2010lincoln_lewis_vannoy_fy12-15-model.dwg
6. Wetlands limits shown were identified and located by Stantec on October 28, 2014.

Legend

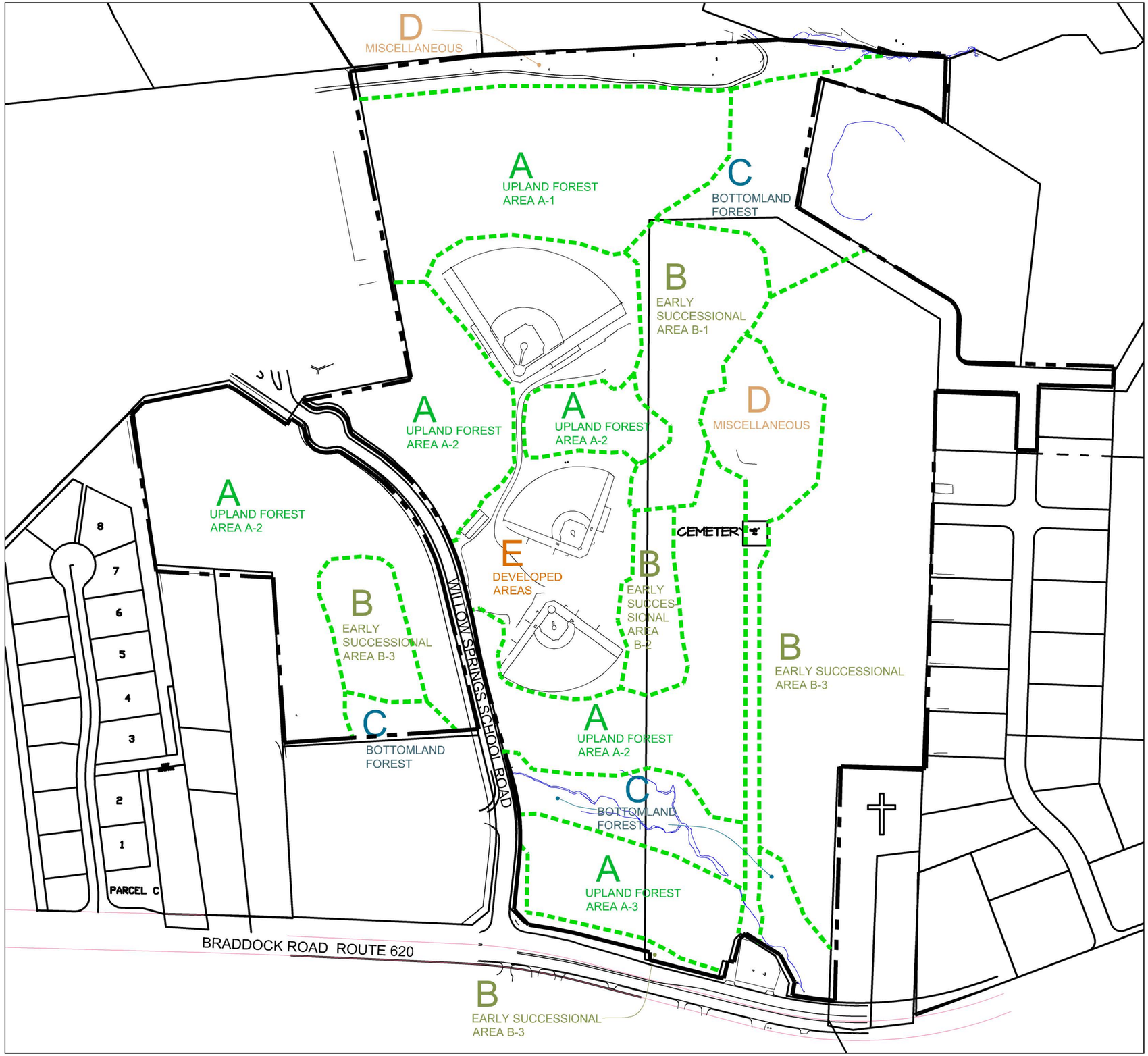
- PATRIOT PARK LLV (INCLUDING PARCELS 4B2, 4D, 8D, 8E) SITE AREA = 67.12 AC
- EXISTING CONTOUR, 5' INTERVAL
- EXISTING CONTOUR, 1' INTERVAL
- + 450.0 ± APPROXIMATE EXISTING SPOT ELEVATION
- APPROXIMATE LOCATION OF EXISTING STREAM
- APPROXIMATE LIMITS OF EXISTING WETLANDS
- APPROXIMATE LIMITS OF WOODED AREAS

Existing Topography

Patriot Park

Lincoln • Lewis • Vannoy Property

0' 125' 250' 375'



Notes

1. This Existing Vegetation Map is intended to be used for planning purposes by Fairfax County Park Authority (FCPA). This pllan shows the overall Cover Types at a scale appropriate for master planning purposes.

2. See descriptions of each Cover Type and typical photographs of the Cover Type on the pages following this plan..

3. The delineation of Cover Types shown on this plan is based on field observation performed October 2014 by Elizabeth Fribush, ISA Certified Arborist MA-5037A

Legend

- PATRIOT PARK LLV (PARCELS 4B2, 4D, 8D, 8E) SITE AREA = 67.12 AC
- APPROXIMATE LIMITS OF VEGETATIVE COVER TYPES
- APPROXIMATE LOCATION OF EXISTING STREAM

Existing Vegetation Map

0' 125' 250' 375'

Patriot Park
Lincoln • Lewis • Vannoy Property

Cover Type A: Upland Hardwood Forest

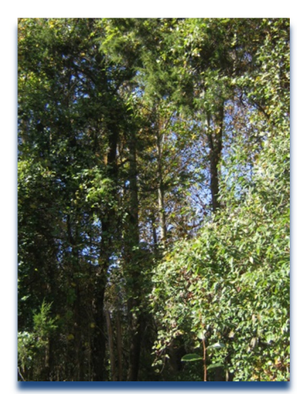
Desirable stands of upland hardwood species; including predominant species Liriodendron tulipifera/ tulip poplar; with occasional Acer rubrum/ Red Maple; Quercus rubra / red oak; Carya glabra / Pignut Hickory and other upland hardwood and softwood species.

AREA A-1

Evenly distributed overstory with sparse understory of vines and underbrush.
Predominant species is Liriodendron tulipifera / Tulip Poplar, 8-16" DB. Occasional species include Quercus prinus / chestnut oak; Quercus rubra / red oak 20-30" Prunus serutina / black cherry understory

AREA A-2

Mature upland hardwood stand.
Predominant species is Liriodendron tulipifera, 8-24" DBH with occasional 8-30" Quercus rubra / red oak 20-30" DBH and rare declining Pinus virginiana/ Virginia Pine. West of Willow Springs School Road, the forest stand also includes Quercus alba/ White Oak and understory that includes Fagus grandiflora/ American Beech and Acer rubrum / Red Maple.



AREA A-3

Upland Hardwoods that have not yet reached maturity; including understory of vines and underbrush.
Predominant species is Liriodendron tulipifera, 8-14" DBH; and occasional species include Carya glabra / Pignut Hickory; Carpinus caroliniana / Blue Beech; and Juniperus virginiana / Eastern Red Cedar.

Cover Type B: Early Successional Forest

Second growth stands with predominant species of Liriodendron tulipifera/ Tulip Poplar and Acer rubrum/ Red Maple; with occasional Juniperus virginiana/ Eastern Red Cedar; Pinus virginiana/ Virginia Pine; Prunus serutina/ Black Cherry; and Liquidambar styriciflua / Sweet Gum.

AREA B-1

Second growth stand of predominantly single species, Liriodendron tulipifera, 2-6" DBH

AREA B-2

Second growth stand of predominantly single species, Acer rubrum, 2-6" DBH

AREA B-3

Second growth stands with predominant species of Liriodendron tulipifera/ Tulip Poplar. Hardwood species also include Acer rubrum/ Red Maple and Quercus borealis / Swamp White Oak. Occasional species include Juniperus virginiana/ Eastern Red Cedar; Pinus virginiana/ Virginia Pine; Prunus serutina/ Black Cherry; and Liquidambar styriciflua / Sweet Gum. Herbaceous understory includes overgrown grasses and vines.

Cover Type C: Bottomland Forest

Hardwood Forest lowland areas containing 8-10" DBH Liriodendron tulipifera; 2-6" DBH Acer rubrum; 4-6" DBH Carya glabra / Pignut Hickory. Groundcover consists of leaf litter and areas of herbaceous vegetation including ferns and grasses.

Cover Type D: Miscellaneous

HOMESTEAD & EASEMENT AREAS

Vegetation in Area D includes overgrown landscape species, and pioneer and volunteer vegetation in the areas surrounding the homestead, and the areas cleared within the electric easement. Groundcover includes grasses and vines, and low woody vegetation.

CEMETERY

The cemetery area is covered with grasses and is not visibly obvious or physically marked in the field.

Cover Type E: Developed

Areas of the property defined as developed land areas include the constructed gravel parking, athletic fields, batting cages and dugouts, accessory structures, walkways and patio areas, and maintained lawn areas.

No.	DBH	Botanical Name	Common Name	Species Rating	Condition	Comments
1	36"	Liriodendron tulipifera	Tulip Poplar	70	6	2 stem 12' above grade
2	38"	Liriodendron tulipifera	Tulip Poplar	70	6	
3	24"	Liriodendron tulipifera	Tulip Poplar	70	6	remove vines and prune
4	25"	Liriodendron tulipifera	Tulip Poplar	70	8	remove vines and prune
5	24"	Liriodendron tulipifera	Tulip Poplar	70	7	
6	18"	Liriodendron tulipifera	Tulip Poplar	70	6	crooked form
7	17"&24"	Liriodendron tulipifera	Tulip Poplar	70	6	co-dominant stems
8	25"	Liriodendron tulipifera	Tulip Poplar	70	7	
9	29"	Liriodendron tulipifera	Tulip Poplar	70	7	
10	19"	Liriodendron tulipifera	Tulip Poplar	70	6	unbalanced crown
11	32"	Liriodendron tulipifera	Tulip Poplar	70	6	full crown, but over-mature
12	30"	Liriodendron tulipifera	Tulip Poplar	70	6	full crown, but over-mature
13	29"	Liriodendron tulipifera	Tulip Poplar	70	7	
14	28"	Liriodendron tulipifera	Tulip Poplar	70	7	
15	21"	Liriodendron tulipifera	Tulip Poplar	70	5	small crown
16	28"	Liriodendron tulipifera	Tulip Poplar	70	5	small crown
17	30"	Quercus rubra	Northern Red Oak	75	7	over-mature
18	23"	Liriodendron tulipifera	Tulip Poplar	70	7	
19	25"	Quercus alba	White Oak	75	7	
20	18"	Quercus alba	White Oak	75	7	
21	33"	Quercus alba	White Oak	75	7	
22	20"	Quercus rubra	Northern Red Oak	75	7	
23	24"	Quercus rubra	Northern Red Oak	75	7	
24	17"	Carya glabra	Pignut Hickory	75	6	crook
25	16"	Carya glabra	Pignut Hickory	75	6	
26	24"	Quercus rubra	Northern Red Oak	75	6	lean, over-mature
27	21"	Liriodendron tulipifera	Tulip Poplar	70	6	small crown, lean
28	22"	Liriodendron tulipifera	Tulip Poplar	70	7	
29	26"	Liriodendron tulipifera	Tulip Poplar	70	7	
30	29"	Quercus rubra	Northern Red Oak	75	7	
31	18"	Liriodendron tulipifera	Tulip Poplar	70	7	
32	14"	Liriodendron tulipifera	Tulip Poplar	70	7	
33	22"	Liriodendron tulipifera	Tulip Poplar	70	8	
34	18"	Quercus phellos	Willow Oak	75	7	
35	18"	Liriodendron tulipifera	Tulip Poplar	70	7	
36	22"	Liriodendron tulipifera	Tulip Poplar	70	7	co-dominant at grade with
	11"	Liriodendron tulipifera	Tulip Poplar	70	5	
37	26"	Quercus alba	White Oak	75	8	
38	19"	Quercus alba	White Oak	75	7	
39	22"	Quercus alba	White Oak	75	7	
40	15"&19"	Liriodendron tulipifera	Tulip Poplar	70	6	co-dominant stems at grade
41	20"	Liriodendron tulipifera	Tulip Poplar	70	8	
42	27"	Liriodendron tulipifera	Tulip Poplar	70	8	
43	24"	Liriodendron tulipifera	Tulip Poplar	70	8	
44	16"	Liriodendron tulipifera	Tulip Poplar	70	7	
45	18"	Liquidambar styriciflua	Sweet Gum		7	
46	20"	Quercus rubra	Northern Red Oak	75	7	Over-mature but full crown
47	30"	Quercus borealis	Swamp White Oak	75	7	full crown
48	24"	Quercus borealis	Swamp White Oak	75	7	
49	18"	Quercus borealis	Swamp White Oak	75	7	
50	26"	Quercus alba	White Oak	75	8	

Tree Inventory

The trees that were selected for inventory and field survey for this Site Analysis Phase were selected based on the following criteria and characteristics:

The inventoried trees are located in stands of desirable upland hardwood forest, and were selected to approximately outline a potential edge of disturbance, and edge of stands that may be recommended to be saved. Specific trees that were selected are typically mature desirable trees with high visual quality, which might be considered for preservation with future Concept Plan Phase. For example, the trees along Willow Springs School Road just west of the road would be highly visible and provide an attractive buffer from the road.

Several areas do not have any trees that were included in the inventory. For example, trees were not inventoried within the upland hardwood stand at the northern edge of the site, north of the Babe Ruth baseball field. This stand contains very evenly distributed, similarly-aged hardwoods. At this phase of design, it is not possible to estimate how far development will extend towards the north. If during conceptual layout phase, a portion of this stand can be preserved, it is likely that desirable trees would be contained in the preservation area due to the even distribution of trees.

In addition, no trees were inventoried in the second growth stands at the eastern portions of the site (Parcels 8D and 8E). Within these areas, no highly desirable stands of trees that might impact design decisions were found.

No trees were inventoried at the southernmost portion of the site, adjacent to the intersection of Braddock Road and Willow Springs School Road. This forest stand is anticipated to be undisturbed due the wetland areas that are anticipated to be proposed for preservation to its north.

Finally, within the forest stand northwest of trees T-12 through T-20, trees were also not inventoried for this Site Analysis Phase. This entire stand is anticipated to be preserved due both to existing grading constraints and to provide an attractive buffer along Willow Springs School Road. So a potential edge of the stand (trees T-12 through T-20) was inventoried.

During later design phases, as the Concept Plan for the park is developed, additional areas of trees recommended for field inventory and location can be identified.

Notes

1. Refer to preceding page for tree Inventory narrative and tabulation of tree inventory data for inventoried trees.
2. Tree inventory was performed October 2014 by Pennoni Arborist.
3. Field survey of individual tree locations was performed October 2014 by Pennoni Associates.

Legend

PATRIOT PARK LLV (PARCELS 4B2, 4D, 8D, 8E) SITE AREA = 67.12 AC

APPROXIMATE LIMITS OF WOODED AREAS

T-01 FIELD LOCATED INVENTORIED TREE

APPROXIMATE LIMITS OF EXISTING WETLANDS

Tree Inventory Plan

Patriot Park

Lincoln • Lewis • Vannoy Property

0' 125' 250' 375'

Environmental Investigation

This summary of Environmental findings prepared by Stantec Consulting Services Inc. (Stantec) follows a preliminary investigation of waters of the United States (WOUS), including wetlands investigation conducted by Stantec on the Patriot Park LLV site.

The site is located within the Piney Branch drainage basin in Fairfax County, Virginia and is situated southwest of Fairfax County Parkway (Route 286), north of Braddock Road (Route 620), and bisected by Willow Springs School Road. The focus of this investigation was to determine the approximate limits of areas under potential jurisdiction by the U.S. Army Corps of Engineers (Corps) and/or the Virginia Department of Environmental Quality (DEQ) and to assess the potential for any Resource Protection Area (RPA) buffers as required by Fairfax County under the Chesapeake Bay Preservation Ordinance. The following sections present the results of the analysis.

Wetlands and Waters

Prior to conducting fieldwork, Stantec consulted the U.S. Geological Survey (USGS) Topographical Quadrangle (Quad) map for Manassas, Virginia (1998), the National Wetlands Inventory (NWI) Online Interactive Mapper, administered by the U.S. Fish and Wildlife Service, and the Web Soil Survey, administered by the Natural Resource Conservation Service (NRCS). The USGS map shows a gently sloping site comprised of cleared and forested land with an unnamed tributary to Piney Branch mapped as intermittent within the southeast portion of the site. The NWI map depicts a freshwater emergent wetland feature within the project limits. However, additional wetlands were found that are more pertinent to the study, so the NWI map is not provided in this study.

The soil survey indicates the site is underlain primarily by Glenelg silt loam, Codorus and Hatboro soils, Haymarket silt loam, Meadowville loam, Orange silt loam, Summerduck loam, and Wheaton loam. Codorus and Hatboro are classified as partially hydric and may contain hydric inclusions. Haymarket, Orange, and Summerduck are classified as predominantly non-hydric and may contain minor hydric inclusions. Glenelg, Meadowville, and Wheaton are classified as non-hydric by the NRCS in Fairfax County, Virginia. Included in this report are the soils map and representative photographs depicting site conditions.

The on-site investigation was conducted using the Routine Determination Method as outlined in the 1987 *Corps of Engineers Wetland Delineation Manual* and methods described in the 2012 *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0)* as a basis for identifying areas subject to potential jurisdiction by Corps. This method involves the positive identification of three parameters in the determination of wetland boundaries: hydrophytic vegetation, hydric soils, and wetland hydrology.

Based upon the site conditions, potential jurisdictional features are present within the project limits, as shown on the Existing Wetlands Plan. These features can be classified as forested and emergent wetland, and non-vegetated stream channels situated within drainages throughout the site. Common vegetation found within wetlands includes red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), pin oak (*Quercus palustris*), slippery elm (*Ulmus rubra*), common rush (*Juncus effusus*), Pennsylvania smartweed (*Persicaria pennsylvanica*), and various sedge species (*Carex spp*). Soils within the wetlands are typically grey to brownish grey (10YR 4/1 to 10YR 4/2 in Munsell color notation) with redoximorphic features present, a color and condition indicative of hydric soils. Indicators of wetland hydrology vary but, at the time of field investigations, included saturation within the upper twelve inches of the soil profile, drainage patterns, oxidized rhizospheres on living roots, and water-stained leaves. The transition from wetland to upland is typified by a transition from hydric to non-hydric soils, a shift in the vegetative community, and a loss of indicators of wetland hydrology due to a rise in topography.

Resource Protection Areas (RPA)

The purpose for this study was to estimate the possible limits of RPA by determining the dominant flow regime (perennial vs. intermittent) within identified stream channels. Additionally, the connectivity of non-tidal wetlands to perennial streams was examined and factored into the preliminary RPA determinations as necessary. This evaluation was conducted using the general application of the Fairfax County Stormwater Planning Division – Perennial Streams Field Identification Protocol (herein referred to as the Fairfax Method). This field indicator protocol is currently accepted by the Department of Conservation and Recreation, Chesapeake Bay Local Assistance (CBLA, formerly CBLAD). This protocol uses physical and biological parameters to identify the break between intermittent and perennial stream channels.

Pursuant to 9VAC 10-20-10 et seq., non-tidal wetlands are considered RPA resources when such features are "…connected by surface flow and contiguous to tidal wetlands or water bodies with perennial flow." Field determinations and designations of non-tidal RPA wetlands are based on interpretations of guidance provided by CBLAD (1991, 2002, 2003a, 2007, 2010). Stantec conducted ground reconnaissance along wetland features associated with the stream systems to determine if the wetland areas on-site are truly contiguous (i.e. not separated by an upland berm or levees) and surficially connected to the streams in question [contiguity and surficial connections evaluated according to CBLAD (1991)].

During preliminary field investigations there were no stream reaches observed within the project limits that appeared to be perennial. All streams observed were determined to be intermittent to ephemeral in nature at the time of field observations. Stream channels identified in the southeast and northeast portions of the site exhibited weak flow, generally poor geomorphologic development, and an overall absence of in-stream biota. As a result, these stream reaches were deemed intermittent, and it is anticipated that no RPA buffer will be required around these streams or any connected or contiguous wetlands as depicted on the field map. Furthermore, field investigations reveal that off-site RPA mapped by Fairfax County, just south of Braddock Road, does not appear to continue upstream into the project limits, as the on-site connection to this area appears to be via intermittent stream channel.

Conclusion

Based upon the on-site analysis, potential jurisdictional features have been identified within the Patriot Park East LLV project limits. The approximate limits of potential WOUS, including wetlands are shown on the field map. Based upon preliminary RPA investigations, no on-site perennial streams were identified, thus it is anticipated that no stream feature, including associated connected and contiguous wetlands will require a 100-foot RPA buffer. It shall be noted that these results are preliminary and final determination of WOUS boundaries and RPA limits shall be determined by a formal wetland delineation and perennial flow determination to be submitted to and approved by the Corps and Fairfax County, respectively.

Fairfax County, Virginia (VA059)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
30A	Codorus and Hatboro soils, 0 to 2 percent slopes, occasionally flooded	7.0	10.1%
39B	Glenelg silt loam, 2 to 7 percent slopes	22.7	32.5%
39C	Glenelg silt loam, 7 to 15 percent slopes	10.4	14.9%
52B	Hattontown-Haymarket complex, 2 to 7 percent slopes	0.1	0.2%
56B	Hattontown-Orange complex, 2 to 7 percent slopes	0.1	0.1%
59B	Haymarket silt loam, 2 to 7 percent slopes	2.3	3.2%
78B	Meadowville loam, 2 to 7 percent slopes	5.2	7.4%
82B	Orange silt loam, 2 to 7 percent slopes	9.6	13.8%
93B	Sumerduck loam, 2 to 7 percent slopes	1.9	2.7%
95	Urban land	1.1	1.6%
102	Wheaton loam, 2 to 25 percent slopes	7.6	10.9%
103A	Wheaton-Codorus complex, 0 to 2 percent slopes	0.0	0.0%
105B	Wheaton-Glenelg complex, 2 to 7 percent slopes	1.3	1.8%
105C	Wheaton-Glenelg complex, 7 to 15 percent slopes	0.2	0.3%
107B	Wheaton-Meadowville complex, 2 to 7 percent slopes	0.3	0.4%
Totals for Area of Interest		**69.7**	**100.0%**

National Cooperative Soil Survey per USDA Natural Resources Conservation Service

Soils Map

Photograph 1: Bottom of intermittent stream reach in southeast portion of site looking upstream. This stream flows southeast before crossing under Braddock Road

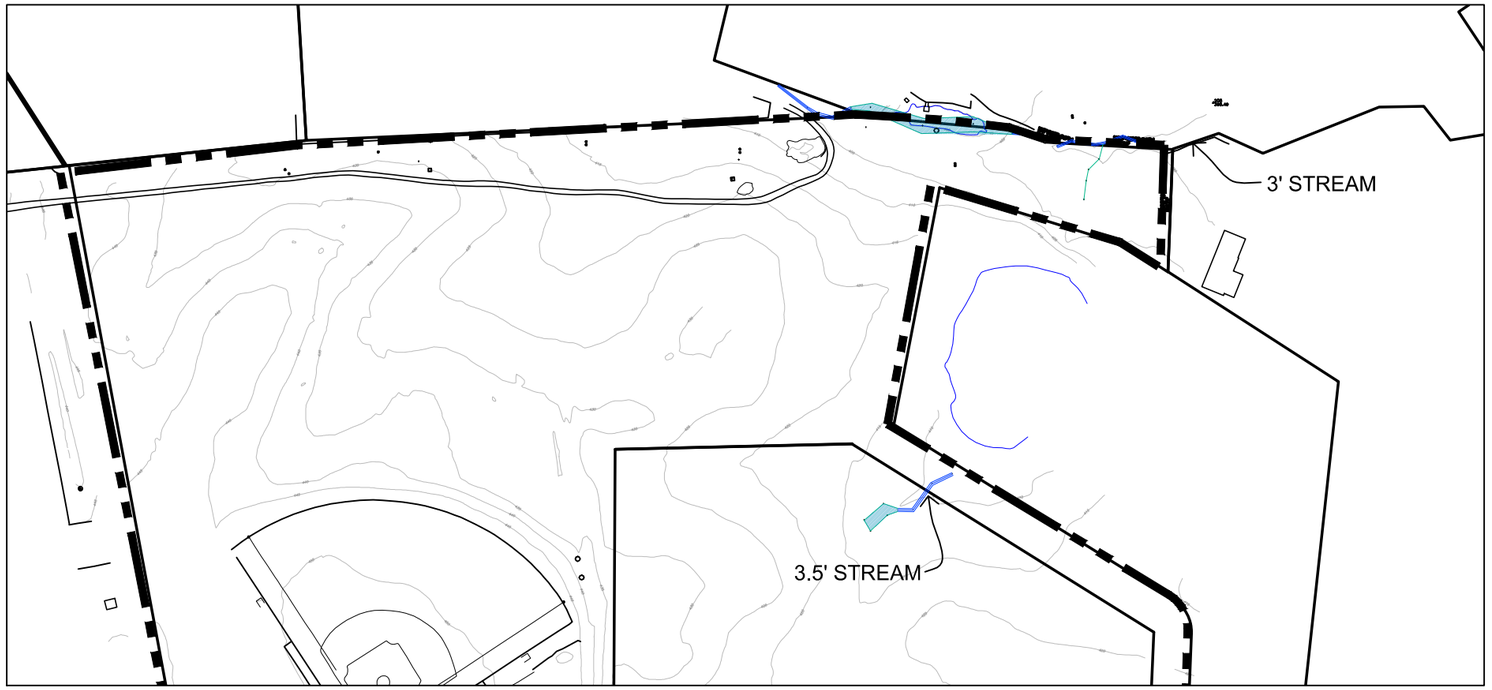
Photograph 2: Emergent wetland within swale in southeast portion of site, looking southeast.

Photograph 3: Top of stream reach and adjacent wetlands in southern portion of site, looking downstream from culvert at Willow Springs School Road. No flow observed during field investigations.

Photograph 4: Bottom of intermittent stream reach in southern portion of site, looking upstream from wetland.

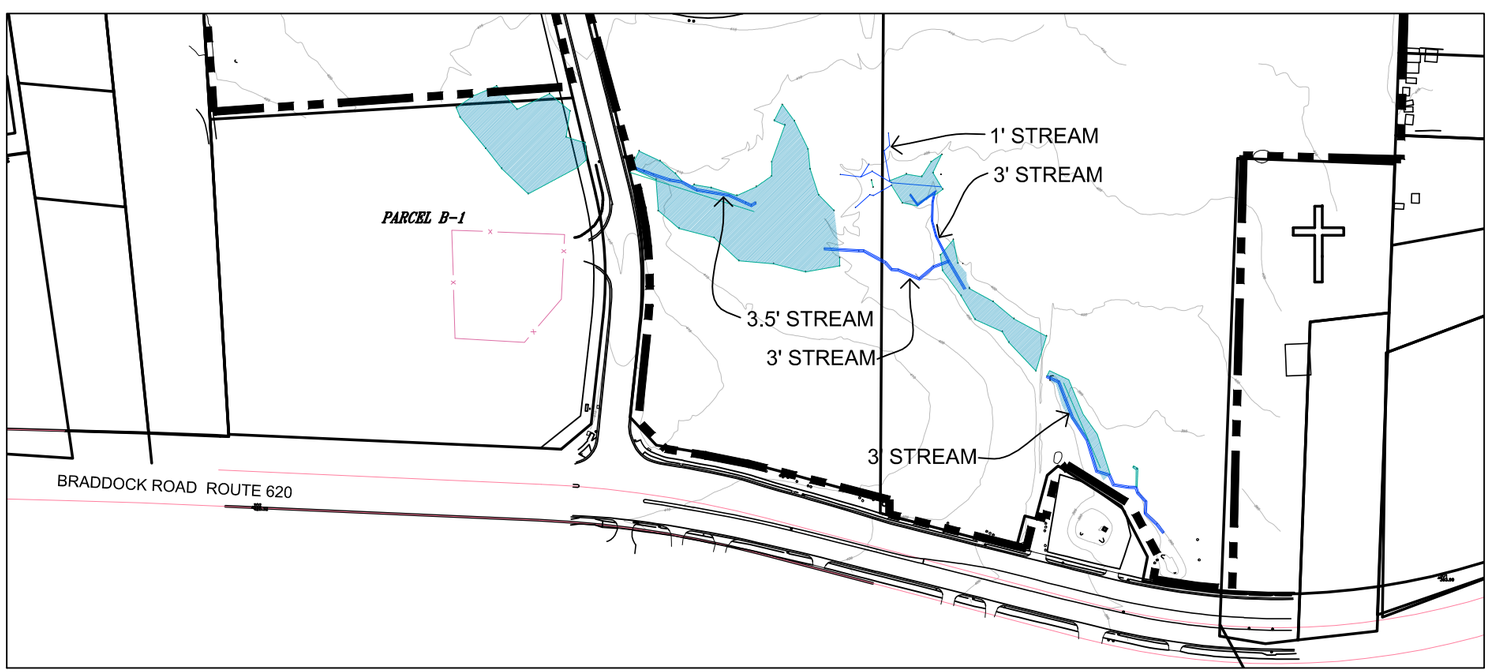
Photograph 5: Top of intermittent stream reach in northeast portion of site, looking downstream. This stream flows northeast and is a tributary to an off-site pond.

Photograph 6: Top of intermittent stream reach in northeast portion of site, looking downstream. This stream flows east, adjacent to a utility corridor along the northern project bopundary.



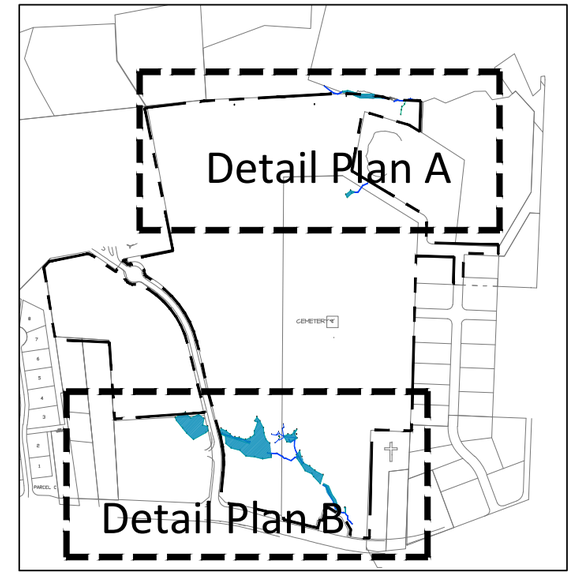
Wetlands Detail Plan A

0' 100' 200' 300'



Wetlands Detail Plan B

0' 100' 200' 300'



Key Map

0' 400' 800' 1200'

Notes

1. Hatched area indicates preliminary limits of wetlands.
2. Wetlands limits shown were identified and located by Stantec on October 28, 2014. Stream widths labeled on the plan are based on Stantec field notes.
2. Information shown hereon is preliminary and not confirmed by the US Army Corps of Engineers.

Legend

PATRIOT PARK LLV (PARCELS 4B2, 4D, 8D, 8E) SITE AREA = 67.12 AC

STREAM CHANNEL

PRELIMINARY LIMITS OF WETLANDS

Existing Wetlands Plan

Patriot Park

Lincoln • Lewis • Vannoy Property

Image (top): Willow Springs School Road looking north
Image (below): Existing entrance to recreation facility parking lot

Transportation and Access

Willow Springs School Road is a two-lane subdivision road, with a 50' right-of-way and 30' wide roadway section (face-of-curb to face-of-curb) that was built in late 1980's under Fairfax County Plan #7375-SP-01 to provide access to Willow Springs Elementary School from Braddock Road (Route 620). It is a curb and gutter section road that was designed at 30 mph. Based on field observations, the road does not have a posted speed sign, but there are three speed bumps for speed control at various intervals, and a caution sign. The road is currently is not accepted into the VDOT system for maintenance. We assume Fairfax County Public Schools is currently maintaining the road, but this needs to be confirmed.

Braddock Road (Route 620) is a Minor Arterial Road that is posted at 45 mph, and has an existing right turn lane that is approximately 125' long with a 100' taper into Willow Springs School Road.

The intersection of Willow Springs School Road and Braddock Road was recently improved with the construction of a new right turn lane and traffic signal in accordance with Fairfax County Public Improvement Plan #8548-PI-001 and a separate VDOT signal plan.

Access to the park will be from Willow Springs School Road. Even though the park site has frontage onto Braddock Road, we do not believe this is viable access for the park for the following reasons:

- A new median cross over would not meet VDOT spacing criteria with the existing Willow Springs School Road intersection.
- Spacing criteria would also prohibit a right turn exit due to the short weaving distance for those wanting to do a U-turn at the existing intersection.
- Off-site right-of-way would most likely be required for a new deceleration lane for a new right turn entrance only.
- New access to the park along Braddock will require crossing the existing intermittent stream and have negative environmental impacts.

Image (top): Intersection of Braddock Rd and Willow Springs School Rd looking northwest
Image (below): Willow Springs School Rd looking north towards elementary school

The existing access into the developed portion of the park (parcel 4D) is from an entrance from Willow Springs School Road. Based on our field observations, the location of this entrance seems to be working well. Access to the western portion of the park (parcel 4B2) should be opposite the entrance to the east. We believe there is flexibility for this access location along Willow Springs School Road to shift to accommodate the future design of the park. The removal of some existing trees may be necessary along the western side of Willow Springs School Road to achieve safe sight distance for those entering Willow Springs School Road from parcel 4B2. All new entrances onto Willow Springs School Road should be commercial entrances, VDOT standard type CG-11 with a minimum with of 30 feet wide. Based on a 30 mph design speed, 335 linear feet of stopping sight distance is required.

Should an entrance be provided to parcel 4B2, we believe a left turn lane may be warranted to maintain traffic flow to the school as well as to an entrance to the east into parcel 4D. A new left turn lane would require widening the existing roadway section to accommodate a minimum of three 12 foot lanes. Furthermore, additional traffic onto Willow Springs School Road with the development of the park may require longer turn lanes at the Willow Springs School Road and Braddock Road intersection. A traffic study may be required by VDOT and/or the County's DOT to address these impacts.

Pedestrian access to the park and existing school is currently limited, as there are no sidewalks along Willow Springs School Road. Braddock Road has a four foot wide concrete sidewalk on its north side and a nine foot wide asphalt trail on the south side. With the development of the park, construction of a sidewalk or trail should be considered on at least one side of the Willow Springs School Road to provide connectivity to the community and the school. The Northern Virginia Regional Bikeway & Trail Network Study was conducted on the Braddock Road (620) trail, and recommended widening of the trail to meet current AASHTO and VDOT guidelines. The recent improvements to the Willow Springs / Braddock Road intersection included a right turn lane, ADA ramps and crosswalks.

Utilities

Existing sanitary sewer, water, electric, gas, and fiber optics are located on or in proximity to the subject property.

The future Patriot Park LLV (Parcels 4B2, 4D, 8D, and 8E) is located within Non-Serviceable Sewer District. There are no sanitary sewer facilities on the subject property except for a couple of portable Johns by the gravel parking lot on parcel 4D. At time of final engineering, further study may be required to determine if any abandoned septic fields associated with the house exist on the subject property. Based on available records and county maps, Willow Springs Elementary School is serviced by gravity sewer that ties into the existing sanitary sewer system located on Hampton Forrest subdivision to the west of the school property. Surrounding the subject property is Braddock Missionary Baptist church property, Vannoy Acres, and Hampton Estates. All these properties are serviced by a sanitary force main that connects to a pumping station on the property owned by Fairfax County Board of Supervisors, and identified as PIN# 0662 01 0004B1.

According to the Fairfax County Sanitary Sewer District map, no sanitary sewer extension to existing system is allowed. However, there may be an opportunity to provide sanitary sewer service for the park site. Coordination with Fairfax County Wastewater Planning & Monitoring Division (Mr. Bo Baik, 703-324-5186) yielded the following information:

1. It may be possible to extend sanitary sewer service by gravity using 400 Foot Rule through the northern property boundary where star signs are not shown (See Existing Sanitary Sewer Plan). This possibility of extending sanitary sewer service should be confirmed.
2. Sanitary sewer service cannot be extended from Willow Springs Elementary School sewer system, because the existing sewer system is private and+ belongs to Fairfax County Public Schools.

Water service is not present on the subject property, Willow Springs School Road, or Braddock Road. Based on available records, Fairfax Water has looped water service facilities on Willow Springs Elementary School. It includes two existing hydrants for fire coverage, an existing 12” ductile iron pipe that reduces to 8”. The existing water system is fed from the northern school boundary, crosses under the existing 22” and 6” gas lines, and high transmission Dominion overhead lines, loops around the existing school building, reduces to an 8”, and then ties into an existing 8” water main on the Hampton Forrest Subdivision property. Coordination with Fairfax Water (Mr. Calixto Perez, 703-289-6346) confirmed that there is enough capacity in the existing water system for future irrigation needs for the athletic fields.

Electric service on the eastern portion of the subject property (Parcels 4D, 8D and 8E) includes an overhead electric line feeding from an existing electric pole on the south side of Braddock Road. This system feeds the existing lights on the existing baseball fields, and it is considered a Northern Virginia Electric Company (NOVEC) Secondary System that feeds a meter for lighting of the fields. Based on field observations, parcel 4B2 is vacant and undeveloped, and does not have any distribution electrical service; in addition, there are no electric power distribution systems nor overhead lights on Willow Springs School Road. On the northern boundary of the subject property, there is an existing High Voltage Transmission Overhead Line that crosses parcel 4D from the west to the east. Coordination with NOVEC (Mr. Chuck Treadway, 703-754-6721) confirmed that there is enough capacity in the existing electric system for lighting the fields. At time of final engineering, further study may be required to accommodate electrical service and lighting to the park site.

Natural gas on the subject property is located on parcel 4D. There are two gas lines (Existing 22” and a 6”) that cross in the east west direction along the northern property. Colonial Pipeline is the owner of the gas facilities. Coordination phone calls to Colonial Pipeline (1-678-762-2200) were pending as of the date of this report. Based on field observations, telephone and fiber optics service is provided on parcels 4B2 and 4D, along east side of Willow Springs School Road and north side of Braddock Road. These facilities are owned by AT&T. Coordination phone calls from AT&T (Mr. Gary Weakfield, 301-874-1180) are still pending as of the date of this report. At time of final engineering, extensive coordination shall be conducted with the utility companies mentioned above.

Easements

Based on title report information provided to us from FCPA, the future Patriot Park LLV property (Parcels 4B2, 4D, 8D, and 8E) has access, construction and slope maintenance, drainage, electric, gas, and telephone/fiber optics recorded easements. There is an existing recorded access easement (25' wide) that provides access from Braddock Road (620) to parcels 8D and 8E, and it runs south to north. We believe this easement is for access to parcel 8E and can be vacated.

Along Willow Springs School Road, on the west and east sides on parcels 4B2 and 4D, there is an existing recorded construction and slope maintenance (15' wide) easements. These easements were placed on the parcels with the construction of Willow Spring Road and can be vacated depending on VDOT acceptance of the road.

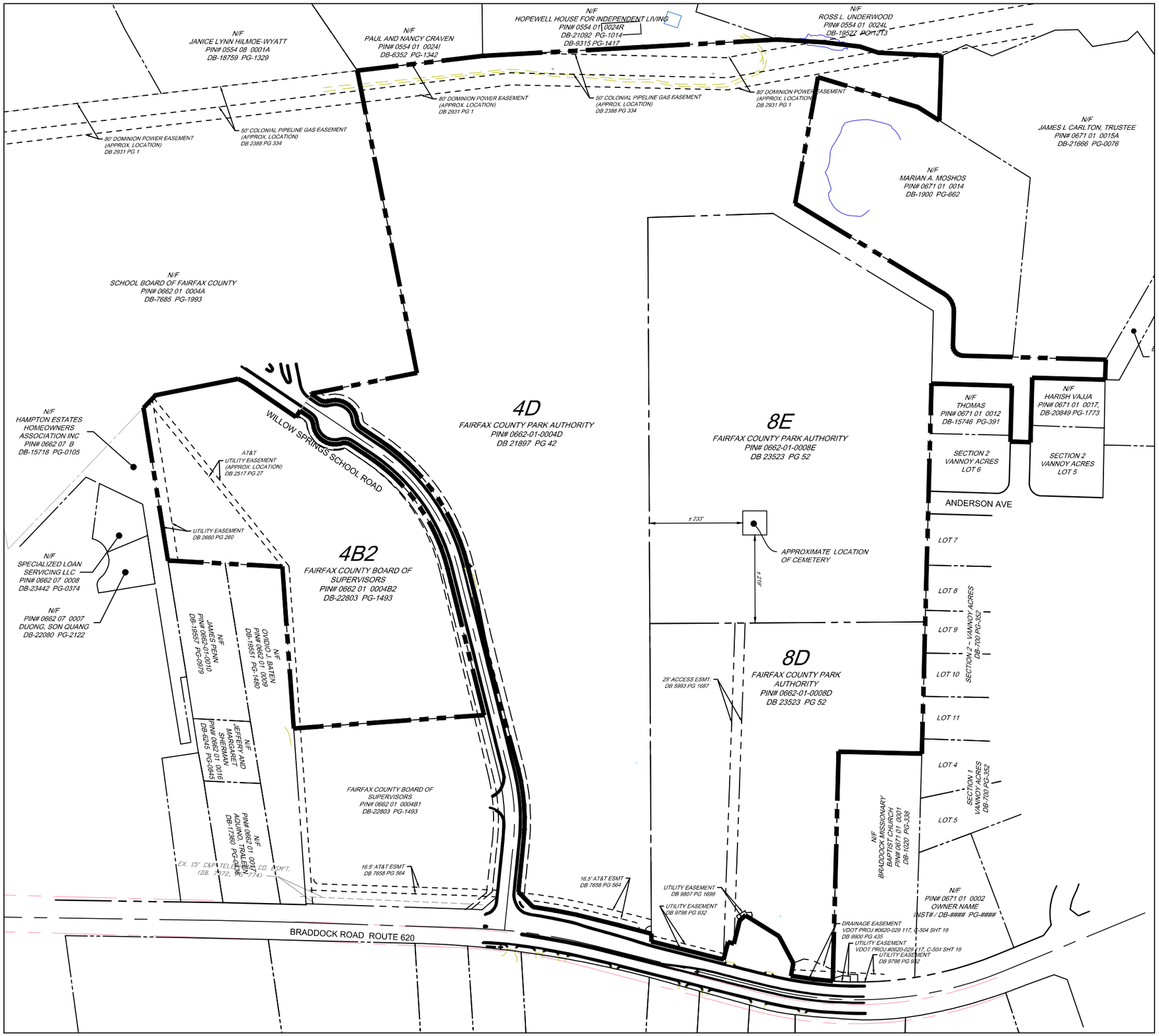
On parcel 8E, next to VDOT Stormwater Management facility, there is an existing recorded drainage easement as part of VDOT Project #0620-029 117. The easement contains the limits of the stormwater backwater into an existing culvert under Braddock Road. This easement is not detrimental to the development of the park and can stay in place.

On parcel 4D; there is an existing recorded Dominion Virginia Power electrical easement (80' wide) for High Voltage Transmission lines and poles that runs from east to west. Any improvements within this easement need to be coordinated carefully with them. They will require FCPA to enter into an agreement designating maintenance and other associated issues with improvements in their easement. Coordination with Dominion Virginia Power (Mr. Gary Doorman, 571-203-5085) confirmed that the easement information is accurate. On parcel 4D, and overlapping the recorded easement for the High Voltage Transmission lines and poles, there is an existing recorded Colonial Pipeline gas easement (50' wide), that runs from east to west. Any improvements within this easement need to be coordinated carefully with them. They will require FCPA to enter into an agreement designating maintenance and other associated issues with improvements in their easement and clearance/cover to their existing underground transmission pipe.

Along the southern boundary of parcels 4D and 8E and the western boundary of parcel 4B2, there is an existing recorded AT&T (16.5' wide) easement. At time of final engineering, verification of all these recorded easements shall be addressed.
the Pre-development Outfall and SWM Plan.

80' wide Dominion Virginia and Overlapping 50' Colonial Gas Pipeline Easement

AT&T Easement at Parcel 4B2



Notes

1. The existing survey was prepared October 2014 by Pennoni Associates.
2. Property information shown hereon does not constitute a land boundary survey.
3. Coordinate system is NAD83 VA north. Datum is NGVD29.
4. Aerial photography is based on information provided by McKenzie Snyder, dated April 5, 2014
5. The approximate location of the cemetery is based on an evaluation of a plat at DB 25523, page 52 recorded among the land records of Fairfax County; and an AutoCAD file provided by Fairfax County Park Authority ref 2010lincoln_lewis_vannoy_fy12-15-model.dwg
6. The 80' Dominion Power Easement and the Colonial Pipeline Gas Easement location is approximate and is based on available records.

Legend

PATRIOT PARK LLV (INCLUDING PARCELS 4B2, 4D, 8D, 8E)
SITE AREA = 67.12 AC

PARCEL BOUNDARY

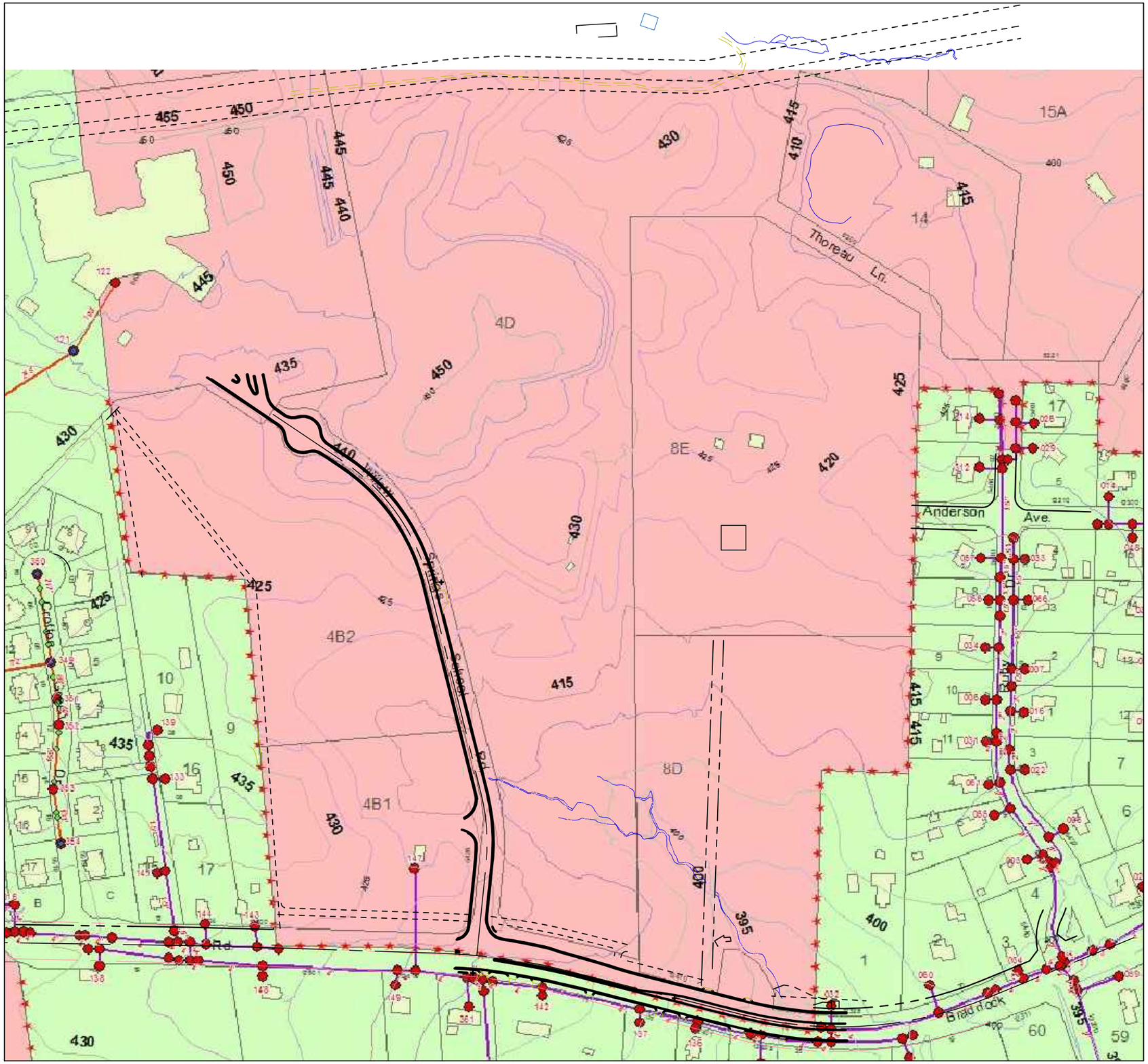
EXISTING UTILITY EASEMENT

Utility Easement Plan

Patriot Park

Lincoln • Lewis • Vannoy Property

0' 125' 250' 375'



Notes

1. The information shown on this plan was provided by Fairfax County Wastewater Planning & Monitoring Division, Department of Public Works & Environment Services, November 2014.
2. The plan shown is approximate scale.
3. The red star symbols delineate the limits of the area into which sanitary sewer cannot be extended.

Legend

- AREA OF EXISTING PUBLIC SANITARY SEWER SERVICE
- AREA NOT SERVED BY PUBLIC SANITARY SEWER SERVICE
- LIMITS OF AREA INBTO WHICH SANITARY SEWER SERVICE CANNOT BE EXTENDED
- EXISTING SANITARY SEWER CONNECTION

Existing Sanitary Sewer

Patriot Park

Lincoln • Lewis • Vannoy Property

0' 125' 250' 375'

Notes

1. The information shown on this plan was provided by Fairfax County Wastewater Planning & Monitoring Division, Department of Public Works & Environment Services, November 2014.
2. The plan shown is approximate scale.

Pipe Material Legend

- **Hydrants**

System Valves

SubtypeCode, CurrentlyOpen

- **Plug, Yes**
- **Yes, No**
- **Gate, Yes**
- **Gate, No**
- **Butterfly, Yes**
- **Butterfly, No**
- Private, In Service
- Private, Approved
- **Approved**
- **TransmissionMain, CastIron**
- **TransmissionMain, DuctileIron**
- **TransmissionMain, Steel**
- **TransmissionMain, Plastic**
- **TransmissionMain, AsbestosCement**
- **TransmissionMain, PreStressedConcreteCylinderPipe**
- **TransmissionMain, Unknown**
- **DistributionMain, CastIron**
- **DistributionMain, DuctileIron**
- **DistributionMain, Steel**
- **DistributionMain, Plastic**
- **DistributionMain, PolyVinylChloride**
- **DistributionMain, AsbestosCement**
- **DistributionMain, PreStressedConcreteCylinderPipe**
- **DistributionMain, Copper**
- **DistributionMain, Galvanized**
- **DistributionMain, High Density Polyethylene**
- **DistributionMain, Unknown**
- **Abandoned Mains**

Existing Water

Patriot Park

Lincoln • Lewis • Vannoy Property

0' 200' 400' 600'

Existing Drainage Patterns and Outfalls

The existing drainage pattern for the site is generally in two separate directions: one to the south and one to the north.

Southern Drainage Area:
This drainage area entails the majority of the park, including the two existing 60 foot diamond fields and parking area on parcel 4D, the southern of parcel 8E, the entirety of parcels 8D and 4B2 and Willow Springs School Road. In addition, approximately one half of the Willow Springs Elementary School site in inclusive of this southern drainage area. The runoff from the school site is controlled by existing stormwater management facilities before being conveyed in an existing closed underground storm drainage system that is part of Willow Springs School Road (described in more detail below). Runoff from this southern drainage area converges into an intermittent stream that flows in an easterly direction to the southeast corner of the park site, designated as OUTFALL #1 on the Pre-development Outfall and SWM Plan and described in more detail below.

The existing drainage system that was constructed with Willow Springs School Road is comprised of a 30 inch concrete pipe that runs the length of the road, conveying runoff from the school site to the low point of the road, the located approximately 480 linear feet north of the Willow Springs School Road – Braddock Road intersection. Drainage from the west side of Willow Springs School Road is conveyed under the road in an easterly direction via twin 30 inch concrete pipes. Due to the flatness of this system and the low velocities of the runoff during storm events, these culverts have silted up and require maintenance to operate as originally designed.

The natural drainage pattern for Parcel 4B2 (the undeveloped parcel on the west side of Willow Springs School Road) is sheet flow in a southeasterly direction into Willow Springs School Road and in the general direction of the location of the stream channel. To connect a storm outfall directly into the existing channel, storm improvements may be needed across the adjacent sewer pump station site. Since this site is owned by the County, we would not expect there to be an issue obtaining permission to make these improvements should they be needed.

As the intermittent stream channel flows in an easterly direction, the flow is constricted by an existing 15 inch pipe under the existing driveway used in the past by the previous residence of parcels 8D and 8E. This pipe is also silted up and the silt should be removed for it to operate well. Ultimately the removal of this driveway crossing and pipe may be advisable, so that the runoff is not impeded on the site.

Downstream from the driveway crossing, the stream channel continues to flow in a southeasterly direction to and existing drainage system associated with Braddock Road. Runoff is conveyed under Braddock Road via an existing triple 30 inch culvert. The backwater created at the entrance of this culvert is contained within an existing drainage easement. This drainage system was designed and constructed by VDOT with the construction of Braddock Road. Consequently ythe outfall appears to be adequate for the future park development. The adequacy of this outfall, however, should be verified in detail during with final engineering and site plan review/approval.

Based on our field review, the existing intermittent stream channel appears to be an incised channel with bed and banks. However the size of the existing channel and the relatively flat slopes result in a 10 year water limit that extends beyond the channel. The flood limits may need to be determined during final engineering and the County may request that a drainage easement be created to contain these limits.

Northern Drainage Area:
This drainage area encompasses the northern portions of parcels 4D and 8E, including the existing 90 foot diamond field. Runoff from this area naturally makes its way to an existing intermittent stream channel that straddles the northern boundary of the park site. Runoff from the eastern portion of this area drains into an existing farm pond that is located immediately adjacent to the park site's boundary. As the continued viability of this existing pond is dependent upon its drainage shed, it is important that the park's development honor this and practice good environmental stewardship. Drainage and outfall strategies related to this pond should be carefully considered, including erosion/sediment controls during construction.

The proposed storm tie-in and outfall into the existing intermittent stream channel needs to occur in the northeast corner of the park site identified as OUTFALL #2 on the Pre-development Outfall and SWM Plan. In this location, the stream is entirely on the park site and the tie-in can occur without the need of off-site easements and permission from the adjacent property owner. The northern boundary of the site is encumbered by existing overhead power and underground gas transmission lines. Consequently a storm drainage tie in to the existing channel in in this area will require coordination with the Dominion Power and Colonial Pipeline Gas.

The condition of the existing channel was observed as being well defined with an incised bed and banks. The flood limits may need to be determined during final engineering and the County may request that a drainage easement be created to contain these limits. Even though the existing channel appears to be in good and stable condition at this outfall location on our site, we are not aware of existing downstream drainage easements on the channel and the County may request that its downstream condition be reviewed with final engineering. If the channel is determined not to be adequate downstream, off-site easements may be required.

View to off-site farm pond

Stormwater Management

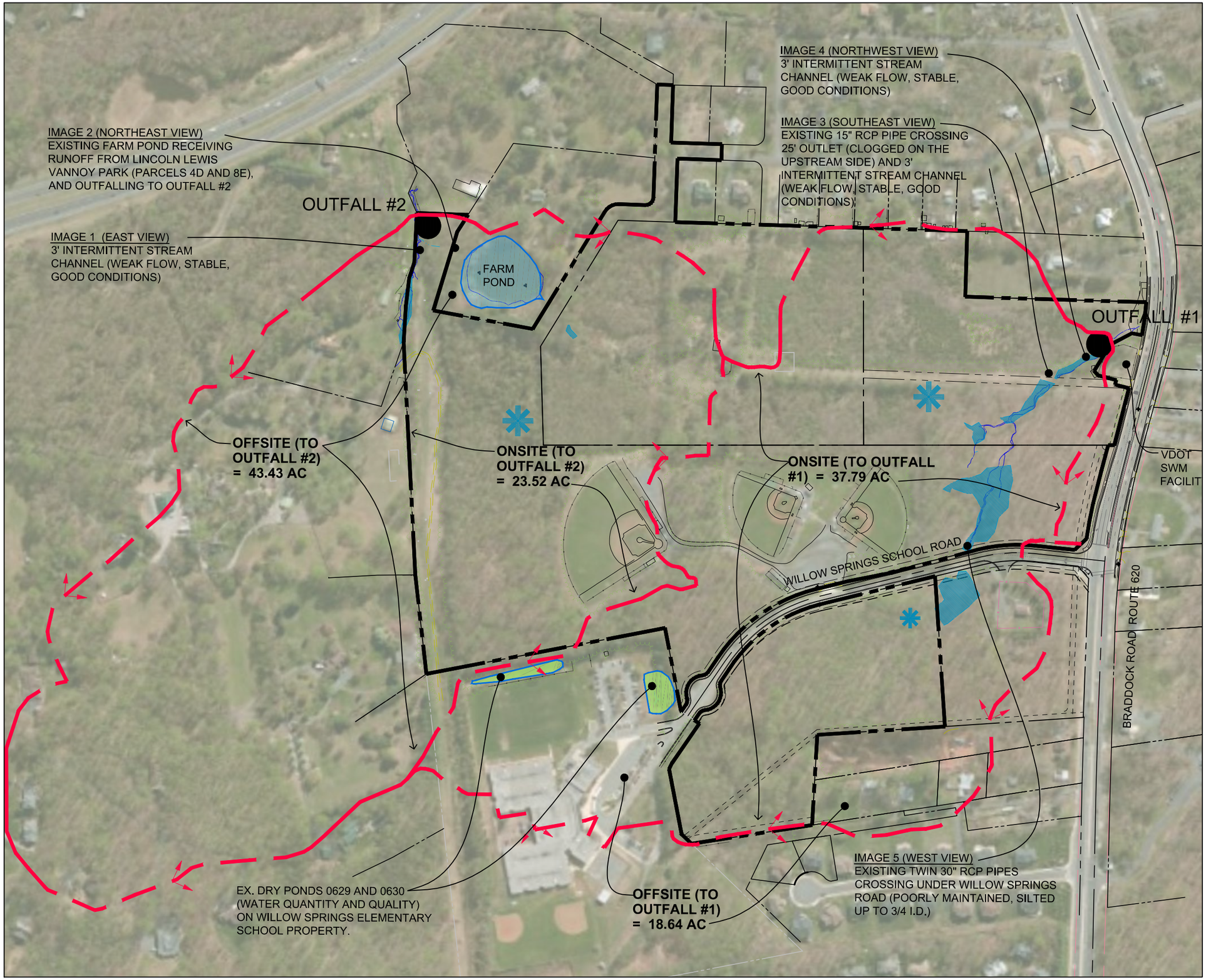
The park site is located within Piney Branch – a sub-watershed of Popes Head watershed – and Water Supply Protection Overlay District. Stormwater Management is required in accordance with new state regulations adopted by Fairfax County and stated in Section 124 - Article 4 of Fairfax County, Virginia, Code of Ordinances to control both runoff quality and quantity.

Water quality requirements shall be met in accordance with Section 124 - Article 4 of Fairfax County, Virginia, Code of Ordinances, and shall be determined by utilizing the Virginia Runoff Reduction Methodology. Land disturbance activities on this site will result in a net increase in impervious cover over the predevelopment conditions; as a result, for any new impervious area, the Total Phosphorus (TP) cannot exceed 0.41 lbs./ac/yr. For remaining area, the Total Phosphorus (TP) shall be reduced by at least 50% because the site is located in a Water Shed Protection Overlay District (WSPOD).

The development of the park should incorporate Low Impact Development (LID) practices to the maximum extent practicable. Unfortunately, infiltration is most likely not an available option due to the clay soils. Other LID facilities such as bio-retention basins, bio-swales, permeable pavement/pavers (with underdrains) in parking and paved areas, and engineered soils should designed with the park design as applicable. To meet the site's water quality requirements and make up any deficiencies that these smaller, more localized facilities cannot fulfill an open BMP facility may be located at the bottom elevation of the developed areas to act as the final quality control. We recommend these facilities be as shallow as possible with flat slopes and enhanced with native vegetation to ensure safety and aesthetic qualities. Possible stormwater management facility locations are shown on the Pre-development Outfall and SWM Plan.

Water Quantity requirements shall be met in accordance with Section 124 - Article 4 of Fairfax County, Virginia, Code of Ordinances, and shall be determined by utilizing the Virginia Runoff Reduction Methodology. Detention onsite Method shall be used to address Channel protection (1-Yr quantity control) and flood protection (10-Yr quantity control). After applying LID practices to the maximum extent practicable, the site post-developed conditions will achieve a reduced CN, which then can be applied to compute required detention volumes using TR-55 or an equivalent Methodology. Potential detention facility locations are shown on the Pre-development Outfall and SWM Plan. These facilities may accommodate water quantity control as well to make up any deficiencies that the localized LID does not provide.

Impacts on downstream and adjacent properties shall be investigated and evaluated during final engineering in accordance with Fairfax County PFM and Chapter 124 of the code of ordinances.



Legend

- PATRIOT PARK LLV (PARCELS 4B2, 4D, 8D, 8E) SITE AREA = 67.12 AC
- DRAINAGE DIVIDE
- INTERMITTENT STREAM CHANNEL PRELIMINARY DELINEATION
- EXISTING SWM PONDS ON WILLOW SPRINGS ELEMENTARY SCHOOL SITE
- EXISTING FARM POND ON PARCEL 14
- POSSIBLE SWM FACILITY LOCATIONS

Pre-Development Outfall and SWM

Patriot Park

Lincoln • Lewis • Vannoy Property

0' 150' 300' 450'

Image 1: View looking east of 3 foot wide intermittent stream channel

Image 2: View looking northeast of Existing Farm Pond receiving runoff from project site parcels 4D and 8E, and outfalling to Outfall #2

Image 3: View looking southeast to existing 15" RCP pipe crossing 25 foot outlet and 3 foot intermittent channel

Image 4: View looking northwest of 3 foot intermittent stream channel

Image 5: View looking west to existing twin 30" RCP pipes crossing under Willow Springs Road

Geotechnical Analysis

The preliminary geotechnical engineering investigation was prepared by GeoConcepts Engineering, Inc. (GeoConcepts) November 2014 and includes the results of the field investigation, soil laboratory testing, and engineering analysis of the geotechnical data. This report specifically addresses the following:

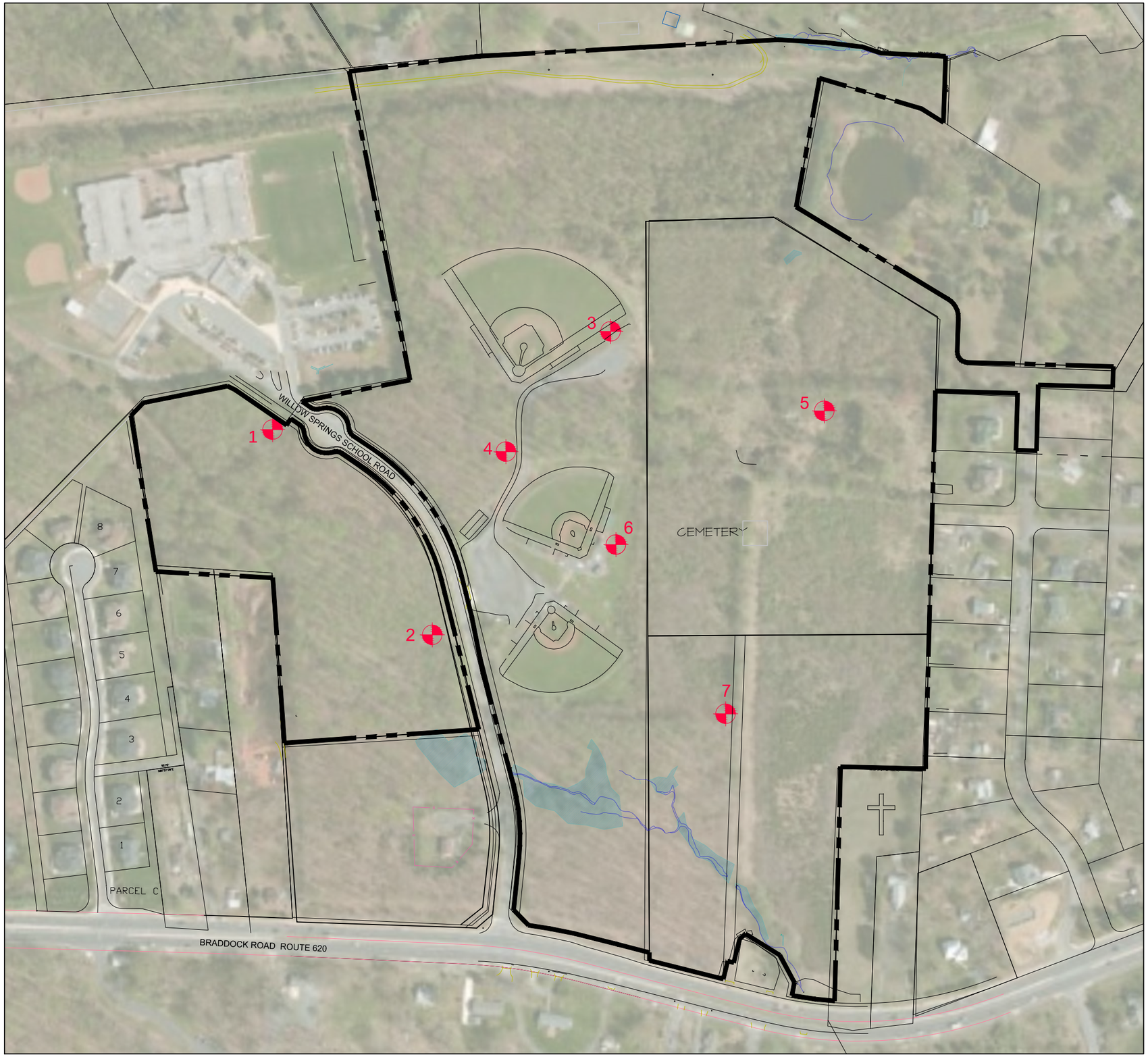
- Analysis of four soil samples for asbestos fibers.
- An evaluation of subsurface conditions within the area of the proposed site development, including a seismic site classification per the International Building Code.
- Earthwork recommendations for construction of loadbearing fills, including an assessment of on-site soils to be excavated for re-use as fill.
- Recommendations regarding rock excavation for the site development.
- USDA textural soil classification and estimated preliminary infiltration capabilities based on published correlations with soil classifications based on two USDA soil laboratory classifications.

Site Description

The site is located at the intersection of Braddock Road and Willow Springs School Road in Fairfax County, Virginia. Currently, the site contains three athletic fields on the east side of Willow Springs School Road, with the rest of the site wooded. The elevation (EL) at the site ranges from approximately EL 410 to EL 450 feet.

Subsurface Conditions

Subsurface conditions were investigated by drilling a total of seven test borings in the proposed park development area. A boring location Plan is included in this report. Test boring logs are presented in the Appendix Section of this report.



Legend

- PATRIOT PARK LLV (INCLUDING PARCELS 4B2, 4D, 8D, 8E) SITE AREA = 67.12 AC
- APPROXIMATE LOCATION OF GEOTECHNICAL BORING
- PARCEL BOUNDARY
- APPROXIMATE LOCATION OF EXISTING STREAM
- APPROXIMATE LIMITS OF EXISTING WETLANDS

Boring Location Plan

0' 125' 250' 375'

Patriot Park
Lincoln • Lewis • Vannoy Property

Geotechnical Analysis

The preliminary geotechnical engineering investigation was prepared by GeoConcepts Engineering, Inc. (GeoConcepts) November 2014 and includes the results of the field investigation, soil laboratory testing, and engineering analysis of the geotechnical data. This report specifically addresses the following:

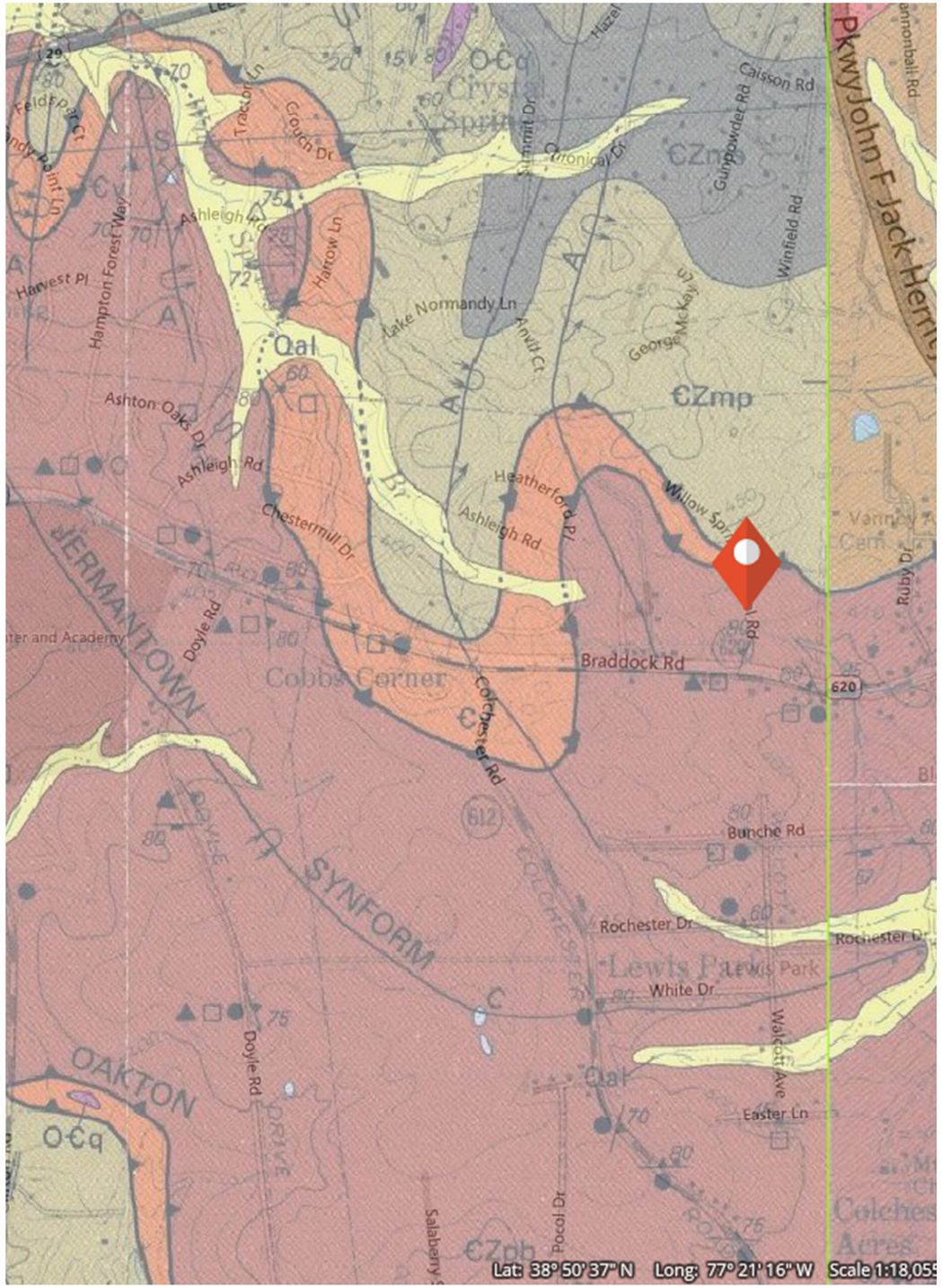
- Analysis of four soil samples for asbestos fibers.
- An evaluation of subsurface conditions within the area of the proposed site development, including a seismic site classification per the International Building Code.
- Earthwork recommendations for construction of loadbearing fills, including an assessment of on-site soils to be excavated for re-use as fill.
- Recommendations regarding rock excavation for the site development.
- USDA textural soil classification and estimated preliminary infiltration capabilities based on published correlations with soil classifications based on two USDA soil laboratory classifications.

Site Description

The site is located at the intersection of Braddock Road and Willow Springs School Road in Fairfax County, Virginia. Currently, the site contains three athletic fields on the east side of Willow Springs School Road, with the rest of the site wooded. The elevation (EL) at the site ranges from approximately EL 410 to EL 450 feet.

Subsurface Conditions

Subsurface conditions were investigated by drilling a total of seven test borings in the proposed park development area. A boring location Plan is included in this report. Test boring logs are presented in the Appendix Section of this report.



Images courtesy of USGS (Drake et al 1994 Geologic Map of the Manassas quadrangle,Fairfax and Prince William Counties, Virginia)

Legend

Qal — **Alluvium (Holocene)**—Sand, gravel, silt, and clay underlying sinuous flood plains along most streams; clastic sediments are in fairly well-bedded, well- to poorly-sorted, graded, fluvial, cyclic deposits with gravel at base of upward fining sequences; locally as much as 16.5 ft thick. Commonly micaceous silts and sands with quartz and crystalline rock pebbles, cobbles, and boulders in streams draining crystalline Piedmont terrain; with subrounded sandstone, siltstone, hornfels, and diabase fragments in Triassic Lowland areas

€Zpb / **€Zpg** — **Piney Branch Complex (Early Cambrian and(or) Late Proterozoic) (Drake and Morgan, 1981)**—Intermixed complex consisting of roughly subequal parts of peridotite, pyroxenite, and gabbro now represented by serpentinite, soapstone, actinolite-tremolite schist, talc schist, and metagabbro, which constitute an autoclastic mélange. Commonly contains slip fiber "asbestos" where sheared. Contains small sheets and dikes of quartz-albite plagiogranite (€Zpg). Rock types in outcrop are indicated by the following symbols: metagabbro, ○ ; plagiogranite, ● ; serpentine, ▲ ; soapstone, △ ; actinolite-tremolite schist, □

€s / **€Zg** **€Zu** **€Zmp** **€Zq** — **Sykesville Formation (Cambrian) (Hopson, 1964; Drake, 1985a)**—Light- to medium-gray, medium-grained sedimentary mélange consisting of a quartzofeldspathic matrix that contains quartz "eyes", fragments of foliated felsic and mafic metavolcanic rocks, biotite schist, and mappable olistoliths of ultramafic rocks (€Zu), metagabbro (€Zg), quartzite (€Zq) and a large proportion of phyllonite (€Zmp). The unit, as mapped here, is the olistolith-rich part described along the Potomac River by Drake and Morgan (1981) and Drake (1989a), and mapped by Drake and Froelich (1994)

€y — **Yorkshire Formation (Cambrian) (Drake and Morgan, 1981)**—Polygenetic mélange consisting of a dark quartz-plagioclase matrix that contains chips, fragments and small blocks of quartz, serpentinite ▲ ; actinolite-tremolite schist □ ; metagabbro ○ ; and plagiogranite ● . Characterized by abundant light-colored feldspar grains that contrast greatly with the dark phyllosilicate component of the matrix.

Geology

The site lies within the Piedmont Physiographic Province of Virginia. The Piedmont is bordered to the east by the Coastal Plain Physiographic Province and to the west by the Blue Ridge Physiographic Province and contains several fault bordered basins. Bedrock in the Piedmont typically consists of highly weathered metamorphic and igneous bedrock. Surface topography in the Piedmont is the result of millions of years of erosion. Specifically, according to local geologic maps, the site is mapped in the Sykesville, Yorkshire, and Piney Branch Formation of the Cambrian geologic period

Soils

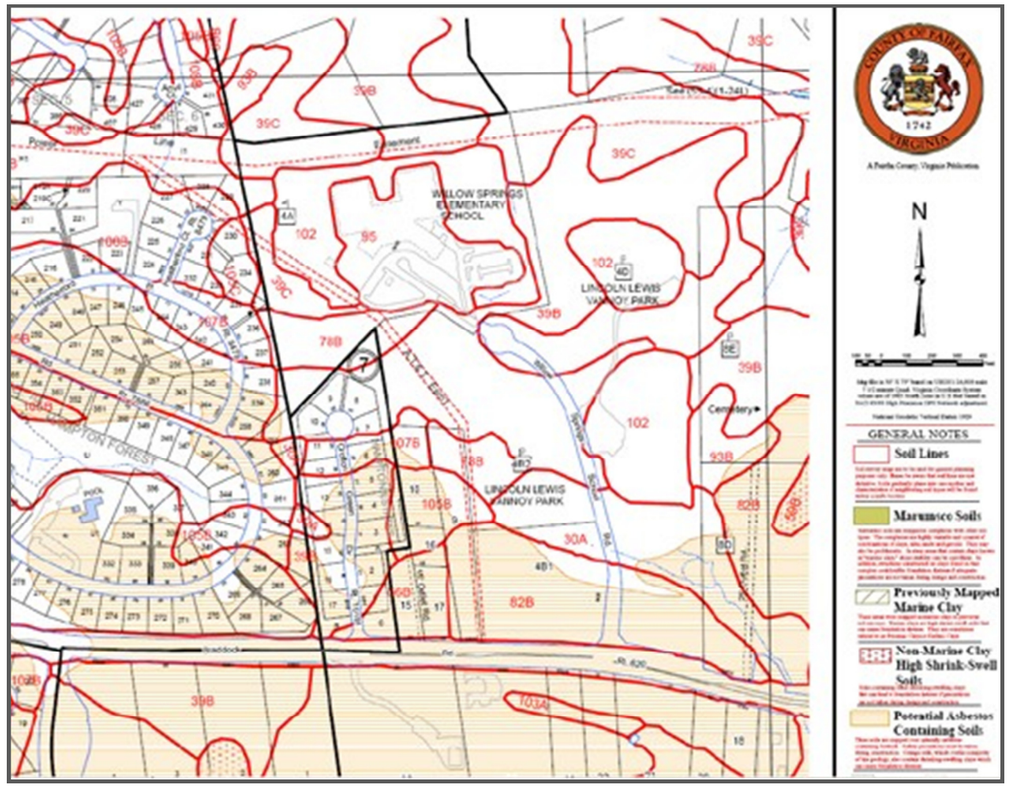
A review of the Fairfax County soils maps indicates a portion of the site development may be built on Class III and IV problem soils. The Description and Interpretive Guide to Soils in Fairfax County indicates the following characteristics. Class I soils are undisturbed natural soils that typically have few characteristics that would adversely affect building foundations or surrounding land. Class II soils are undisturbed natural soils that typically have shallow water tables or restrictive layers. Class III soils are undisturbed natural soils that have characteristics such as high shrink/swell potential, landslide susceptibility, high compressibility, low bearing strength, and shallow water tables, which may result in poor drainage, building settlement, unstable slopes, etc. Class IV soils are soils that have been disturbed or altered as a result of grading or construction resulting in soils with variable characteristics. Class IVA soils are disturbed soils that were originally Class III soils; whereas IVB soils are disturbed soils that were originally Class I or II soils.

Soil Type Characteristics by Mapping Unit

Mapping Unit	Soil Group	Depth to Bedrock	Water Table	BMP Infiltration Trench Suitability	Foundation Support	Hydrologic Soil Group	Soil Problem Class
30A	Codorus and Hatboro soils	8-20 feet	0 to 2 feet	Poor – w, f	Poor – f, w, b	D	III
39B	Glenelg silt loam	5-100 feet	> 6 feet	good	good	B	I
39C	Glenelg silt loam	5-100 feet	> 6 feet	good	good	B	I
59B	Haymarket silt loam	> 5 feet	> 6 feet	Fair - c	Poor – c, b	D	III
78B	Meadowville loam,	> 6 feet	3.4 to > 6 feet	Marginal - w	Fair – w, b	B	II
82B	Orange silt loam	4 to 6 feet	1.5 to 2.5 feet	Poor – p, c, r, s	Poor – p, c, b	D	III
93B	Sumerduck loam	> 6 feet	2.0 to 3.3 feet	Poor - w	Marginal – w, b	C	II
95	Urban land	n/a	n/a	n/a	n/a	n/a	IVB
102	Wheaton loam	> 5 feet	> 6 feet	Marginal - s	good	D	IVB
105B	Wheaton-Glenelg complex	> 5 feet	> 6 feet	good	good	D	IVB
107B	Wheaton-Meadowville complex	> 5 feet	3.4 to > 6 feet	Marginal -w	Fair – w, b	D	IVB

b – low bearing values for foundation support
c - clays with moderate to high shrink-swell potential often having slow to very slow permeability rates
f – flooding hazard following storm events
p - perched groundwater above restrictive soil or rock layers
r – shallow depth to bedrock
s – slow permeability rates
w - high seasonal groundwater tables in drainage way or low lying area

The southern portion of the site is mapped in the "Orange Soils" of Fairfax County and is noted as Potential Asbestos Containing soils.



Official Soils Map of Fairfax County provided by County of Fairfax.

Stratification

The subsurface materials encountered have been stratified for purposes of our discussions herein. These stratum designations do not imply that the materials encountered are continuous across the site. Stratum designations have been established to characterize similar subsurface conditions based on material gradations and parent geology. The subsurface materials encountered in the test borings completed at the site have been assigned to the following strata:

Stratum A (Existing Fill)	soft to stiff, sandy silt (ML) FILL, sandy silt with gravel (ML) FILL, sandy lean clay with gravel (CL) FILL, silty gravel (GM) FILL, moist, contains wood, brown, black, gray
Stratum B1 (Residual)	firm to stiff, sandy SILT (ML), SILT with sand (ML), sandy SILT with gravel (ML), LEAN CLAY with sand (CL), micaceous, moist, gray and brown
Stratum B2 (Residual)	medium dense to very very dense, silty SAND (SM), silty SAND with gravel (SM), silty GRAVEL with sand (GM), micaceous, moist, gray and brown
Stratum B3 (Weathered Rock)	very dense, weathered rock, silty SAND (SM), with gravel, moist, gray and brown

The two letter designations included in the strata descriptions presented above and on the test boring logs represent the Unified Soil Classification System (USCS) group symbol and group name for the samples based on laboratory testing per ASTM D-2487 and visual classifications per ASTM D-2488. It should be noted that visual classifications per ASTM D-2488 may not match classifications determined by laboratory testing per ASTM D-2487.

Groundwater

Groundwater level observations were made in the field during drilling and up to one day after the completion of the test borings. After we made 24-hour water level observations, all boreholes were backfilled for safety concerns. Longer-term groundwater level readings were obtained in a temporary observation standpipe installed in test borings B-4. Groundwater was observed at depths ranging from 7.5 to 15.9 feet below the existing ground surface, or about EL 401 to 417.6 feet. A summary of the water level readings is presented in the table below.

Test Boring No.	Depth to Groundwater (feet)	Groundwater Elevation (feet)
B-1	Dry	Dry
B-2	15.9	403
B-3	Dry	Dry
B-4	Dry	Dry
B-5	Dry	Dry
B-6	11.5	417.6
B-7	7.5	401

The groundwater observations presented herein are considered to be an indication of the groundwater levels at the dates and times indicated. Where more impervious Stratum B1 silt and clay soils are encountered, the amount of water seepage into the borings is limited, and it is generally not possible to establish the location of the groundwater table through short term water level observations. Accordingly, the groundwater information presented herein should be used with caution. Also, fluctuations in groundwater levels should be expected with seasons of the year, construction activity, changes to surface grades, precipitation, or other similar factors.

Soil Laboratory Test Results

Selected soil samples obtained from the field investigation were tested for grain size distribution with hydrometer, Atterberg limits, and natural moisture contents. A summary of soil laboratory test results is presented below, and the results of natural moisture content tests are presented on the test boring logs in the Appendix. Additionally, the hydrometer USDA classifications are included in the Preliminary Infiltration Analysis Section of this report.

Test Boring No.	Depth (ft)	Sample Type	Stratum	Description of Soil Specimen	Sieve Results		Atterberg Limits			Natural Moisture Content (%)
					Percent Retained #4 Sieve	**Percent Passing #200 Sieve**	**LL**	**PL**	**PI**	
B-2	5.0-6.5	Jar	B2	silty SAND (SM)	0	36.4	42	32	10	17.9
B-3	5.0-6.5	Jar	A	sandy LEAN CLAY (CL)	8.2	69.3	35	19	16	21.3
B-4	2.5-4.0	Jar	B2	silty SAND (SM)	3.9	45.6	55	35	20	16.2
B-5	18.5-20	Jar	B1	FAT CLAY (CH) with sand	0.4	84.5	63	27	36	49.0

Test Boring No.	Depth (ft)	Sample Type	Stratum	Description of Soil Specimen	Sieve Results		Atterberg Limits			Natural Moisture Content (%)
					Percent Retained #4 Sieve	**Percent Passing #200 Sieve**	**LL**	**PL**	**PI**	
B-6	5-6.5	Jar	A	sandy LEAN CLAY (CL)	5.6	65.2	41	24	17	30.2
B-7	8.5-10	Jar	B2	clayey SAND (SC) with gravel	38.8	16.6	28	20	8	5.7

Asbestos Laboratory Test Results

GeoConcepts collected and submitted four soil samples for analysis of the presence of asbestos fibers. The four samples submitted were at the bottom of the soil test borings (23.5 to 25 feet) at the southern portion of the site where the soils are mapped in or near the “Orange Soils”, soil test borings B-1, B-2, B-6, and B-7. The laboratory test results indicated that no asbestos fibers were presented in all four tested samples. A copy of the laboratory results are presented in the Appendix

Seismic Site Classification

Based on the results of the subsurface investigation and our knowledge of local geologic conditions, the site soils have been assigned to a site class D per the International Building Code (IBC). It may be possible to improve the site classification from a “D” to a “C” with in-situ shear wave testing at the site. We can provide this additional service upon request.

Engineering Analysis

Engineering Analysis includes recommendations regarding foundations, subdrainage, earthwork, rock excavation, and stormwater management by infiltration, are presented herein.

Spread Footings

Based on the lower floor elevation for the proposed structure(s), firm natural soils or new compacted fill should be encountered at normal spread footing depths. The exact locations of the proposed structure(s) are not known at this time. However, spread footings founded in these materials are considered suitable for support of the proposed structure(s), and may be designed with a net allowable soil bearing pressure ranging from 2,000 to 3,000 psf. The final bearing pressure should be determined once the locations of the structures are confirmed. In order to achieve the design bearing pressure, lowering or undercutting of specific footings may be required. It is critical that all footing subgrades be observed and approved for the appropriate bearing pressure by the geotechnical engineer, prior to placement of steel reinforcement or concrete.

Fill material and compaction requirements are presented in the Earthwork Section of this report. Exterior footing subgrades should be located at least 2 feet below final exterior grades for frost considerations. The existing fill will not be suitable for direct support of spread footings. Accordingly, we recommend

undercutting the existing fill to a depth of two times the footing width, to 4 feet or to natural soils, whichever is less, and replace with new compacted fill. After undercutting the existing fill and prior to placement of any new compacted fill, the undercut subgrade should be observed during proofrolling by the geotechnical engineer to confirm that the new subgrade is suitable to receive new compacted fill. The footings can then be constructed at normal design depths on the new compacted fill.

Individual column footings and continuous wall footings should be at least 30 inches and 18 inches wide, respectively, for local or punching shear considerations. A maximum slope of one horizontal to one vertical (1H:1V) should be maintained between the bottom edges of adjacent footings. Settlement of spread footings should not exceed about 1-inch, and differential settlement between adjacent foundation elements should not exceed about one-half this amount, including not exceeding an angular distortion of 0.002 inch/inch along continuous wall footings.

Footing subgrades should be observed and approved prior to placement of concrete, to ascertain that footings are placed on suitable bearing soils as recommended herein. Footings should be excavated and concrete placed the same day in order to avoid disturbance from water or weather. Disturbance of footing subgrades by exposure to water seepage or weather conditions should be avoided. Any existing fill, disturbed, frozen, or soft subgrade soils should be removed prior to placing footing concrete. It may be desirable to place a 3 to 4-inch thick “mud mat” of lean concrete immediately on the approved footing subgrade to avoid softening of the exposed subgrade. Forms may be used if necessary, but less subgrade disturbance is anticipated if excavations are made to the required dimensions and concrete placed against the soil. If footings are formed, the forms should be removed and the excavation backfilled as soon as possible. Water should not be allowed to pond along the outside of footings for long periods of time.

Subdrainage

Groundwater was encountered at depths of about 7.5 to 15.9 feet below the existing ground surface, or about EL 401 to EL 417.6. Accordingly, groundwater should be below the assumed lowest floor level of concession or restroom facilities but the actual location of the structure(s) needs to be confirmed after design drawings are completed. Based on the groundwater observations, temporary construction dewatering and permanent subdrainage may be necessary.

Earthwork

Fill will be required for site grading in building and pavement areas, and as backfill against walls below grade. The areas to be filled should be cleared and grubbed prior to placing fill. Unsuitable existing fill, soft or loose natural soils, organic material, and rubble should be stripped to approved subgrades as determined by the geotechnical engineer. Topsoil depths presented on the boring logs should not be considered as stripping depths, as topsoil depths may vary widely across the site, particularly in wooded or previously cultivated areas. Stripping depths will probably extend to greater depths than the topsoil depths indicated herein due to the presence of minor amounts of organics, roots, and other surficial materials that will require removal as a part of the stripping operations. In addition, seasonal soil moisture variations can affect stripping depths. In general, less stripping may occur during summer months when drier weather conditions can be expected. The depth of required stripping should be determined prior to construction by the excavation contractor using test pits, probes, or other means that the contractor wishes to employ, and this determination should be the responsibility of the excavation contractor. All subgrades should be proofrolled with a minimum 20 ton, loaded dump truck or suitable rubber tire construction equipment approved by the geotechnical engineer, prior to the placement of new fill.

For building areas, the new fill should extend at least 10 feet outside building lines. For parking areas, the new fill should extend at least 5 feet outside pavement edges. These recommendations are illustrated by Figure 2 in the Appendix of this report.

Fill material should be placed in lifts not exceeding 8 inches loose thickness, with fill materials compacted by hand operated tampers or light compaction equipment placed in maximum 4-inch thick loose lifts. Fill should be compacted at +/- 2% of the optimum moisture content to at least 95 percent of the maximum dry density per VTM-1. The upper 6 inches of pavement subgrades should be compacted to at least 100 percent of the maximum dry density per the

same standard. Fill placed along slopes steeper than 5H:1V should be benched into the existing slope. Benches should consist of minimum 8 feet wide level cut, and at least one such bench should be used for each 3 feet of vertical rise of fill placed.

Materials used for compacted fill for support of footings, floor slabs, and pavements should consist of soils classifying CL, ML, SC, SM, SP, SW, GC, GM, GP, or GW per ASTM D-2487, with a maximum dry density greater than 105 pcf. It is expected that the majority of soils excavated at the site will be suitable for re-use as fill based on classification. However, the Stratum A existing fill may not be suitable for re-use as new compacted fill due to deleterious man-made materials in the fill. In addition, drying of excavated soils by spreading and aerating may be necessary to obtain proper compaction. This may not be practical during the wet period of the year. Accordingly, earthwork operations should be planned for early Spring through late Fall, when drier weather conditions can be expected.

Fill materials should not be placed on frozen or frost-heaved soils, and/or soils that have been recently subjected to precipitation. All frozen or frost-heaved soils should be removed prior to continuation of fill operations. Borrow fill materials should not contain frozen materials at the time of placement.

Compaction equipment that is compatible with the soil type used for fill should be selected. Theoretically, any equipment type can be used as long as the required density is achieved; however, sheepsfoot roller equipment are best suited for fine-grained soils and vibratory smooth drum rollers are best suited for granular soils. Ideally, a smooth drum roller should be used for sealing the surface soils at the end of the day or prior to upcoming rain events. In addition, compaction equipment used adjacent to walls below grade should be selected so as to not impose undesirable surcharge on walls. All areas receiving fill should be graded to facilitate positive drainage of any water associated with precipitation and surface run-off.

For utility excavation backfill, we recommend that open graded stone be used to backfill the pipe trench to the spring line of the pipe. Backfill should be compacted in lifts not exceeding 6 inches loose thickness, to at least 95 percent of the maximum dry density per VTM-1. Hand operated compaction equipment should be used until the backfill has reached a level 1 foot above the top of the pipe to prevent damaging the pipe. Also, backfill material within 2 feet of the top of the pipe should not contain rock fragments or gravel greater than 1-inch in diameter.

After completion of compacted fill operations in building or pavement areas, construction of building elements or asphalt should begin immediately, or the finished subgrade should be protected from exposure to inclement weather conditions. Exposure to precipitation and freeze/thaw cycles will cause the finished subgrade to soften and become excessively disturbed. If development plans require that finished subgrades remain exposed to weather conditions after completion of fill operations, additional fill should be placed above finished grades to protect the newly placed fill. Alternatively, a budget should be established for reworking of the upper 1 to 2 feet of previously placed compacted fill.

Rock Excavation

The majority of excavations to reach proposed building and pavement grades should generally be feasible using normal earth moving equipment. Disintegrated rock was only encountered in soil boring B-7 at a depth of 23.5 feet below existing grades, or about EL 385 feet.

Preliminary Infiltration Analysis

The classification test method is performed with grain-size sieve analyses including hydrometer testing on samples obtained from corresponding proposed infiltration depths, to determine the USDA soil texture classifications. Published correlations between USDA classifications and infiltration rates were used to provide estimated hydraulic conductivity values. Since hydraulic conductivity and infiltration values are essentially equal at no head conditions, using the hydraulic conductivity values to estimate the infiltration rates provides a conservative estimate of infiltration for use in design. Two soil samples were submitted for soil laboratory testing; however, the laboratory testing is not yet complete. Estimated infiltration rates using the USDA soil texture classifications will be presented in the final preliminary geotechnical engineering report.

Test Boring No.	Approximate Test Depth (feet)	USDA Soil Texture Classification	Estimated Infiltration Rate (inches/hour)
B-1	5-6.5	TBD	TBD
B-7	5-6.5	TBD	TBD

TBD- To Be Determined once the laboratory testing is complete

Based on the results of the soil laboratory classification tests and the published soils map for Fairfax County, it is likely portions of the site will be feasible for infiltration via BMPs, whereas other portions of the site will be unlikely to support infiltration BMPs. It should be noted that the recommended design infiltration rate presented herein is intended for use in design. However, during construction, observations of the subgrade conditions should be made to confirm that the subgrade soils are consistent with the soils analyzed in this report.

Recommendations for Additional Geotechnical Studies and General Notes

This preliminary geotechnical engineering study is not adequate to use for final design. It will likely be necessary to conduct a more comprehensive geotechnical engineering analysis and reporting for this project. The field investigation for the final design phase study should consist of additional test borings including in-situ infiltration tests per Fairfax County requirement, to adequately define the subsurface conditions across the site. Soil laboratory tests should also be performed to determine physical and engineering properties of the bearing soils, and on-site soils for re-use as compacted fill.

The comprehensive geotechnical engineering analysis and report should contain final foundation recommendations for support of the structure(s) based on final building layouts, floor grades, and structural loads. The final report should also include recommendations, if applicable, for lower floor slab support, lateral earth pressures, site retaining walls, subdrainage, pavements, stormwater management by infiltration, and utility installations.

Recommendations contained in this report are based upon the data obtained from the relatively limited number of test borings. This report does not reflect conditions that may occur between the points investigated, or between sampling intervals in test borings. The nature and extent of variations between test borings and sampling intervals may not become evident until the course of construction. Therefore, it is essential that on-site observations of subgrade conditions be performed during the construction period to determine if re-evaluation of the recommendations in this report must be made. It is critical to the successful completion of this project that GeoConcepts be retained during construction to observe the implementation of the recommendations provided herein. An allowance should be established for additional costs that may be required for foundation and earthwork construction as recommended in this report. Additional costs may be incurred for various reasons including wet fill materials, soft subgrade conditions, unexpected groundwater problems, rock excavation, etc.

The geotechnical engineering report is for informational purposes only. The opinions expressed in this report are those of the geotechnical engineer and represent their interpretation of the subsoil conditions, tests and results of analyses that they performed. This report was prepared in accordance with generally accepted geotechnical engineering practices.

Archeological Information

Archeological investigation was not included in the scope of the Site Analysis Phase. The following available archeological findings are provided for informational purposes.

John Rutherford, Archeologist with the Fairfax County Park Authority Cultural Resources Management & Protection Section, stated the following:
The park has not had an archeological survey, and does have potential to contain historic, Civil War and Native American sites. One site has been recorded there, 44FX1666, the Rigg Family Cemetery. It is located in the center of the park, just east of the middle ball field, along the old farm road, running north from Braddock Road. During further assessments of the park, structures appear on historic aerial photography from 1937. Those structures still appear on the current aerials of the county. So, at a minimum, those structures should be assessed by qualified historic architects. If the structures are found significant, they will need to be documented. Also, the CRMPB would recommend all areas of the park that are undisturbed to undergo Phase I archaeological survey, in order to determine the presence or absence of archaeological sites. If significant sites are located, the CRMPB would recommend Phase II archaeological testing in order to determine eligibility for inclusion onto the National Register of Historic Places. If sites are found eligible, avoidance or Phase III data recovery would be recommended for eligible sites that would be impacted by development or other disturbances. The cemetery dates to the 2nd quarter of the 19th century. It is recorded with the state as an archaeological site, 44FX1666.

A Fairfax County representative, Brian Conley, visited the Rigg Family Cemetery in November 1991 and at that time he reported the following. There is an approximately 30' X 30' area, evidence of at least 9 graves, one broken marble headstone marked "John Rigg / Departed this life / April 15th 1849 / Aged _ years (# is illegible) 4 months -9 days" with J.R. footstone, and 4 others with fieldstones. The remaining headstone is in at least five pieces. Some periwinkle was present. The location is 400 yards north of Braddock Road on the east side of what was a driveway. The site today appears to be on the east side of a cleared north-south area, on the edge of a wooded area, on parcel 66-2((1))8E.

Additional archaeological investigation may be performed at later phases of the project.

Appendix A
Subsurface Investigation

Subsurface Investigation Procedures 43
Identification of Soil 43
Test Boring Notes 44
Test Boring Logs 44

Subsurface Investigation Procedures

1. Test Borings – Hollow Stem Augers

The borings are advanced by turning an auger with a center opening of 2-¼ inches. A plug device blocks off the center opening while augers are advanced. Cuttings are brought to the surface by the auger flights. Sampling is performed through the center opening in the hollow stem auger, by standard methods, after removal of the plug. Usually, no water is introduced into the boring using this procedure.

2. Standard Penetration Tests

Standard penetration tests are performed by driving a 2-inch O.D., 1-⅜ inch I.D. sampling spoon with a 140-pound hammer falling 30 inches, according to ASTM D-1586. After an initial 6 inches penetration to assure the sampling spoon is in undisturbed material, the number of blows required to drive the sampler an additional 12 inches is generally taken as the N value. In the event 30 or more blows are required to drive the sampling spoon the initial 6 inch interval, the sampling spoon is driven to a total penetration resistance of 100 blows or 18 inches, whichever occurs first. The sampling operation is terminated after a total of 100 hammer blows and the depth of penetration is recorded.

3. Temporary Groundwater Observation Standpipes

Temporary groundwater observation standpipes were installed in test borings B-4 to observe groundwater levels. The standpipes were installed by inserting a 1-¼ inch diameter plastic pipe through the 2-¼ inch center opening of the auger. Groundwater level observations were made as shown on the test boring logs. The standpipes were removed from the test borings after completion of the final water level readings.

4. Test Boring Stakeout

The test boring stakeout was provided by the project civil engineer, Pennoni Associates, Inc.

GeoConcepts Engineering, Inc.

Identification of Soil

I. DEFINITION OF SOIL GROUP NAMES

		ASTM D-2487	Symbol	Group Name
Coarse-Grained Soils More than 50% retained on No. 200 sieve	**Gravels** More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines	***GW***	WELL GRADED GRAVEL
			GP	POORLY GRADED GRAVEL
		Gravels with Fines More than 12% fines	***GM***	silty GRAVEL
			GC	clayey GRAVEL
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines	***SW***	WELL GRADED SAND
			SP	POORLY GRADED SAND
		Sands with fines More than 12% fines	***SM***	silty SAND
			SC	clayey SAND
Fine-Grained Soils 50% or more passes the No. 200 sieve	**Silts and Clays** Liquid Limit less than 50	Inorganic	***CL***	LEAN CLAY
			ML	SILT
		Organic	***OL***	ORGANIC CLAY
				ORGANIC SILT
	Silts and Clays Liquid Limit 50 or more	Inorganic	***CH***	FAT CLAY
			MH	ELASTIC SILT
		Organic	***OH***	ORGANIC CLAY
				ORGANIC SILT
Highly Organic Soils	Primarily organic matter, dark in color, and organic odor		***PT***	PEAT

II. DEFINITION OF MINOR COMPONENT PROPORTIONS

Minor Component	Approximate Percentage of Fraction by Weight
Gravelly, Sandy (adjective)	30% or more coarse grained
Sand, Gravel	15% to 29% coarse grained
Silt, Clay	5% to 12% fine grained

III. GLOSSARY OF MISCELLANEOUS TERMS

SYMBOLS	Unified Soil Classification Symbols are shown above as group symbols. Use "A" Line Chart for laboratory identification. Dual symbols are used for borderline classification.
BOULDERS & COBBLES	Boulders are considered pieces of rock larger than 12 inches, while cobbles range from 3 to 12 inches.
WEATHERED ROCK	Residual rock material with a standard penetration test (SPT) resistance of at least 60 blows per foot.
ROCK/SPOON REFUSAL	Rock material with a standard penetration test (SPT) resistance of 50 blows for 1 inch.
ROCK FRAGMENTS	Angular pieces of rock which have separated from original vein or strata and are present in a soil matrix. Only used in residual soils
QUARTZ	A hard silicate mineral often found in residual soils. Only used when describing residual soils.
CEMENTED SAND	Usually localized rock-like deposits within a soil stratum composed of sand grains cemented by calcium carbonate, iron oxide, or other minerals. Commonly encountered in Coastal Plain sediments, primarily in the Potomac Group sands (Kps).
MICACEOUS	A term used to describe soil that "glitters" or is shiny. Most commonly encountered in fine-grained soils.
ORGANIC MATERIALS (Excluding Peat)	Topsoil - Surface soils that support plant life and contain organic matter. Lignite - Hard, brittle decomposed organic matter with low fixed carbon content (a low grade of coal).
FILL	Man-made deposit containing soil, rock, and other foreign matter.
CONTAINS	This is used when a fill deposit contains a secondary component that does not apply to a USCS classification. Only used for fill deposits
WITH	This is used when a residual soil contains a secondary component that does not contribute to its USCS classification. Only used for natural soils.
PROBABLE FILL	Soils which contain no visually detected foreign matter but which are suspect with regard to origin.
LAYERS	½ to 12 inch seam of minor soil component.
COLOR	Two most predominant colors present should be described.
MOISTURE CONDITIONS	Wet, moist, or dry to indicate visual appearance of specimen.

GeoConcepts Engineering, Inc.

Test Boring Notes

1. Classification of soil is by visual inspection and is in accordance with the Unified Soil Classification System.

2. Estimated groundwater levels are indicated on the logs. These are only estimates from available data and may vary with precipitation, porosity of soil, site topography, etc.

3. Sampling data presents standard penetrations for 6-inch intervals or as indicated with graphic representations adjacent to the sampling data.

4. The logs and related information depict subsurface conditions at the specific locations and at the particular time when drilled. Soil conditions at other locations may differ from conditions occurring at the test locations. Also, the passage of time may result in a change in the subsurface conditions at the test locations.

5. The stratification lines represent the approximate boundary between soil types as determined in the sampling operation. Some variation may be expected vertically between samples taken. The soil profile, groundwater level observations and penetration resistances presented on the logs have been made with reasonable care and accuracy and must be considered only an approximate representation of subsurface conditions to be encountered at the particular location.

6. Weathered rock is defined as residual earth material with a penetration resistance between 60 blows per foot and refusal. Spoon refusal at the surface of rock, boulders, or obstructions is defined as a penetration resistance of 50 blows for 0 inches penetration. Auger refusal is taken as the depth at which further penetration of the auger is not possible without risking significant damage to the drilling equipment.

GeoConcepts Engineering, Inc.

19955 Highland Vista Dr., 170
Ashburn, Virginia 20147

703-726-8030
703-726-8032 fax

PROJECT: **Patriot Park**	LOGGED BY: **K. Thuya**	BORING NUMBER: **B-1**
LOCATION: **Braddock Road & Willow Springs School Road, Fairfax, VA**	DRILLING CONTRACTOR: **Connelly and Associates, Inc.**	SHEET 1 OF 1
OWNER/CLIENT: **Pennoni Associates, Inc.**	DRILLER: **Nadal A.**	DATES DRILLED: **11/4/14 - 11/4/14**
PROJECT NUMBER: **12214** / GROUND SURFACE ELEVATION (ft): **433.7**	DRILLING METHOD: **2.25" I.D. HSA**	OFFSET NOTES:

ELEV. (ft)	DEPTH (ft)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	SOIL: SPT BLOW COUNTS	REC (in)	MC (%)
433.7					Topsoil = 0.67ft.			
433.0					*Residual*, brown, **f**, sandy SILT, moist, **ML**	2+2+3+6	20	6.8
430.2					Gray	4+5+7	18	
428.7	5				Gray and light brown	5+6+8	16	
	10					6+9+11	18	
420.2		B1			Gray	6+9+10	18	8.4
	15							
415.2					Gray and brown	4+6+11	18	
	20							
	25					18+22+26	18	
					Bottom of Boring at 25.0 ft			

STANDARD PENETRATION TEST RESISTANCE (BPF): 20 40 60 80

GROUND WATER LEVELS:

NOT ENCOUNTERED DURING DRILLING

NOT ENCOUNTERED UPON COMPLETION — CAVED: 17.5 ft ELEV. 416.2

11/6/2014: NOT ENCOUNTERED AFTER DRILLING

SAMPLE TYPES: Split Spoon

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

BOREHOLE/TEST PIT LOGS.GPJ TRAINING 8_14A.GPJ 11/24/14

GeoConcepts Engineering, Inc.
19955 Highland Vista Dr., 170
Ashburn, Virginia 20147
703-726-8030
703-726-8032 fax

PROJECT:	LOGGED BY:	BORING NUMBER:
Patriot Park	K. Thuya	B-2
LOCATION: Braddock Road & Willow Springs School Road, Fairfax, VA	DRILLING CONTRACTOR: Connelly and Associates, Inc.	SHEET 1 OF 1
OWNER/CLIENT: Pennoni Associates, Inc.	DRILLER: Nadal A.	DATES DRILLED: 11/4/14 - 11/4/14
PROJECT NUMBER: 12214 / GROUND SURFACE ELEVATION (ft): 419.2	DRILLING METHOD: 2.25" I.D. HSA	OFFSET NOTES:

ELEV. (ft)	DEPTH (ft)	SAMPLE TYPE	STRATUM	MATERIAL DESCRIPTION	SPT BLOW COUNTS	REC (in)	MC (%)
419.2				Topsoil = 0.58ft.			
418.6			B1	*Residual*, brown, **f**, sandy SILT, micaceous, moist, **ML**	1+3+3+5	22	
417.2				*Residual*, brown, **f-m**, silty SAND, micaceous, moist, **SM**	3+5+7	18	
414.2	5			Dark brown and gray	2+4+7	18	7.9
410.7				Light brown	5+6+5	16	
	10		B2		1+1+3	12	
	15						
400.7				**F-c**	3+6+8	18	
	20						
	25				4+5+6	18	10.1
				Bottom of Boring at 25.0 ft			

SOIL — STANDARD PENETRATION TEST RESISTANCE (BPF): 20 40 60 80

GROUND WATER LEVELS:
NOT ENCOUNTERED DURING DRILLING
NOT ENCOUNTERED UPON COMPLETION — CAVED: 17.3 ft — ELEV. 401.9
11/6/2014 — 15.9 ft — ELEV. 403.3

SAMPLE TYPES: Split Spoon

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

BOREHOLE/TEST PIT LOGS.GPJ TRAINING 8_14A.GPJ 11/24/14

GeoConcepts Engineering, Inc.
19955 Highland Vista Dr., 170
Ashburn, Virginia 20147
703-726-8030
703-726-8032 fax

PROJECT:	LOGGED BY:	BORING NUMBER:
Patriot Park	K. Thuya	B-3
LOCATION: Braddock Road & Willow Springs School Road, Fairfax, VA	DRILLING CONTRACTOR: Connelly and Associates, Inc.	SHEET 1 OF 1
OWNER/CLIENT: Pennoni Associates, Inc.	DRILLER: Nadal A.	DATES DRILLED: 11/3/14 - 11/3/14
PROJECT NUMBER: 12214 / GROUND SURFACE ELEVATION (ft): 447.9	DRILLING METHOD: 2.25" I.D. HSA	OFFSET NOTES:

ELEV. (ft)	DEPTH (ft)	SAMPLE TYPE	STRATUM	MATERIAL DESCRIPTION	SPT BLOW COUNTS	REC (in)	MC (%)
447.9				Topsoil = 0.17ft.			
447.7				*Fill*, dark brown, sandy SILT, micaceous, moist, **ML**	5+6+10+10	24	
					4+6+6	18	
442.9	5		A	*Fill*, dark brown and gray, sandy LEAN CLAY, micaceous, moist, **CL**	2+2+4	18	21.3
439.4				Contains wood	2+3+2	16	
	10						
434.4				*Residual*, brown, silty GRAVEL with sand, micaceous, moist, **GM**	4+5+6	16	
	15						
			B2		5+6+11	12	
	20						
424.4			B1	*Residual*, brown, sandy SILT, micaceous, moist, **ML**	6+7+9	16	0.4
	25			Bottom of Boring at 25.0 ft			

SOIL — STANDARD PENETRATION TEST RESISTANCE (BPF): 20 40 60 80

GROUND WATER LEVELS:
NOT ENCOUNTERED DURING DRILLING
NOT ENCOUNTERED UPON COMPLETION — CAVED: 18.0 ft — ELEV. 429.9
11/4/2014: NOT ENCOUNTERED AFTER DRILLING

SAMPLE TYPES: Split Spoon

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

BOREHOLE/TEST PIT LOGS.GPJ TRAINING 8_14A.GPJ 11/24/14

GeoConcepts Engineering, Inc.
19955 Highland Vista Dr., 170
Ashburn, Virginia 20147
703-726-8030
703-726-8032 fax

PROJECT:	LOGGED BY:	BORING NUMBER:
Patriot Park	K. Thuya	B-4
LOCATION: Braddock Road & Willow Springs School Road, Fairfax, VA	DRILLING CONTRACTOR: Connelly and Associates, Inc.	SHEET 1 OF 1
OWNER/CLIENT: Pennoni Associates, Inc.	DRILLER: Nadal A.	DATES DRILLED: 11/3/14 - 11/3/14
PROJECT NUMBER: 12214 / GROUND SURFACE ELEVATION (ft): 443.5	DRILLING METHOD: 2.25" I.D. HSA	OFFSET NOTES:

ELEV. (ft)	DEPTH (ft)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	SOIL: SPT BLOW COUNTS	REC (in)	STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80	MC (%)
443.5					Topsoil = 0.5ft.				
443.0			B1		*Residual*, brown, **f-m**, sandy SILT, micaceous, moist, **ML**	2+3+5+5	22		
441.0					*Residual*, brown, **f-m**, silty SAND, micaceous, moist, **SM**	4+5+8	10		6.2
	5					5+7+7	12		
	10					4+6+5	16		
			B2			7+10+12	18		21.7
	15								
425.0						8+16+18	18		
	20								
	25				Bottom of Boring at 25.0 ft	8+10+11	18		4.7

GROUND WATER LEVELS:
NOT ENCOUNTERED DURING DRILLING
NOT ENCOUNTERED UPON COMPLETION — CAVED: 25.0 ft ELEV. 418.5
11/4/2014: NOT ENCOUNTERED AFTER DRILLING

SAMPLE TYPES: Split Spoon

REMARKS: Installed temporary standpipe.
Offset 4.0 ft. east due to tree and branches.

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

BOREHOLE/TEST PIT LOGS.GPJ TRAINING 8_14A.GPJ 11/24/14

GeoConcepts Engineering, Inc.
19955 Highland Vista Dr., 170
Ashburn, Virginia 20147
703-726-8030
703-726-8032 fax

PROJECT:	LOGGED BY:	BORING NUMBER:
Patriot Park	K. Thuya	B-5
LOCATION: Braddock Road & Willow Springs School Road, Fairfax, VA	DRILLING CONTRACTOR: Connelly and Associates, Inc.	SHEET 1 OF 1
OWNER/CLIENT: Pennoni Associates, Inc.	DRILLER: Nadal A.	DATES DRILLED: 11/3/14 - 11/3/14
PROJECT NUMBER: 12214 / GROUND SURFACE ELEVATION (ft): 420.7	DRILLING METHOD: 2.25" I.D. HSA	OFFSET NOTES:

ELEV. (ft)	DEPTH (ft)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	SOIL: SPT BLOW COUNTS	REC (in)	STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80
420.7					Topsoil = 0.67ft.			
420.0					*Residual*, brown, **f**, sandy SILT, moist, **ML**	1+2+2+4	22	
						3+3+4	18	
	5					2+3+4	18	
	10					6+5+8	12	
			B1			4+5+7	18	
	15							
402.2					*Residual*, light green, **f**, FAT CLAY with sand, moist, **CH**	2+3+3	18	
	20							
	25				Bottom of Boring at 25.0 ft	3+5+8	8	

GROUND WATER LEVELS:
NOT ENCOUNTERED DURING DRILLING
NOT ENCOUNTERED UPON COMPLETION — CAVED: 19.0 ft ELEV. 401.7
11/4/2014: NOT ENCOUNTERED AFTER DRILLING

SAMPLE TYPES: Split Spoon

REMARKS: Offset 5.0 ft. west due to trees.

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

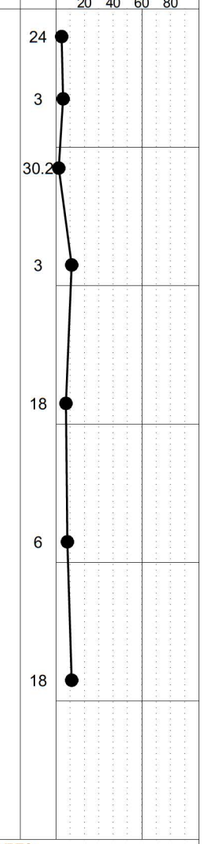
BOREHOLE/TEST PIT LOGS.GPJ TRAINING 8_14A.GPJ 11/24/14

GeoConcepts Engineering, Inc.
19955 Highland Vista Dr., 170
Ashburn, Virginia 20147
703-726-8030
703-726-8032 fax

PROJECT:	LOGGED BY:	BORING NUMBER:
Patriot Park	K. Thuya	B-6
LOCATION: Braddock Road & Willow Springs School Road, Fairfax, VA	DRILLING CONTRACTOR: Connelly and Associates, Inc.	SHEET 1 OF 1
OWNER/CLIENT: Pennoni Associates, Inc.	DRILLER: Nadal A.	DATES DRILLED: 11/3/14 - 11/3/14
PROJECT NUMBER: 12214 / GROUND SURFACE ELEVATION (ft): 429.1	DRILLING METHOD: 2.25" I.D. HSA	OFFSET NOTES:

ELEV. (ft)	DEPTH (ft)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	PID (ppm)	SPT BLOW COUNTS	REC (in)
429.1					Topsoil = 0.5ft.			
428.6					*Fill*, black and brown, **f-m**, sandy SILT with gravel, moist, **ML**		2+2+2+3	24
							2+2+3	3
424.1	5		A		*Fill*, dark gray, **f-m**, sandy LEAN CLAY, moist, **CL**		2+1+1	30.2
							6+6+5	3
415.6	10				*Residual*, gray, **f**, sandy SILT, micaceous, moist, **ML**		2+3+4	18
	15							
	20		B1			23.2	3+3+5	6
	25				Bottom of Boring at 25.0 ft		4+5+6	18

SOIL — STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80



GROUND WATER LEVELS:

NOT ENCOUNTERED DURING DRILLING

NOT ENCOUNTERED UPON COMPLETION — CAVED: 18.0 ft ELEV. 411.1

▼ 11/4/2014 — 11.5 ft ELEV. 417.6

SAMPLE TYPES: ☒ Split Spoon

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

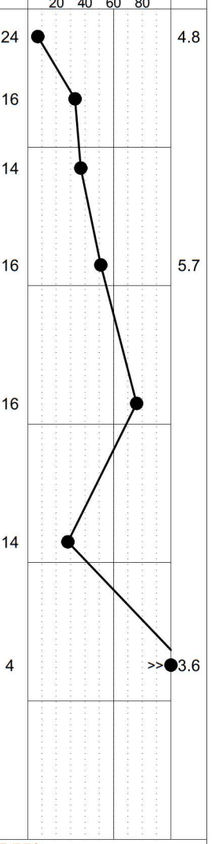
BOREHOLE/TEST PIT LOGS.GPJ TRAINING 8_14A.GPJ 11/24/14

GeoConcepts Engineering, Inc.
19955 Highland Vista Dr., 170
Ashburn, Virginia 20147
703-726-8030
703-726-8032 fax

PROJECT:	LOGGED BY:	BORING NUMBER:
Patriot Park	K. Thuya	B-7
LOCATION: Braddock Road & Willow Springs School Road, Fairfax, VA	DRILLING CONTRACTOR: Connelly and Associates, Inc.	SHEET 1 OF 1
OWNER/CLIENT: Pennoni Associates, Inc.	DRILLER: Nadal A.	DATES DRILLED: 11/3/14 - 11/3/14
PROJECT NUMBER: 12214 / GROUND SURFACE ELEVATION (ft): 408.5	DRILLING METHOD: 2.25" I.D. HSA	OFFSET NOTES:

ELEV. (ft)	DEPTH (ft)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	SPT BLOW COUNTS	REC (in)	MC (%)
408.5			B1		*Residual*, gray and brown, **f-c**, sandy SILT with gravel, moist, **ML**	3+3+4+6	24	4.8
406.0					*Residual*, gray and brown, **f-c**, clayey SAND, moist, **SC**	9+13+20	16	
403.5	5				With gravel	22+18+19	14	
	10		B2			9+20+31	16	5.7
	15					21+33+43	16	
	20					21+11+17	14	
385.0			B3		*Weathered rock*, gray and brown, **f-c**, silty SAND with gravel, moist, **SM**	50/4	4	>>3.6
	25				Bottom of Boring at 23.9 ft			

SOIL — STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80



GROUND WATER LEVELS:

▽ ENCOUNTERED: 10.0 ft ELEV. 398.5

▼ UPON COMPLETION: 9.0 ft ELEV. 399.5 — CAVED: 10.0 ft ELEV. 398.5

▼ 11/4/2014 — 7.5 ft ELEV. 401.0

SAMPLE TYPES: ☒ Split Spoon

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

BOREHOLE/TEST PIT LOGS.GPJ TRAINING 8_14A.GPJ 11/24/14

Appendix B
Soil Laboratory Results

Liquid Limit and Grain Size Analysis Test Data . . . 48
Texture Analysis Test Data 54
Asbestos Test Results 55

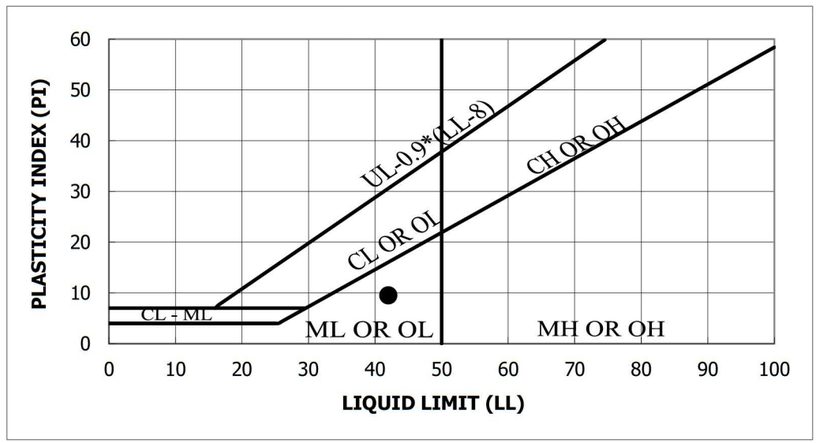
Supplemental Detail

Figure 2: Compacted Structural Fill Diagram 56

GeoConcepts Engineering, Inc.
19955 Highland Vista Dr., Suite 170
Ashburn, Virginia 20147
(703) 726-8030
www.geoconcepts-eng.com

LIQUID AND PLASTIC LIMIT - ASTM D4318

Project No.	12214	**Project Name**	Patriot Park
Test Boring No.	B-2	**Depth (Feet)**	5.0'-6.5'
Lab Order No.	3427-3	**Date**	11/18/2014



Material Description	LL	PL	PI	% Passing #4	% Passing #200	USCS	w (%)
SILTY SAND	42	32	10	100.0	36.4	SM	17.9
Color	Dark Brownish Gray		AASHTO Classification			A-5	

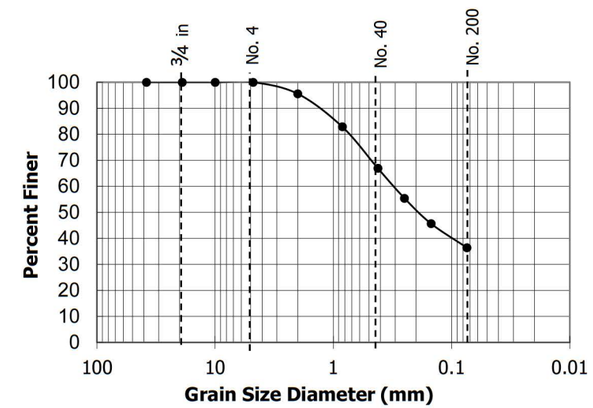
Test Method: ASTM D 4318
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by _____ Reviewed by _____

GeoConcepts Engineering, Inc.
19955 Highland Vista Dr., Suite 170
Ashburn, Virginia 20147
(703) 726-8030
www.geoconcepts-eng.com

GRAIN SIZE ANALYSIS - ASTM D422

Project No.	12214	**Project Name**	Patriot Park
Test Boring No.	B-2	**Depth (Feet)**	5.0'-6.5'
Lab Order No.	3427-3	**Date**	11/18/2014



SIEVE	% Passing
1 ½ "	**100**
3/4"	**100**
3/8"	**100**
#4	**100**
#10	**96**
#20	**83**
#40	**67**
#60	**55**
#100	**46**
#200	**36**
Pan	**--**

USCS Group Symbol	**SM**
USCS Group Name	**SILTY SAND**
Cu	**---**
Cc	**---**
LL	**42**
PI	**10**
Gravel	**0.0**
Sand	**63.6**
Fines	**36.4**
AASHTO Classification	**A-5**
Color	**Dark Brownish Gray**

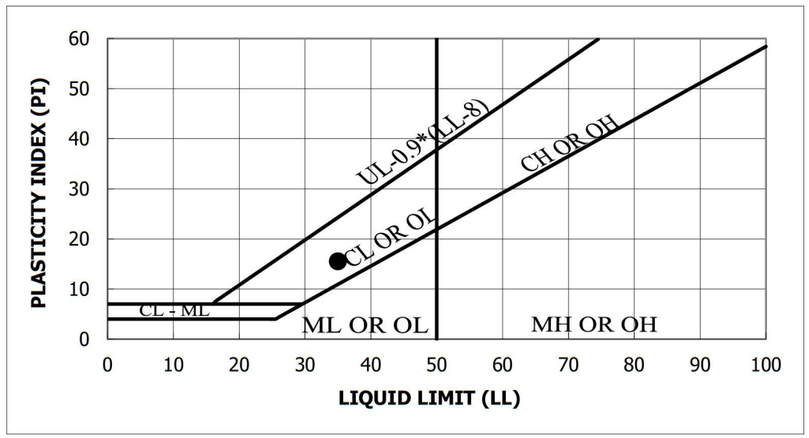
Test Method: ASTM D 422
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by:_____ Reviewed by: _____

GeoConcepts Engineering, Inc.
19955 Highland Vista Dr., Suite 170
Ashburn, Virginia 20147
(703) 726-8030
www.geoconcepts-eng.com

LIQUID AND PLASTIC LIMIT - ASTM D4318

Project No.	12214	**Project Name**	Patriot Park
Test Boring No.	B-3	**Depth (Feet)**	5.0'-6.5'
Lab Order No.	3427-5	**Date**	11/18/2014



Material Description	LL	PL	PI	% Passing #4	% Passing #200	USCS	w (%)
sandy Lean Clay	35	19	16	91.8	69.3	CL	21.3
Color	Dark Brownish Gray		AASHTO Classification			A-6	

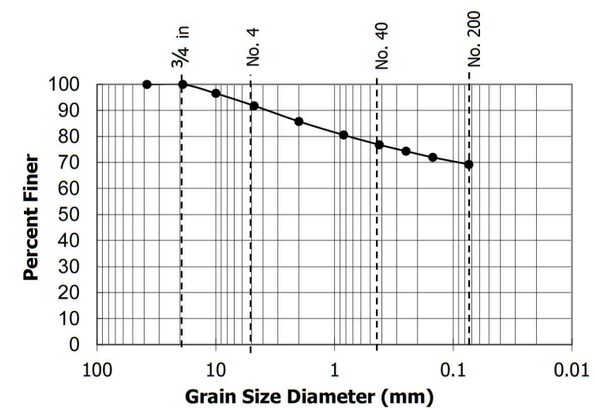
Test Method: ASTM D 4318
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by _____ Reviewed by _____

GeoConcepts Engineering, Inc.
19955 Highland Vista Dr., Suite 170
Ashburn, Virginia 20147
(703) 726-8030
www.geoconcepts-eng.com

GRAIN SIZE ANALYSIS - ASTM D422

Project No.	12214	**Project Name**	Patriot Park
Test Boring No.	B-3	**Depth (Feet)**	5.0'-6.5'
Lab Order No.	3427-5	**Date**	11/18/2014



SIEVE	% Passing
1 ½ "	**100**
3/4"	**100**
3/8"	**97**
#4	**92**
#10	**86**
#20	**81**
#40	**77**
#60	**74**
#100	**72**
#200	**69**
Pan	**--**

USCS Group Symbol	**CL**
USCS Group Name	**sandy Lean Clay**
Cu	**---**
Cc	**---**
LL	**35**
PI	**16**
Gravel	**8.2**
Sand	**22.5**
Fines	**69.3**
AASHTO Classification	**A-6**
Color	**Dark Brownish Gray**

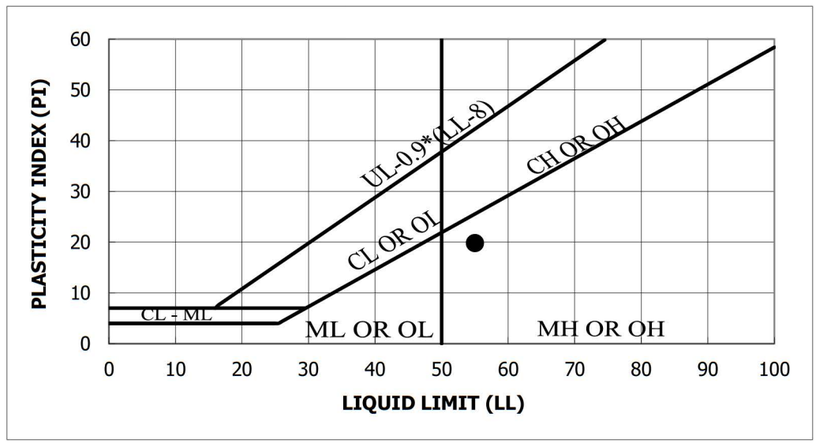
Test Method: ASTM D 422
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by:_____ Reviewed by: _____

GeoConcepts Engineering, Inc.
19955 Highland Vista Dr., Suite 170
Ashburn, Virginia 20147
(703) 726-8030
www.geoconcepts-eng.com

LIQUID AND PLASTIC LIMIT - ASTM D4318

Project No.	12214	**Project Name**	Patriot Park
Test Boring No.	B-4	**Depth (Feet)**	2.5'-4.0'
Lab Order No.	3427-7	**Date**	11/18/2014



Material Description	LL	PL	PI	% Passing #4	% Passing #200	USCS	w (%)
SILTY SAND	55	35	20	96.1	45.6	SM	16.2
Color	Brown		AASHTO Classification			A-7-5	

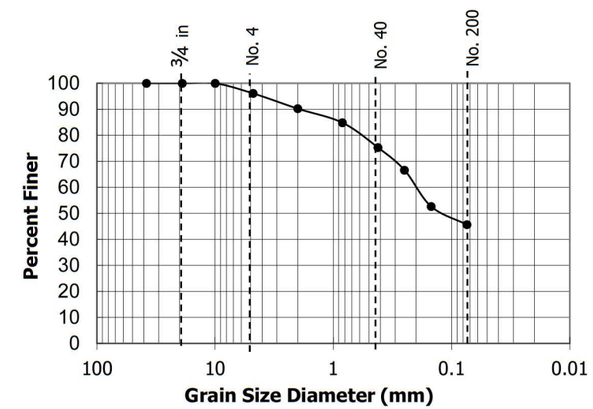
Test Method: ASTM D 4318
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by _____ Reviewed by _____

GeoConcepts Engineering, Inc.
19955 Highland Vista Dr., Suite 170
Ashburn, Virginia 20147
(703) 726-8030
www.geoconcepts-eng.com

GRAIN SIZE ANALYSIS - ASTM D422

Project No.	12214	**Project Name**	Patriot Park
Test Boring No.	B-4	**Depth (Feet)**	2.5'-4.0'
Lab Order No.	3427-7	**Date**	11/18/2014



SIEVE	% Passing
1 ½ "	**100**
3/4"	**100**
3/8"	**100**
#4	**96**
#10	**90**
#20	**85**
#40	**75**
#60	**67**
#100	**53**
#200	**46**
Pan	**--**

USCS Group Symbol	**SM**
USCS Group Name	**SILTY SAND**
Cu	**---**
Cc	**---**
LL	**55**
PI	**20**
Gravel	**3.9**
Sand	**50.5**
Fines	**45.6**
AASHTO Classification	**A-7-5**
Color	**Brown**

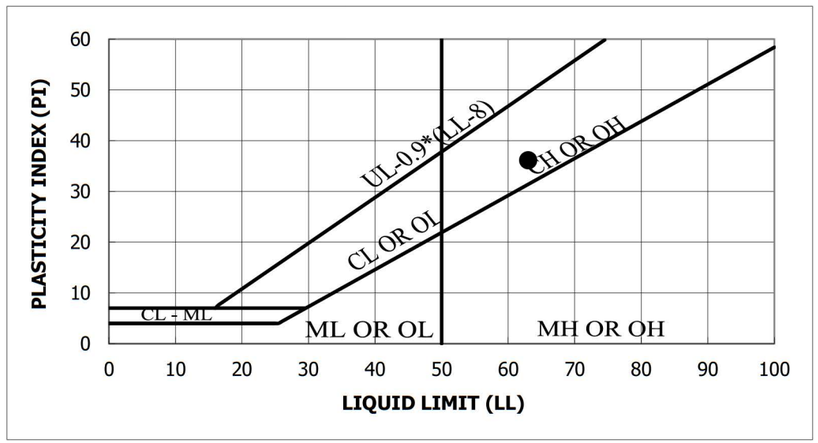
Test Method: ASTM D 422
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by:_____ Reviewed by: _____

GeoConcepts Engineering, Inc.
19955 Highland Vista Dr., Suite 170
Ashburn, Virginia 20147
(703) 726-8030
www.geoconcepts-eng.com

LIQUID AND PLASTIC LIMIT - ASTM D4318

Project No.	12214	**Project Name**	Patriot Park
Test Boring No.	B-5	**Depth (Feet)**	18.5'-20
Lab Order No.	3427-11	**Date**	11/18/2014



Material Description	LL	PL	PI	% Passing #4	% Passing #200	USCS	w (%)
Fat Clay with sand	63	27	36	99.6	84.5	CH	49.0
Color	Light Olive		AASHTO Classification			A-7-6	

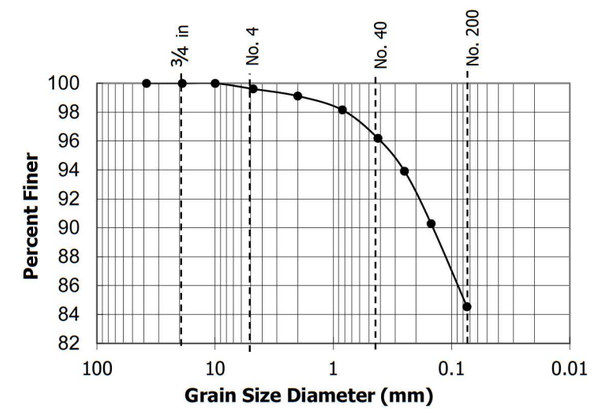
Test Method: ASTM D 4318
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by _____ Reviewed by _____

GeoConcepts Engineering, Inc.
19955 Highland Vista Dr., Suite 170
Ashburn, Virginia 20147
(703) 726-8030
www.geoconcepts-eng.com

GRAIN SIZE ANALYSIS - ASTM D422

Project No.	12214	**Project Name**	Patriot Park
Test Boring No.	B-5	**Depth (Feet)**	18.5'-20
Lab Order No.	3427-11	**Date**	11/18/2014



SIEVE	% Passing
1 ½ "	**100**
3/4"	**100**
3/8"	**100**
#4	**100**
#10	**99**
#20	**98**
#40	**96**
#60	**94**
#100	**90**
#200	**85**
Pan	**--**

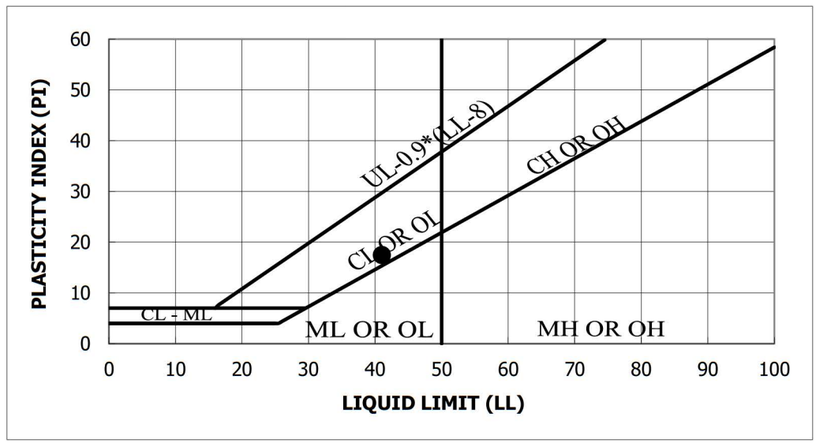
USCS Group Symbol	**CH**
USCS Group Name	**Fat Clay with sand**
Cu	**---**
Cc	**---**
LL	**63**
PI	**36**
Gravel	**0.4**
Sand	**15.1**
Fines	**84.5**
AASHTO Classification	**A-7-6**
Color	**Light Olive**

Test Method: ASTM D 422
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by:_____ Reviewed by: _____

GeoConcepts Engineering, Inc.
19955 Highland Vista Dr., Suite 170
Ashburn, Virginia 20147
(703) 726-8030
www.geoconcepts-eng.com

LIQUID AND PLASTIC LIMIT - ASTM D4318			
Project No.	12214	**Project Name**	Patriot Park
Test Boring No.	B-6	**Depth (Feet)**	5.0'-6.5'
Lab Order No.	3427-12	**Date**	11/18/2014



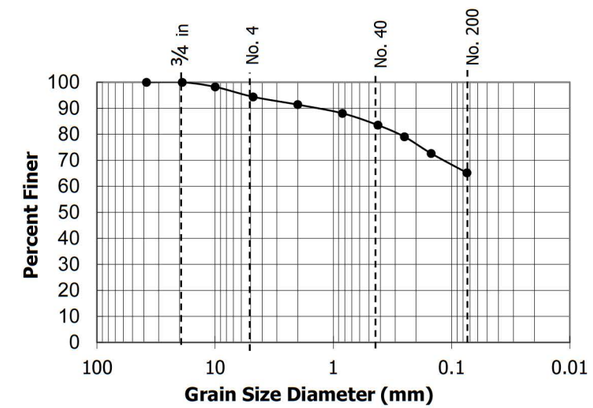
Material Description	LL	PL	PI	% Passing		USCS	w (%)
				#4	#200		
sandy Lean Clay	41	24	17	94.4	65.2	CL	30.2
Color	Dark Gray		AASHTO Classification			A-7-6	

Test Method: ASTM D 4318
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by _____ Reviewed by _____

GeoConcepts Engineering, Inc.
19955 Highland Vista Dr., Suite 170
Ashburn, Virginia 20147
(703) 726-8030
www.geoconcepts-eng.com

GRAIN SIZE ANALYSIS - ASTM D422			
Project No.	12214	**Project Name**	Patriot Park
Test Boring No.	B-6	**Depth (Feet)**	5.0'-6.5'
Lab Order No.	3427-12	**Date**	11/18/2014



SIEVE	% Passing
1 ½ "	**100**
3/4"	**100**
3/8"	**98**
#4	**94**
#10	**91**
#20	**88**
#40	**84**
#60	**79**
#100	**73**
#200	**65**
Pan	**--**

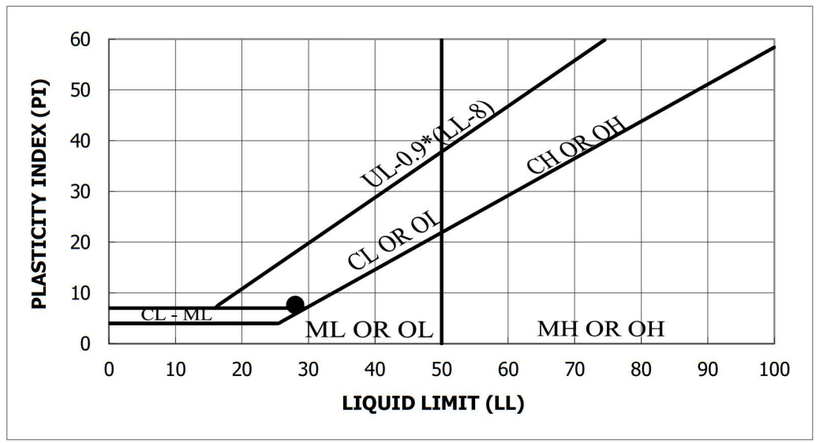
USCS Group Symbol	**CL**
USCS Group Name	**sandy Lean Clay**
Cu	**---**
Cc	**---**
LL	**41**
PI	**17**
Gravel	**5.6**
Sand	**29.2**
Fines	**65.2**
AASHTO Classification	**A-7-6**
Color	**Dark Gray**

Test Method: ASTM D 422
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by:_____ Reviewed by: _____

GeoConcepts Engineering, Inc.
19955 Highland Vista Dr., Suite 170
Ashburn, Virginia 20147
(703) 726-8030
www.geoconcepts-eng.com

LIQUID AND PLASTIC LIMIT - ASTM D4318			
Project No.	12214	**Project Name**	Patriot Park
Test Boring No.	B-7	**Depth (Feet)**	8.5' - 10'
Lab Order No.	3427-15	**Date**	11/18/2014



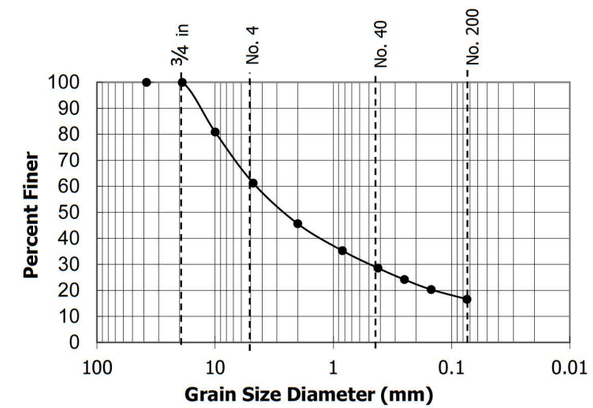
Material Description	LL	PL	PI	% Passing		USCS	w (%)
				#4	#200		
CLAYEY SAND with gravel	28	20	8	61.2	16.6	SC	5.7
Color	Dark Gray		AASHTO Classification			A-2-4	

Test Method: ASTM D 4318
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by _____ Reviewed by _____

GeoConcepts Engineering, Inc.
19955 Highland Vista Dr., Suite 170
Ashburn, Virginia 20147
(703) 726-8030
www.geoconcepts-eng.com

GRAIN SIZE ANALYSIS - ASTM D422			
Project No.	12214	**Project Name**	Patriot Park
Test Boring No.	B-7	**Depth (Feet)**	8.5' - 10'
Lab Order No.	3427-15	**Date**	11/18/2014



SIEVE	% Passing
1 ½ "	**100**
3/4"	**100**
3/8"	**81**
#4	**61**
#10	**46**
#20	**35**
#40	**29**
#60	**24**
#100	**20**
#200	**17**
Pan	**--**

USCS Group Symbol	**SC**
USCS Group Name	**CLAYEY SAND with gravel**
Cu	**---**
Cc	**---**
LL	**28**
PI	**8**
Gravel	**38.8**
Sand	**44.6**
Fines	**16.6**
AASHTO Classification	**A-2-4**
Color	**Dark Gray**

Test Method: ASTM D 422
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by:_____ Reviewed by: _____

A&L Eastern Laboratories

7621 Whitepine Road Richmond, Virginia 23237 (804) 743-9401 Fax (804) 271-6446

www.aleastern.com

TEXTURE ANALYSIS

Client : GEOCONCEPTS ENGINEERING SUITE 170 19955 HIGHLAND VISTA DR ASHBURN, VA 20147	Grower : PATRIOT PARK PHASE 1&2 PROJ #12214 BRADDOCK RD AND FIRST RD Farm:	Report No : 14-316-0606 Cust No : 74328 Date Printed : 11/14/2014 Page : 1 of 1 Submitted By : ASHLEY HOGAN Date Received : 11/12/2014

Lab No	Field ID	Sample Identification	Percent Sand	Percent Silt	Percent Clay	Textural Classification
14458		B-75-6.5	64.4	24.8	10.8	Sandy Loam
14459		B-15-6.5	42.4	46.8	10.8	Loam

Analysis prepared by: A&L Eastern Laboratories, Inc.

Please Reply To:

AmeriSci Richmond
13635 GENITO ROAD
MIDLOTHIAN, VIRGINIA 23112
TEL: (804) 763-1200 • FAX: (804) 763-1800

FACSIMILE TELECOPY TRANSMISSION

To: Ashley Hogan
GeoConcepts Engineering, Inc.
Fax #:
Email: ahogan@geocapeng.com

From: T. Brian Keith
AmeriSci Job #: 114111491
Subject: Chatfield 5 day Results
Client Project: 12214; Patriot Park

Date: Monday, November 17, 2014
Time: 13:20:58
Comments:

Number of Pages: _____
(including cover sheet)

CONFIDENTIALITY NOTICE: Unless otherwise indicated, the information contained in this communication is confidential information intended for use of the individual named above. If the reader of this communication is not the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is prohibited. If you have received this communication in error, please immediately notify the sender by telephone and return the original message to the above address via the US Postal Service at our expense. Preliminary data reported here will be verified before final report is issued. Samples are disposed of in 60 days or unless otherwise instructed by the protocol or special instructions in writing. Thank you.

Certified Analysis ***Service 24 Hours A Day • 7 Days A Week*** ***Competitive Prices***

visit our web site - www.amerisci.com

Boston • Los Angeles • New York • Richmond

AmeriSci Job #: **114111491**

Client Name: GeoConcepts Engineering, Inc.

Table I
Summary of Bulk Asbestos Analysis Results by EPA 600/R-93/116

12214; Patriot Park

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by TEM
01	B-1		0.941	3.5	3.5	93.0	NAD
Location: 23.5' - 25'							
02	B-2		0.685	4.0	0.3	95.7	NAD
Location: 23.5' - 25'							
03	B-6		0.483	3.8	0.8	95.4	NAD
Location: 23.5 - 25'							
04	B-7		0.426	3.0	0.2	96.8	NAD
Location: 23.5 - 23.9'							

Reviewed by: _____ Date Reviewed: 11-17-14 Analyzed By: T. Brian Keith _____ Date Analyzed: 11/17/2014

Semi-Quantitative Analysis: NAD = no asbestos detected; NA = not analyzed; NA/PS = not analyzed due to positive stop; Trace = <1%;
PLM analysis by EPA 600/M4-82-020 per 40 CFR 763 (NVLAP Lab Code 101904-0) or NY ELAP 198.1 for New York friable samples which includes quantitation of any vermiculite observed (198.6 for NOB samples) (NY ELAP Lab # 10984);
TEM analysis by EPA 600/R-93/116 (not covered by NVLAP Bulk accreditation); or NY ELAP 198.4 for New York NOB samples (NY ELAP Lab # 10984);

** Warning Notes: Consider PLM fiber diameter limitation, only TEM will resolve fibers <0.25 micrometers in diameter. TEM bulk analysis is representative of the fine grained matrix material and may not be representative of non-uniformly dispersed debris, soils or other heterogeneous materials for which a combination PLM/TEM evaluation is recommended; Quantitation for beginning weights of <0.1 grams should be considered as qualitative only.

AMERISCI America's Laboratory

CHAIN OF CUSTODY RECORD

AMERISCI RICHMOND Job No.: 114111491

AMERISCI RICHMOND
13635 GENITO ROAD
MIDLOTHIAN, VA 23112
PHONE: (804) 763-1200
FAX: (804) 763-1800
TOLL FREE: (800) 476-5227
www.amerisci.com

PROJECT INFORMATION
JOB NAME: Patriot Park
JOB NO.: 12214
JOB MANAGER: Ashley Hogan
JOB DESCRIPTION:

P.O.#:
SPECIAL INSTRUCTIONS:

ANALYSIS TYPE	TURNAROUND TIME (X) 6-8 HR	12 HR	24 HR	48 HR	72 HR	5 DAY	OTHER	AIR FILTER INFORMATION:
TEM/AHERA								MCE
TEM/LEVEL II								PC
TEM/7402								25 mm
TEM/BULK						X		37 mm
TEM/DUST								0.45 um
TEM/WATER								0.80 um
PLM								OTHER:
PCM								
OTHER:								

RESULTS TO: GeoCapitol
EMAIL RESULTS: (Y) / N EMAIL ADDRESS: AHogan@GeoCapEng.com
WRITTEN REPORT TO: GeoCapitol
COMMENTS:

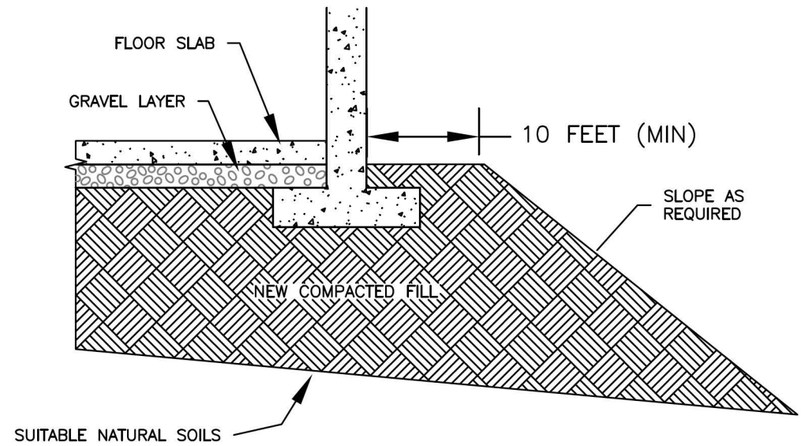
INVOICE TO: ~~GeoCapitol~~ Corporate
RETURN SAMPLES: YES ____ NO X
PHONE: 202-375-7900
FAX:
SITE FAX:
PAGER/CELL:

LAB ID	SAMPLE ID	SAMPLE LOCATION	START TIME	STOP TIME	TOTAL TIME	LITERS X /MIN. = TOTAL VOLUME	DATE COLLECTED
	B-1 23.5'-25'						11/4/14
	B-2 23.5'-25'						11/4/14
	B-6 23.5-25'						11/3/14
	B-7 23.5-23.9'						11/3/14

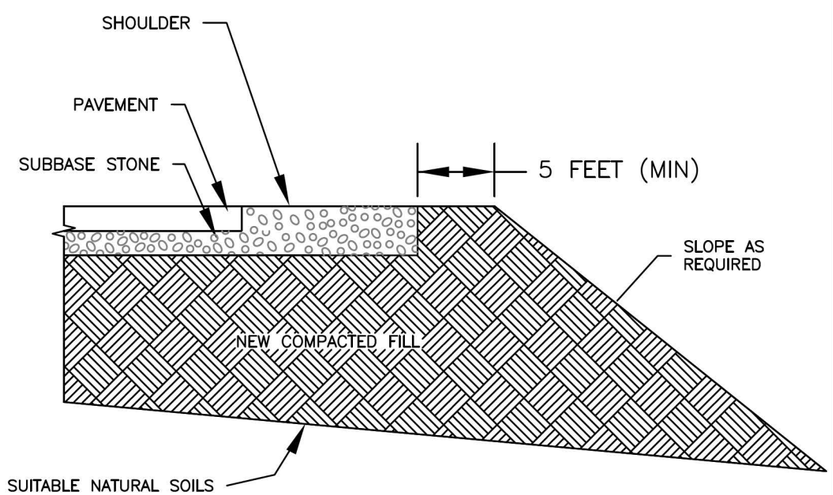
SAMPLED BY: K. Thuya DATE/TIME: 11/3/14 - 11/4/14.
RELINQUISHED BY: KThuya DATE/TIME: 11/10/14
RECEIVED BY: RECEIVED IN LAB BY: DATE/TIME:

RECEIVED NOV 13 2014

FOR BUILDINGS:



FOR PAVEMENTS:



N:\PROJECTS\Active 12 Projects\12214, Patriot Park\CAD\CSF DIAGRAM (BUILDING & PAVEMENT) 2-2-15.dwg

GeoConcepts Engineering, Inc.

19955 Highland Vista Dr., Suite 170 (703) 726-8030
Ashburn, Virginia 20147 (703) 726-8032 fax

PATRIOT PARK, WILLOW SPRINGS SCHOOL ROAD, FAIRFAX COUNTY, VIRGINIA

COMPACTED STRUCTURAL FILL DIAGRAM			Scale: N.T.S.	Fig. 2
Date: FEB. 2015	Drawn By: K.T.	Checked By: D.F.G.	Project No.: 12214	