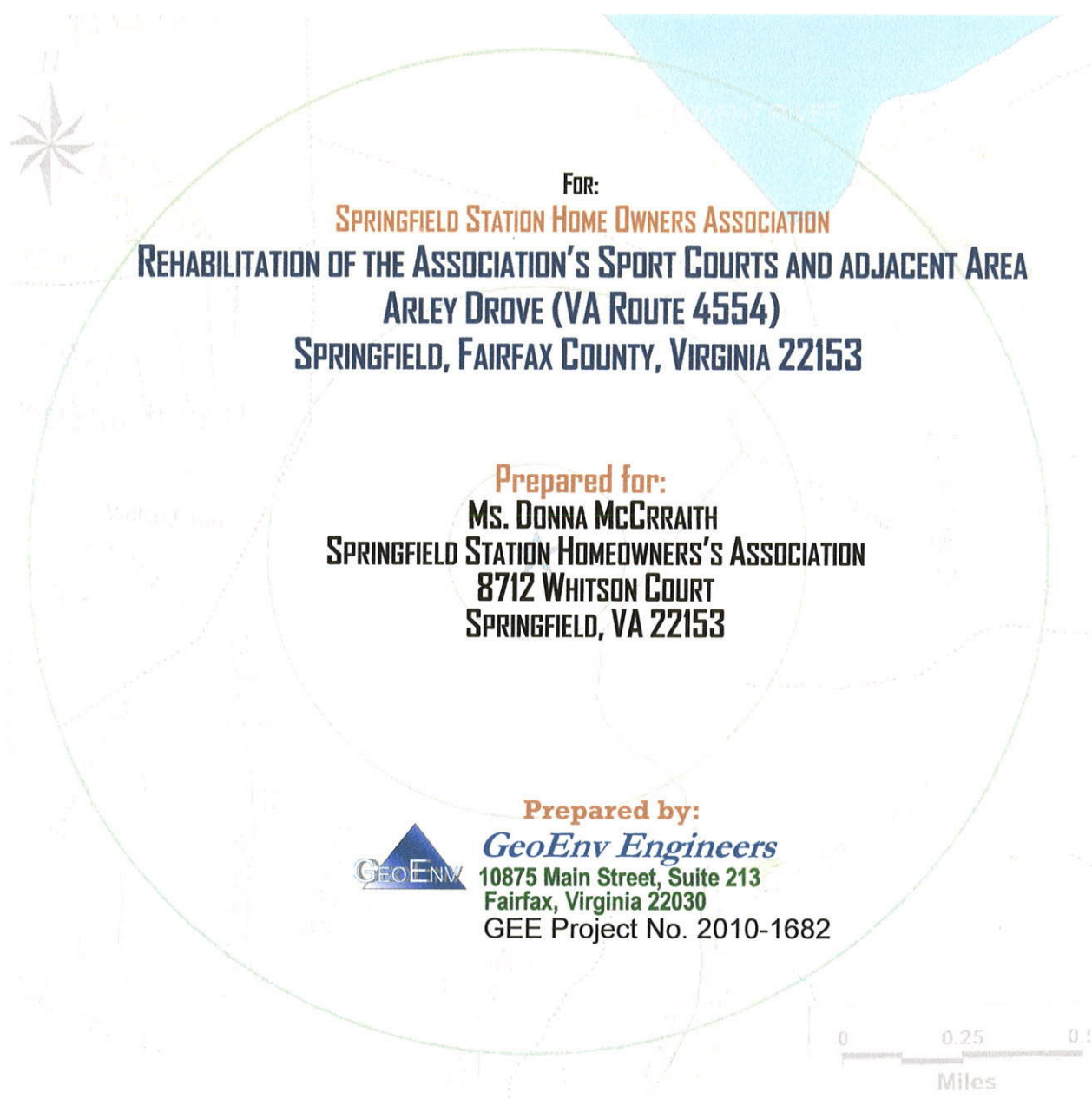


Draft Technical Memorandum



FOR:

SPRINGFIELD STATION HOME OWNERS ASSOCIATION

REHABILITATION OF THE ASSOCIATION'S SPORT COURTS AND ADJACENT AREA

ARLEY DROVE (VA ROUTE 4554)

SPRINGFIELD, FAIRFAX COUNTY, VIRGINIA 22153

Prepared for:

MS. DONNA MCCRAITH

SPRINGFIELD STATION HOMEOWNERS'S ASSOCIATION

8712 WHITSON COURT

SPRINGFIELD, VA 22153

Prepared by:



GeoEnv Engineers

10875 Main Street, Suite 213

Fairfax, Virginia 22030

GEE Project No. 2010-1682



Date:

November 18, 2010



November 18, 2010

Ms. DONNA McCRAITH
SPRINGFIELD STATION HOMEOWNERS'S ASSOCIATION
8712 WHITSON COURT
SPRINGFIELD, VIRGINIA 22153

**Re: TECHNICAL MEMORANDUM FOR THE REHABILITATION OF THE
SPRINGFIELD STATION HOMEOWNERS ASSOCIATION (SSHOA) SPORT COURT AND ADJACENT
AREAS ARLEY DRIVE (ACROSS FROM 8733 ARLEY DRIVE)
SPRINGFIELD, VA 22153
SPRINGFIELD DISTRICT: AREA: 1.804 ACRES; TAX MAP No. 89-3-((6))-A; ZONE: R-3C
GEE PROJECT No. FFC-2010-8-1682**

In accordance with the approved contract for the referenced project, **GeoEnv Engineers & Consultants, LLC** (GEE) is pleased to provide you with this technical memorandum regarding the proposed Development of a Capital Plan to upgrade the SSHOA Tennis Courts and Basketball Court located across from 8733 Arley Drive, in Springfield, Fairfax County, Virginia. The project site. The project site is known as Parcel A, Section 88, Rolling Valley, and located on the northern side of Arley Drive, in Springfield Election District, Fairfax County, Virginia 22153. The study site contains 78,504 square feet of land, and zoned R-3C (residential). The soil of the site is mapped as Mixed Alluvial (1A) which is considered poor for foundation support, subsurface drainage, and subject to slight erosion.

At the time of this study, the site was improved by two (2) Tennis Courts fenced with a 10-ft high chain-link-fence, one (1) basketball court, two buried 60-inch Storm Drain RCP Culverts with head walls, an 8-inch sanitary sewer pipe, an asphalt trail that crosses the property, storm inlets, and various other site features and easements. At the present time, the southern part of the site is mostly cleared of vegetation and covered with the at-grade and below grade structures, while the northern part of the site is mostly wooded. The RCP storm culverts run under the southeastern part of the site and convey the stormwater from the existing running stream into the drainage gully located downstream (south) of the study site. As shown on the attached plans, the site is entirely located within the established 2003 RPA boundary. The adjacent properties are mostly occupied by single-family residential dwellings, and the site is accessible through Arley Drive (VDOT Route 4554), which is a 60-ft Public Right-of-Way. However, except for the existing asphalt trail that crosses the study site, no onsite driveway access or parking areas are currently located within its boundaries. A site plan showing the site and various known features is attached to this report.

As a part of this phase of the project, GEE performed limited record searches, collected available documents, established the vertical controls for the site, performed a field run topographic survey for the entire study site, field located the surface features and mapped Resources Protection Area (RPA) limits, and prepared a concept design plans with associated cost estimates for the three (3) proposed alternatives as set in the scope of work. This technical memorandum is intended

to present the SSHOA with our findings to date, and provide our professional recommendations regarding the proposed remedial options.

Upon your review and approval of the selected option, GEE will be glad to prepare the detailed design and detailed cost estimate for the selected option. This to include any required environmental study (WQIA, Flood Plain, Wetland), required Geotechnical Studies (based on the mapped soil type) and will prepare the final site plans and associated construction documents for county submittal and to obtain the county permits. The following sections present summaries of our activities, findings, and recommendations to date:

I. RECORD SEARCH

As a part of this phase of the project, GEE performed a limited record search at the Fairfax County Courthouse (Registry of Deeds), Fairfax County Department of Public Works and Environmental Management (DPW&EM), Department of Waste Management, and various agencies in order to obtain available environmental and site utility records. GEE obtained available records of the recorded subdivision plat and associated easements, water and sewer information, storm drainage system, soil, RPA, wetland, flood plain, and other environmental constraints. These are included on the existing site plans.

Our record search revealed that the property is last recorded in Deed Book 3409P at Page 664. The Fairfax County Tax Administration lists the property as Parcel "A" of Section "8B" with tax Map 89-3-((6))-A. The parcel contains approximately 1.804 acres of land, zoned R-3C (R-3 with Cluster Development), and identified as Parcel A, Section 8B Rolling Valley Subdivision. The property was purchased by the Springfield Station Homeowners Association, Incorporated about January 15, 1971 to be utilized as a private open space. The study Parcel is considered non-buildable for other than recreational purposes. Although the public sewer line crosses the Parcel, the site is not currently connected to the public water, sewer or gas lines.

There are several easements located within the boundaries of the site. These are shown on the attached plans and include a 10-ft storm sewer easement (BD 3409, Page 662), a 35-ft storm sewer easement (DB 3409, page 662), and a 20-ft sanitary sewer easement (DB 3409, page 662). The records also indicate that the entire site is encompassed with the 2003 Resources Protection area (RPA) boundary.

II. TOPOGRAPHIC SURVEY

GEE established the vertical controls for the site and perform a field run topographic survey for the entire property. Two (2) vertical control benchmarks were established on the rim of existing sewer manholes located within the right-of-way of Arley Drive (VDOT Route 4554). These established survey benchmarks were obtained from the records of the Fairfax County Department of Waste Management, and the elevations are depicted on the attached Site Plans. Based on the established benchmarks, GEE performed a field run topography survey using a Total Station instrument. The survey located the existing surface features (tennis and basketball courts, fences, storm drainage and sanitary sewer structures, inlets, curb & gutters, tree lines, clearing limits, and other major topographic features).

In accordance with the attached plans, the site slopes down in the northeastern direction. The site elevations range from a high of 292.5 feet above mean sea level (MSL) at the southwestern property corner and 286 feet MSL at the northwestern property corner to a low of 274 feet MSL at the northeastern corner of the property. As indicated by the attached plans, the southern part of the site has been cleared during past construction activities, while the northern part of the site is mostly wooded. Based on our review of available records, the topography of the southern part of the site has been modified extensively during the installation of the existing sanitary sewer, storm drainage pipes, trails, and sport facilities. Minimum of five (5) feet of fills are presents in some areas, especially under the Tennis court, and over storm drainage/sewer pipes. Based on our review of current site topography, we believe that some modification may be necessary to improve drainage and minimize ponding of the surface water. This issue must be addressed during the development of the design details for the site.

III. EXISTING VEGETATION MAP:

An existing vegetation map has been established for the site. This is shown on the attached plans. The tree cover surveys revealed that most of the northern part of the site is fully wooded with shrubs and mature trees. This area encompass approximately 32,745 square feet or 41.7% of the total site. The southern part of the site has been cleared and a small area was cleared , and a small area of the site had been replanted with Red Cedar and shrubs. The total area of planted area is approximately 3,137 square feet or 4% of the total lot area. Considering both the original wooded area and the planted area, approximately 45.7% of the site is currently wooded. This exceeds Fairfax County requirement of 30% for R-3 zone. Therefore, we believe that the future redevelopment plans for the sport facilities will not require additional tree planting, unless modifications to current regulations are adopted by the county. Sheet 4 of the attached plans depict the limits of the wooded areas at the site.

IV. ESTABLISHMENT OF THE RPA LIMITS:

Based on the county records and our field measurements, Resources Protection Area (RPA) currently covers the entire property. The attached plans also show the 50-ft and 100-ft setback from the headwall of the pipe culvert. Based on our understanding of the Fairfax County requirements, a Water Quality Impact Assessment (WQIA) will be required for any proposed disturbances at the site. The WQIA will address the criteria set by the Public Facility Manual and will identify any proposed additional planting and other stabilization elements required by the regulations.

V. SOIL AND GEOTECHNICAL CONDITIONS:

In accordance with Fairfax County Soil Science Mapping of the site, the soil for the entire Parcel is mapped as 1A (Mixed Alluvial). This is a channel-dissected soil complex that occurs in flood plain and drainage ways, and susceptible to flooding. The soil materials range from soft organic silt and clays to dense gravel-sand-silt-clay alluvium. The soil strength is considered poor because of soft soil and seasonal saturation. Infiltration facilities are poorly suited because of wetness and flooding potential. Stream bank erosion within these soils may result in undercutting of embankments on adjacent properties. Hydric soils may occur within this mapping units. The alluvial soil is considered poor for foundation support, poor as subsurface drainage, marginal for

slope stability, slight for erodibility. Placement of any structure within this type of soil requires an approved Geotechnical Report by Fairfax County prior to Site Grading Plans submittal.

Our field reviews and limited investigations revealed that the southern part of the site mostly disturbed during the installation of the pipe culverts, sewer main, and the construction of the sport facilities. A review of a Geotechnical report prepared by ECS, Ltd revealed that the existing the tennis and basketball courts were constructed on uncontrolled fill materials that include plastic clays and placed on marginal in Subgrade soils. Based on our review of available data and our field observations, it appears that the Subgrade for the existing sport facilities were prepared without the supervision of a qualified Geotechnical professional. These materials appear to have been stockpiles during previous grading activities at the site, and include significant quantities of plastic clays (CH) materials. Considering the Soil Science Office mapping of the parent materials as Alluvial Soils (1A), these materials are considered unstable and unsuitable for use as pavement or other types of slab-on-subgrade. The type, thickness, and method of placement for these materials are evident in the completed soil boring logs. Based on our experience with similar conditions, we believe that the developed cracks are direct results of the type of subgrade materials, placement method, thickness of the unstable fill, and exposure to the frost-heave process.

Based on the results of the ECS report, it appears that at least of five (5) feet of uncontrolled fill exist under the sport courts. These fills are considered non-structural in nature and are highly suspect to excessive differential settlements and damages caused by repeated frost-heave processes. The engineering characteristics of the subgrade materials indicate that the onsite fills (CH materials) may not be properly compacted once disturbed, unless treated with stabilizing agents. In addition, due to their excessive shrink-swell potential, these plastic clay materials should not have been placed within the upper 24 to 30 inches of the surface grades. Based on our experience with similar conditions, the type and size of cracks that are observed on the concrete Tennis Courts and Basketball Court are within the normal range. We believe that any surficial repair of the existing sport courts without improving the base and subgrade would not improve the long-term performance of the subject sport facilities.

Therefore, for the courts to last the normal life span, we strongly recommend that at least the upper two (2) feet of the uncontrolled fills must be removed and replaced with an engineered section that include a stabilized subgrade, a structural Geogrid layer (Tensar 1100 or approved equal), minimum of 18 inches of VDOT No. 57 stones or compacted sandy soil s (SM), and six (6) inches of compacted VDOT 21-A stones. The surface layer can consist of either a 4-inch of concrete/asphalt or a grid of Versacourt installed per the manufacturer specifications.

VI. EXISTING SITE PLAN PER EXISTING RECORDS AND FIELD RUN SURVEY

Attached are **Existing Conditions Site Plans** per available records and the Field Run Topographic Survey performed by GEE for the site. The Site Plans depict existing improvements and other surface features, including the tennis and basketball courts, existing trail, stream, SWM structures, crossing sewer lines and structures curb&gutters, existing public right of way with

existing underground and aboveground utilities, existing trees and shrubs, and other existing features.

As per the statement of works requested by the SSHOA, the facilities of most concerns are the spot facilities that include the existing two tennis courts and the basketball court. Based on our field measurements, the two (2) tennis courts are encompassed by a 10-ft chain-link-fence, and the adjacent basketball court located within the cleared part of the site. The paved area for the tennis courts measures 123 feet deep by 110 feet wide with an approximate area of 13,530 square feet. The basketball court measures 51.02 feet deep by 85.6 feet wide with an approximate area of 4,367 square feet. The total areas encompassed by the sport courts is 17,897 square feet. Since that sport courts were constructed mostly on unstable fills, any remedial measures will require disturbance of the entire paved area with approximately of 10 feet around the perimeter. Therefore, the proposed disturbed area associated with either remediating or removing the sport courts will impact an approximate area of 23,700 square feet or approximately 30.2 percent of Parcel A.

The attached concept plans include the mapped soil type of the property, RPA limits, established wetland and flood plain limits, tree covers, and other relevant information. Calculation of the impervious and disturbed areas are included on the attached plans, and calculations for existing tree cover are also included. A factual Pre-development land-use narrative with computations of weighted runoff coefficients and derivation are also included on the attached plans. Upon approval of one of the options presented in this study, GEE will developed the detailed Site Plans have been in accordance with the Fairfax County DPW & EM requirements, and accepted practices. The following existing features are specifically included:

1. Lot/Parcel layout, number, area, and subdivision name (refer to title block)
2. Established boundaries with bearing and distances, per the recorded deed
3. Established survey benchmarks (rim of sewer manholes), roadway centerline, curb and gutter and other survey benchmark
4. Existing improvements, recorded easements, and other surface features
5. Soil identifications, boundaries, and descriptions
6. Zoning and establish building restriction lines (Note that this Parcel is considered non-buildable)
7. Existing 2-ft contour with spot elevations
8. Limits of existing clearing and grading
9. Existing utilities (in the lot and within the right-of-way of Arley Drive)
10. Impervious area calculations
11. Legal Lot Certification
12. Watershed for the site and disturbed areas in the watershed
13. Tree cover limits and computations
14. Other relevant information
15. Sign and seal by a Virginia Certified Professional Engineer.



VII. CONCEPTUAL PLANS PER OPTIONS OUTLINED IN THE STATEMENT OF WORK:

As a part of this task, GEE researched available records, performed field topographic surveys for the site, established the limits of the RPA, investigated the soil type, assessed the history of cut and fill operation at the site, and reviewed the Geotechnical Boring Logs and laboratory data prepared by others. The Geotechnical study revealed valuable information regarding the thickness and type of fill placed to establish current grade and support the existing sport courts, insitu bearing capacity, and factors that impact the stability of the onsite soils. Based on our findings to date, we believe that stabilization of the subgrade and base are required for the long-term performance on any at-grade pavement section or structure. In addition to the engineered section recommended above, stabilization agents such as cement, lime or dynamic compaction may be required at this site. Based on the above, GEE is presenting conceptual plans and associated preliminary cost estimate for each of the three (3) requested remedial measure options stated in the Statement of Work. These include:

Option I: This option involves retaining sufficient court surfaces as a foundation for one tennis court and a general purpose court using Versacourt or similar products. The remaining area of the courts will be landscaped.

In order to accomplish this option, the basketball court will be removed and landscaped. The subgrade of the existing tennis courts will be rehabilitated by using an engineered section in accordance with the detail presented in this memorandum. The existing 10-ft high chain-link-fence will be retained and the tennis court will be reconstructed for a new tennis court and a general purpose court. This option is considered the most costly among the three proposed by the associated. Accomplishing this task required demolition of the existing Basketball Court, removal of the concrete pavement and underlying base materials, and reading the basketball court area to be integrated within the overall landscaping of the site.

Since that the Tennis courts are underlain by up to five (5) feet of unstable fills that include Plastic Clay (CH), and Sandy Clay (CL), we recommend the removal of the surface materials, stone base, and up to 18-24 inches of the unsuitable subgrade. Upon undercutting to the desired depth within the rehabilitated Tennis Court and General Court area, the exposed subgrade must be proofrolled to assess the presence of excessively soft or unstable areas. Localized areas exhibiting excessive soft or organic contaminated materials will need to be removed and replaced with structural fills, or stabilized using soil cement or other approved agents. Upon approval of the subgrade by the inspecting engineer, the new engineered section (Figure I) will be placed under the direction of the Geotechnical engineer. This must be performed as described in part V above. As shown on Figure I, the remedial section to include a structural Geogrid layer (Tensar 1100 BX or approved equal), minimum of 18 inches of VDOT No. 57 stones or compacted sandy soils (SM), and six (6) inches of compacted VDOT 21-A stones. The surface layer can consist of either a 4-inch of concrete/asphalt or a grid system of Versacourt installed per the manufacturer specifications. The following table presents a preliminary estimate of quantities and associated costs.

TABLE I - OPTION I COST ESTIMATE

ITEM No.	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL COST
1	Engineering (Phase II per approved contract)	1	AL	17,500	\$17,500.00
2	County Review Fee - Geotechnical Report	1	AL	1800	\$1,800.00
3	County Review Fee (WQIA)	1	AL	160	\$160.00
4	County Review Fee - Site Grading Plans(residential)	1	AL	2385	\$2,385.00
5	County Fee - Pro Rata Share	1	AL	1200	\$1,200.00
6	Refundable Conservation Agreement	1	AL	7,500	\$7,500.00
7	Mobilization	1	AL	2,500	\$2,500.00
8	Silt Fence	1	AL	1,200	\$1,200.00
9	Removal and Haul Away of Existing Basketball Court Concrete Surface	48	CY	40	\$1,920.00
10	Removal and Recycle of Stone Base Materials @ Basketball Court	6	HR	110	\$660.00
11	Removal & Haul Away of Tennis Courts Concrete Surface	150	CY	40	\$6,000.00
12	Removal and Recycle of Stone Base Materials from Tennis Courts	16	HR	110	\$1,760.00
13	Proofroll and Stabilize Existing Subgrade	1500	SY	2.50	\$3,750.00
14	Geogrid/Filter Fabric	13500	SF	0.6	\$8,100.00
15	Acquire and place 18 inches of Structural Fill VDOT No. 57 Stones of SM Materials	750	CY	24	\$18,000.00
16	Acquire and Install 4" of 21-A stones base (some of the materials maybe salvaged from existing)	250	CY	24	\$6,000.00
17	Install Versacourt Materials (8" x8" tiles)	13500	SF	3	\$40,500.00
18	Final Grading and Landscaping @ removed courts	1	AL	5000	\$5,000.00
19	General Contracting Fee/Construction Management @ 15% of Total Cost	1	AL	15%	\$20,100.00
20	Contengency @ 5% of Total Cost	1	AL	5%	\$7,752.00
20	Construction Quality Control Testings & Inspections	20	Day	450	\$9,000.00
TOTAL					\$162,787.00

Option II: This option proposes retaining sufficient court surfaces as a foundation for a general purpose court overlay using Versacourt or similar product. Remove the rest of the courts and landscape the remaining area. Similar approach to Option I will be utilized to accomplish this option.

TABLE II - OPTION II COST ESTIMATE

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL COST
1	Engineering (Phase II per approved contract)	1	AL	17,500	\$17,500.00
2	County Review Fee - Geotechnical Report	1	AL	1800	\$1,800.00
3	County Review Fee (WQIA)	1	AL	160	\$160.00
4	County Review Fee - Site Grading Plans(residential)	1	AL	2385	\$2,385.00
5	County Fee - Pro Rata Share	1	AL	1200	\$1,200.00
6	Refundable Conservation Agreement	1	AL	7,500	\$7,500.00
7	Mobilization	1	AL	2,500	\$2,500.00
8	Silt Fence	1	AL	1,200	\$1,200.00
9	Removal and Haul Away of Existing Concrete Surface (Tennis & Basketball)	198	CY	40	\$7920
10	Removal and Recycle of Stone Base Materials (Tennis & Basketball)	22	HR	110	\$2,420.00
11	Removal & Dispose of Excess 10-ft CLF	1	AL	1500	\$1,500.00
12	Proofroll and Stabilize Existing Subgrade for one General Purpose Court (60' x120')	800	SY	2.50	\$2,000.00
13	Geogrid/Filter Fabric	7200	SF	0.6	\$4,320.00
14	Acquire and place 18 inches of Structural Fill VDOT No. 57 Stones of SM Materials	400	CY	24	\$9,600.00
15	Acquire and Install 4" of 21-A stones base (some of the materials maybe salvaged from existing)	80	CY	24	\$1,920.00
16	Install Versacourt Materials (8" x8" tiles)	7200	SF	3.25	\$23,400.00
17	Final Grading and Landscaping of removed courts	1	AL	7500	\$7,500.00
18	Construction Quality Control Testings & Inspections	14	Day	450	\$6,300.00
19	General Contracting Fee/Construction Management @ 15% of Total Cost	1	AL	15%	\$14,150.00
20	Contingency & 5% of Total Cost	1	AL	5%	\$6,171.00
TOTAL					\$115,446.00

Option III: This option proposes removal of all existing courts and landscape the entire area as a Park.

ITEM No.	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL COST
1	Engineering (Phase II per approved contract)	1	AL	17,500	\$17,500.00
2	County Review Fee - Geotechnical Report	1	AL	1800	\$1,800.00
3	County Review Fee (WQIA)	1	AL	160	\$160.00
4	County Review Fee - Site Grading Plans(residential)	1	AL	2385	\$2,385.00
5	County Fee - Pro Rata Share	1	AL	1200	\$1,200.00
6	Refundable Conservation Agreement	1	AL	5,000	\$5,000.00
1	Mobilization	1	AL	2,500	\$2,500.00
2	Silt Fence	1	AL	1,200	\$1,200.00
3	Removal and Haul Away of Existing Concrete Surface (Tennis court & Basketball courts)	198	CY	40	\$7,920.00
4	Removal and Haul away the existing stone base (Tennis & Basketball)	36	HR	110	\$3,960.00
5	Removal & Dispose of Existing CLF (466 feet)	1	AL	2000	\$2,000.00
6	Grade and Landscape entire area as a Park.	1	AL	10000	\$10,000.00
12	Construction Quality Control Testings & Inspections	10	Day	450	\$4,500.00
19	General Contracting Fee/Construction Management @ 15% of Total Cost	1	AL	15%	\$8,344.00
20	Contingency & 5% of Total Cost	1	AL	5%	\$3,424.00
TOTAL					\$71,893.00

Note: If a children playground, a picnic area, benches, or other park facilities are planned as part of option III, then the cost of acquiring and installing such items must be included in the cost estimate.

The above preliminary estimates are based on the concept plans available to us at this time. The cost for each option may be modified as GEE develops the final plans, details, and specification for the selected option. Our findings to date and associated professional opinion are based on the limited record searches, completed field activities, professional observations during our field evaluation visits, preliminary assessment of the problem and associated cost estimates, our experience with similar projects, and understanding of Fairfax County DPW&EM requirements. Upon your review of this technical memorandum, we will be glad to meet with you to discuss our findings to date and establish a roadmap for the next phase of field activities, design documents, county submittal, and permit process.

GEE will coordinate closely with the Board to present the three (3) options and associated cost estimates to the membership at a general membership meeting. The presentation will be performed by the project manager who prepared the three concepts. The engineer will present the designs, clarify the advantage and disadvantage of each of the options, and will respond to questions from the general membership as required.

VII. CONCLUSIONS AND LIMITATIONS

Based on the data gathered to date, it is our professional opinion that the existing sport courts were constructed on unsuitable fills. The presence of plastic clays (CH) within the upper two feet inches of the surface are of major concern for the long stability and performance of the sport courts. The use of Versacourt in lieu of the concrete or asphalt pavement will also require a stable and non-plastic subgrade. Therefore, removal and replacement of the upper 24 inches of the bearing subgrade will be required regardless of the selected surface course. We believe that the recommended engineered section presented should adequate to remediate the developed problem, if any of the sport courts are to be retained.

The preliminary concepts presented in this technical memorandum are based on the limited information gathered to date. These findings may be modified as the [project progresses into the design and permit stages. Our services were performed in accordance with generally accepted engineering principles and practices. We will not be responsible for interpretations made by others based on the data contained in this report.

We appreciate this opportunity to be of service to you. Should you have any questions regarding the contents of this report, or if we may be of further service to you, please contact the undersigned engineer at (703) 591-7170. We look forward to working with you again.

Sincerely,


Ibrahim (Abe) Chehab, P.E.
Principal Engineer

