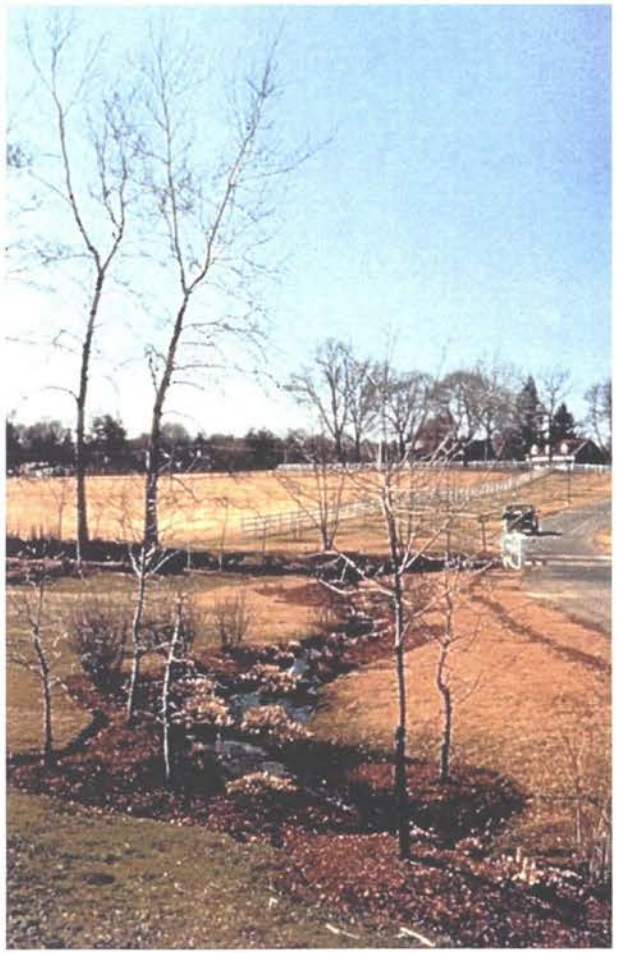
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Board of Zoning Adjustment
District of Columbia
CASE NO. 17149
EXHIBIT NO. 29A2

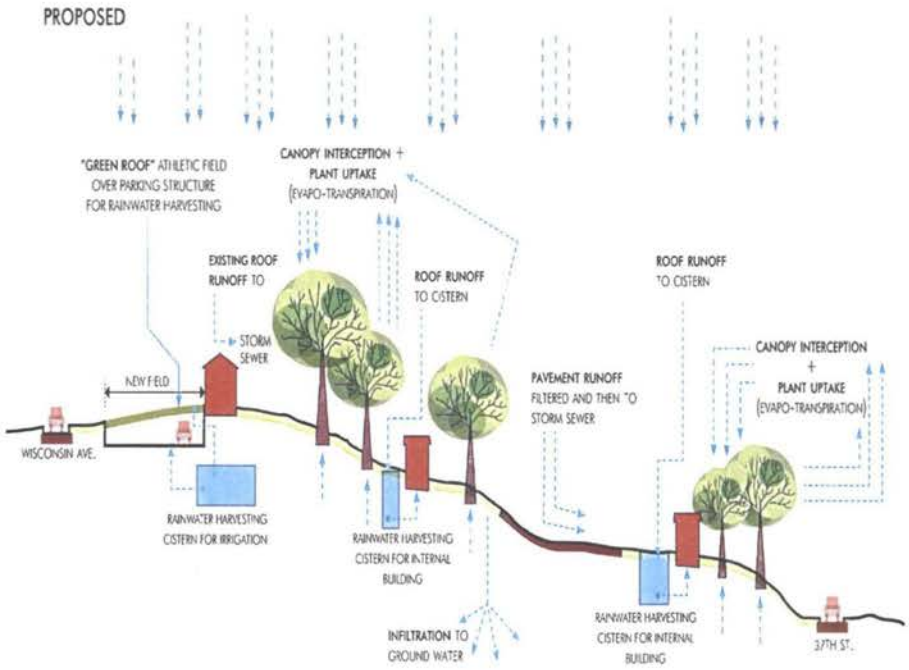


- Temporary storage of storm water runoff below pavement or lawn (detention / infiltration).
- Storage in pipes, clean stone or modular stacking units.
- Re-use rain water for irrigation and other uses
- Support natural hydrological cycle.
- Increase in total permeable surfaces to reduce runoff

HYDROLOGY AND STORM WATER MANAGEMENT

- 29 geotechnical borings ranged from 10-55 feet without hitting water (most were 30 feet deep)
- 1 geothermal boring to 400 feet encountered water at 100 feet
- No rock encountered, so no blasting anticipated
- State-of-the-art water management will result in overall reduction in water usage and release into the neighborhood
- Collection and dissipated release of storm water
- Water re-use for irrigation
- Recycling of building water
- Choice of low volume water technologies

wherever possible



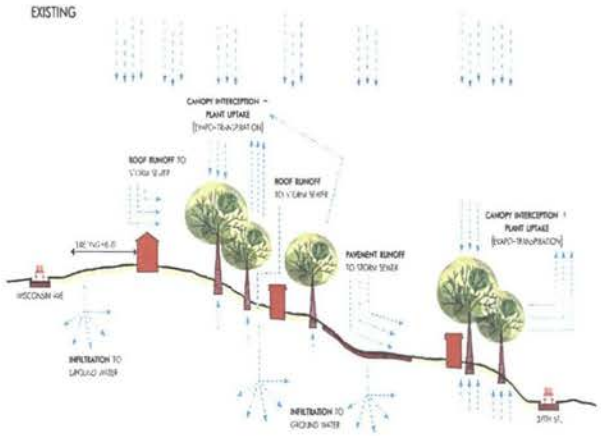
STATE OF THE ART WATER MANAGEMENT

- Net increase in permeable surfaces
- State of the art water management
- Increased vegetation and connectivity of green spaces
- Emphasis on local varieties means reduced chemical inputs, water
- Reduced energy use
- Locally available and recycled materials support the local economy
- Emphasis on alternative transportation

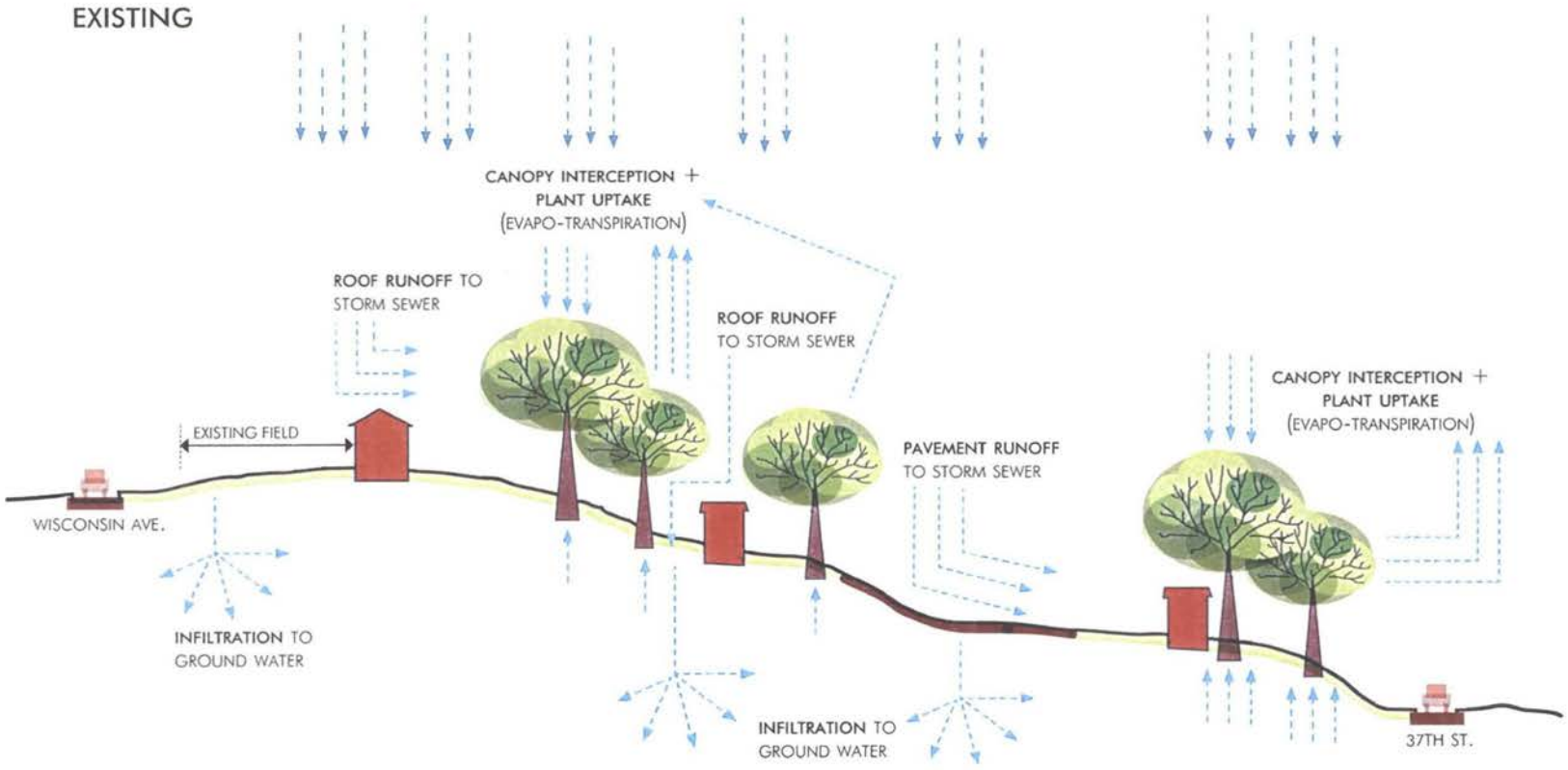


SUSTAINABLE DESIGN

- 29 geotechnical borings ranged from 10-55 feet without hitting water (most were 30 feet deep)
- 1 geothermal boring to 400 feet encountered water at 100 feet
- No rock encountered, so no blasting anticipated
- State-of-the-art water management will result in overall reduction in water usage and release into the neighborhood
- Collection and dissipated release of storm water
- Water re-use for irrigation
- Recycling of building water
- Choice of low volume water technologies wherever possible
- Follow-up meeting will be held with hydrology group

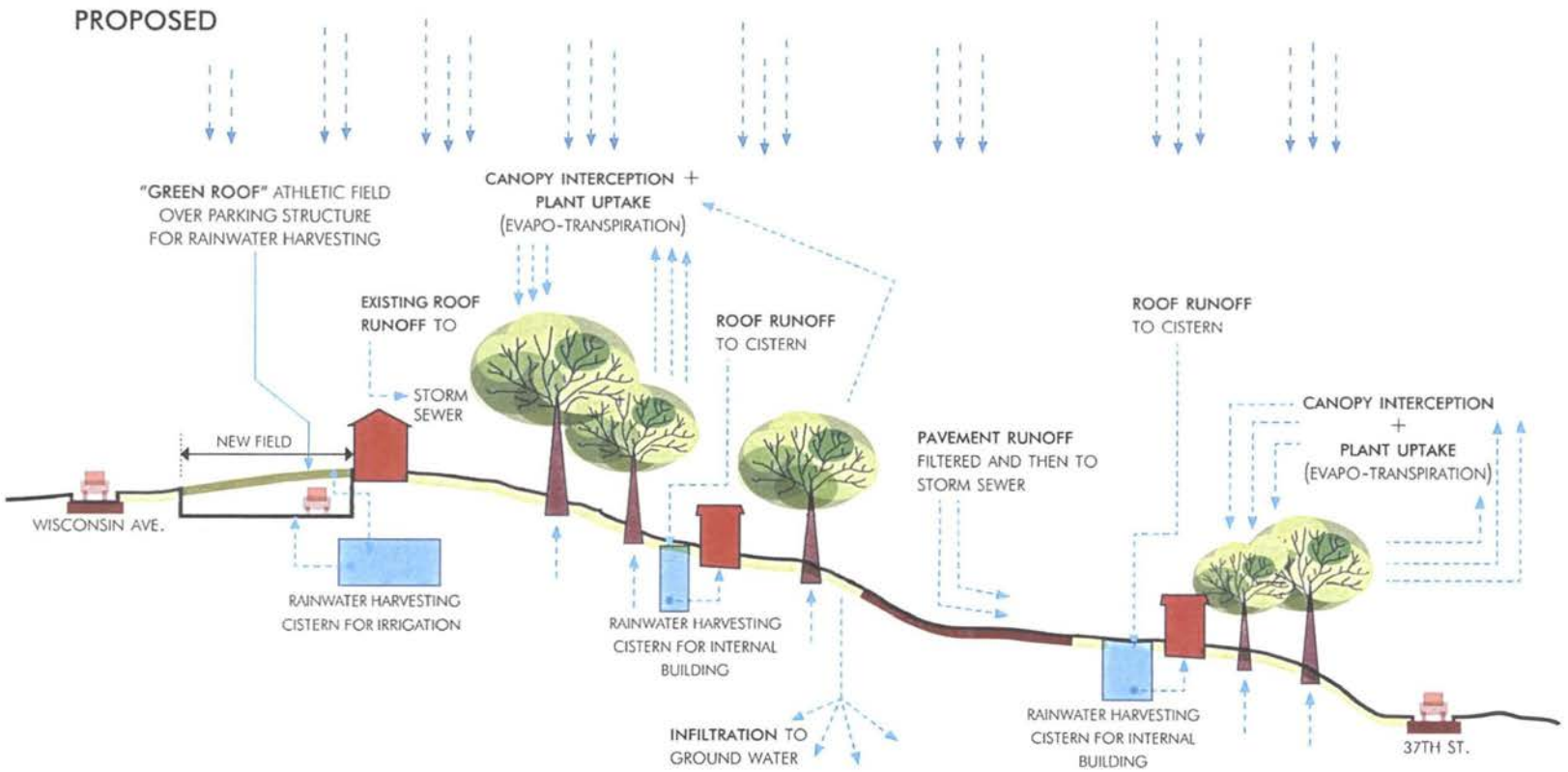


STATE OF THE ART WATER MANAGEMENT



EXISTING	AREA	SF	TOTAL EXISTING
IMPERVIOUS - BUILDING ROOFS	90,732	14%	45%
IMPERVIOUS - PAVEMENT	206,640	31%	
PERVIOUS - FIELDS AND VEGETATION	372,280	56%	55%
TOTAL	669,652	100%	100%

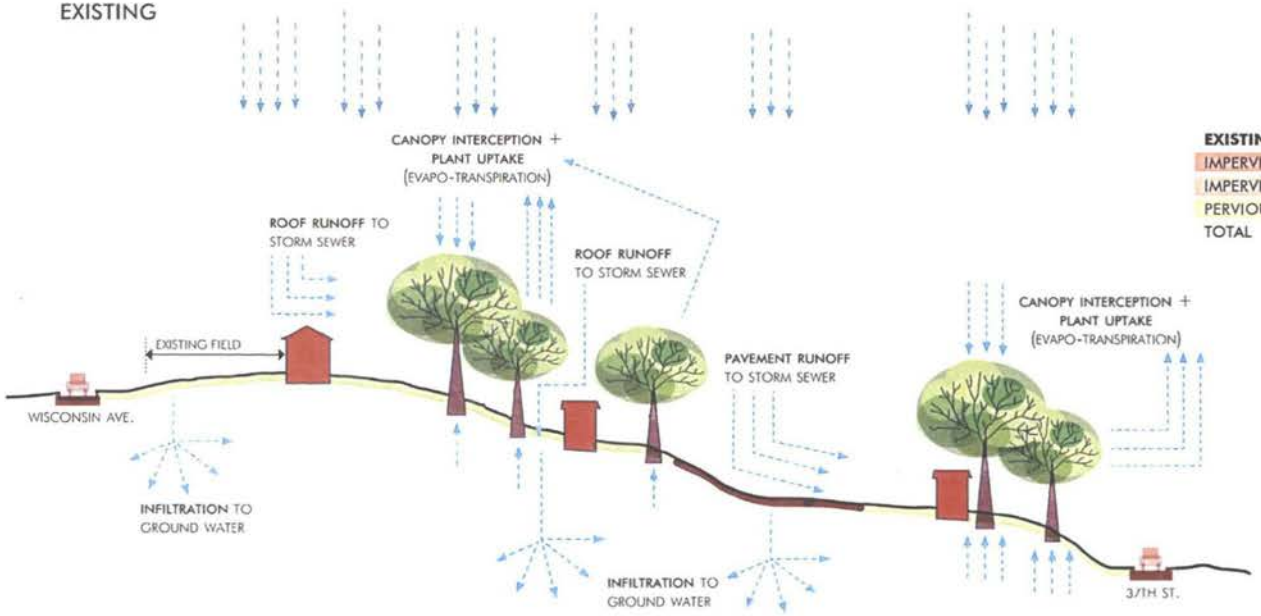
EXISTING STORM WATER DIAGRAM



PROPOSED	AREA	SF	TOTAL PROPOSED	TOTAL EXISTING
IMPERVIOUS - BUILDING ROOFS	76,206	11%	37%	45%
IMPERVIOUS - PAVEMENT	171,580	26%		
HARVESTING - NEW BLDG ROOFS + FRONT FIELD	114,400	17%	17%	0%
PERVIOUS - FIELDS AND VEGETATION	307,465	46%	46%	55%
TOTAL	669,651	100%	100%	100%

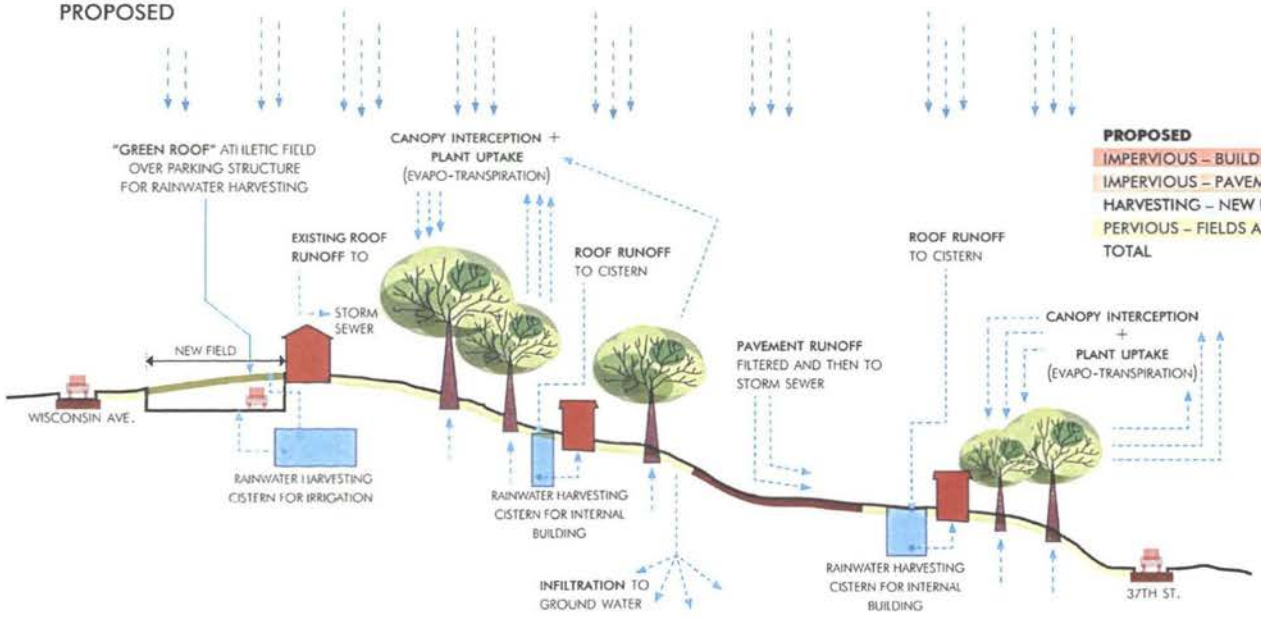
PROPOSED STORM WATER DIAGRAM

EXISTING



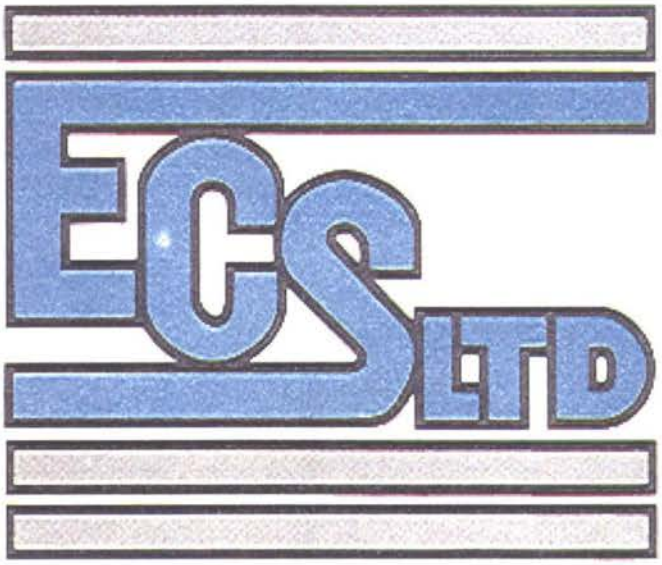
EXISTING	AREA	SF	TOTAL EXISTING
IMPERVIOUS – BUILDING ROOFS	90,732	14%	45%
IMPERVIOUS – PAVEMENT	206,640	31%	
PERVIOUS – FIELDS AND VEGETATION	372,280	56%	55%
TOTAL	669,652	100%	100%

PROPOSED



PROPOSED	AREA	SF	TOTAL PROPOSED	TOTAL EXISTING
IMPERVIOUS – BUILDING ROOFS	76,206	11%	37%	45%
IMPERVIOUS – PAVEMENT	171,580	26%		
HARVESTING – NEW BLDG ROOFS + FRONT FIELD	114,400	17%	17%	0%
PERVIOUS – FIELDS AND VEGETATION	307,465	46%	46%	55%
TOTAL	669,651	100%	100%	100%

EXISTING AND PROPOSED STORM WATER DIAGRAM



REPORT OF

SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING ANALYSIS

SIDWELL FRIENDS SCHOOL WISCONSIN AVENUE CAMPUS

WASHINGTON, DC

FOR

JFW, INC.

APRIL 27, 2004

ENGINEERING CONSULTING SERVICES, LTD.
Geotechnical • Construction Materials • Environmental

April 27, 2004

Mr. Bob Waechter
JFW Inc.
19650 Club House Road
Montgomery Village, Maryland 20886

ECS Job No. 9807

Reference: Report of Subsurface Exploration and Geotechnical Engineering Analysis, Sidwell Friends School Wisconsin Avenue Campus, Washington, DC

Dear Mr. Waechter:

As authorized by acceptance of our proposal No. 19368-GPR, dated February 2, 2004, Engineering Consulting Services, Ltd. (ECS, Ltd.) has completed the subsurface exploration and geotechnical engineering analysis for the above-referenced project. Our geotechnical engineering evaluation of the project is based on drilling 31 soil borings and installing 4 temporary piezometers. The enclosed report discusses the subsurface exploration procedures, presents the results of our subsurface exploration and laboratory testing programs, and presents our recommendations for the design and construction of the proposed structures and associated site work.

Based on the information provided to us, the proposed development will consist of improvements to the Sidwell Friends School's Wisconsin Avenue Campus in Washington, DC. Improvements to the Wisconsin Avenue Campus will include additions and renovations to the Zavitz Middle School, the Kogod/Kenworthy Building, and the Wannan Gym. A new connector will be constructed from the new gymnasium extending to the existing Kogod/Kenworthy Building. Additionally, a new gym, a below-grade parking structure with an at-grade playing field, and a new Quaker Meeting house will be constructed.

Existing fill and possible fill was encountered in all of the borings performed at depths ranging from approximately 2 to 16 feet below the existing ground surface. The majority of the existing fill and possible fill material encountered generally consisted of Clayey or Silty SAND (SC, SM) with varying amounts of wood, quartz, brick, and asphalt fragments, and organics. It should be noted that given the lack of documentation that would substantiate that the fill soils were placed in a controlled manner, we do not recommend supporting the foundations directly on the existing fill soils since undesirable differential settlements may occur.

The natural soils encountered consisted of interbedded layers of Silty SAND (SM), SILT (ML, MH), and Silty GRAVEL (GM). SPT N-value resistances in the granular soils indicated a relative density of loose to very dense, and N-values in the cohesive soils indicate a consistency

of medium stiff to very stiff. Several soft or loose layers were present at various depths in the majority of the borings.

Groundwater seepage was observed in 3 of the 31 borings during drilling operations at depths ranging from approximately 20 to 28.5 feet below the existing ground surface. Additionally, four of the borings (PSP-1, MSP-3, KKP-1, and QMP-3) were converted to temporary piezometers to record groundwater levels at the site. Based on our readings, groundwater was encountered at depths ranging from approximately EL. 346.8 to EL. 370.3 feet. With the exception of the Middle School basement level, groundwater was not encountered within the proposed excavation depth. Based on the depths to groundwater encountered and our understanding of the proposed development, we do not anticipate that groundwater will present an impact on construction procedures or that the construction will have an impact on the groundwater conditions.

For the proposed Zavitz Middle School addition we recommend a maximum allowable soil bearing pressure of 5,000 psf for footings bearing at an elevation of EL. 354 or deeper within the Natural Soil Stratum. Soil capable of supporting this design bearing pressure may be identified on the boring log as those natural materials having Standard Penetration Test N-values of at least 10 bpf. If a greater bearing capacity than 5,000 psf is desired, a deep foundation system will be required.

We recommend a maximum allowable soil bearing pressure of 5,000 psf for the proposed parking structure. However, is should be noted that some of the footings within the structure will either need to be stepped down or be designed for a reduced allowable soil bearing pressure of 3,000 psf due to the presence of looser soils and old fill materials encountered within two of the ten borings drilled in the proposed parking structure footprint.

Due to the presence of more than ten feet of old fill soils beneath the anticipated finish floor elevation, the proposed connector between the Wannan Gym and the Kenworthy/Kogod Building will need to be supported by a drilled shaft or caisson foundation or a ground improvement technique such as Geopiers^{R} will need to be utilized. It is anticipated that bearing capacities on the order of 4,000 psf to 6,000 psf can be provided if Geopiers^{R} are used. The caisson foundation may be designed for an allowable bearing pressure of 10,000 psf.

Based on the subsurface conditions observed, including the recovered soil samples and the Standard Penetration Test N-values obtained during drilling operations, the remainder of the proposed structures may be supported on a shallow foundation system consisting of spread and/or continuous footings following proper subgrade preparation. We recommend that footings founded on natural soils or newly placed and compacted engineered fill be designed for a net allowable soil bearing pressure of 3,000 psf.

This report has been prepared to aid in the evaluation of this site and to assist the design team with the design of the proposed development. The report scope is limited to the specific project and the project description represents our current understanding of the significant aspects of the

proposed construction relevant to the geotechnical considerations. We recommend that ECS, Ltd. be retained to review the final plans and determine if any reevaluation or additional recommendations are necessary.

We appreciate this opportunity to be of service to you on this project. If you have any questions regarding the information and recommendations contained in the accompanying report, or if we may be of further assistance to you in any way during planning and construction of this project, please do not hesitate to contact us.

Respectfully,

ENGINEERING CONSULTING SERVICES, LTD

Tricia K. McCord
Assistant Project Engineer

COMMONWEALTH OF VIRGINIA
BRYAN C. LAYMAN
No. 023314
05/05/04
PROFESSIONAL ENGINEER

Bryan C. Layman, P.E.
Principal Engineer

cc: Mr. Michael Saxenian- Sidwell Friends School

TKM:\geotech\report\9807rpc

REPORT

PROJECT

Subsurface Exploration
and Geotechnical Engineering Analysis
Sidwell Friends School Wisconsin Avenue Campus
Washington, DC

CLIENT

JFW Inc.
19650 Club House Road
Montgomery Village, Maryland 20886

PROJECT #9807

DATE April 27, 2004

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PROJECT OVERVIEW

Project Location

The project site is located within the Sidwell Friends School Wisconsin Avenue campus in northwest Washington, DC. More specifically the site is bordered by Wisconsin Avenue to the west, Quebec Street to the south, 37th Street to the east, and existing development to the north. A site Vicinity Map, depicting the generalized location of the project site is included within the Appendix of this report.

Proposed Construction

The project will consist of improvements to the Sidwell Friends School's Wisconsin Avenue Campus in Washington, DC. Improvements to the Wisconsin Avenue Campus will include additions and renovations to the Zavitz Middle School, the Kogod/Kenworthy Building, and the Wannan Gym. A new connector will be constructed from the new gymnasium extending to the existing Kogod/Kenworthy Building. Additionally, a new gym, a below-grade parking structure with an at-grade playing field, and a new Quaker Meeting house will be constructed.

Additions to the existing Zavitz Middle School building cover a footprint of approximately 10,000 square feet and will be up to three levels to match the existing building, with a lowest proposed finished floor elevation of approximately EL. 342. A portion of the Zavitz Middle School addition will include a basement level covering a footprint of approximately 6,700 square feet to facilitate storage area and a mechanical room. Based on information provided to us from Kieran Timberlake Associates, we understand that the additions will be constructed of post tensioned concrete with typical column and wall loads of 1200 kips and nine kips per linear foot, respectively.

A below-grade parking structure supporting a new athletic field is proposed immediately adjacent to the west side of the existing Harrison Upper School and just south of the existing Johnson Building. The construction of the new parking structure will cover a footprint of approximately 72,000 square feet and will have one level of below-grade parking with one structured level supporting a new athletic field. The lowest finished floor elevation (along the proposed drive aisle) is approximately EL. 383.5. The parking structure will ramp down to the north and will include the construction of 13 bays at 24 feet on center, facilitating approximately 196 total parking spaces. We have assumed that the structure will be comprised of cast-in-place concrete and that maximum column and wall loads will be on the order of 600 kips and four kips per linear foot, respectively.

A new Quaker Meeting House will cover a footprint of less than 5,000 square feet is proposed to be constructed either just south of the proposed parking structure (northwest of the existing Zartman House) or southeast of the existing Zartman House. The Quaker Building will include up to two above-grade levels and will have one full or partial basement level, depending upon

the final location. We have assumed maximum column and wall loads of 150 kips and four kips per linear foot, respectively for this building.

A new gymnasium covering a footprint of approximately 12,500 square feet will be constructed adjacent to the existing Wannan Gym. The new gym will include one basement level and two above grade levels, with a lowest finished floor elevation of approximately EL.369. A connector covering approximately 5,000 square feet will be constructed between the new gymnasium and the existing Wanaan Gym. Also, a connector covering less than 2,000 square feet between will be constructed between the Wanaan Gym and the Kogod/Kenworthy Building. We have assumed maximum column and wall loads of 200 kips and four kips per linear foot, respectively for this structure.

The Kogod/Kenworthy Building will include renovations to both the basement level and the at-grade existing level. This will include new entry and Gallery additions on the west side of the Kenworthy Building, new additions on the east side of the Kenworthy Building, and a new addition between the Kenworthy Building and the Kogod Building adjacent to the existing track. We have assumed maximum column and wall loads of 200 kips and four kips per linear foot, respectively for these buildings.

The project will also include drainage improvements including the construction of stormwater management ponds. Other than the excavations required for the ponds and the below grade areas, we have assumed that only minor site grading (less than five feet of cuts and fills) will be required to develop this site.

No other information concerning the proposed construction was available at this time. However, we anticipate that the proposed construction will also include the installation of all necessary site utilities. Additionally, retaining walls are not indicated on the site plan. Therefore, we have not specifically addressed these features in establishing our current scope of services for our field exploration.

If any of this information is inaccurate, either due to our misunderstanding or due to design changes that may occur later, we recommend that we be contacted in order to provide additional or alternate recommendations that may be warranted.

Purpose and Scope of Work

The purposes of this subsurface exploration were to explore the soil and groundwater conditions (if encountered) at the site and to develop engineering recommendations to guide design and construction of the project. We accomplished these purposes by performing the following scope of services:

1. drilling 31 borings and installing 4 temporary piezometers to explore the subsurface soil and groundwater conditions,

2. performing laboratory tests on selected representative soil samples from the borings to evaluate pertinent engineering properties,

3. analyzing the field and laboratory data to develop appropriate engineering recommendations, and

4. preparing this report of our findings and recommendations.

The conclusions and recommendations in this report are based on the results of 31 soil test borings, performed by ECS, Ltd. on the site in March and April, 2003. Five borings were drilled to depths of 30 feet within the proposed gymnasium and connector to Wanaan footprint, one boring was drilled to a depth of 30 feet in the proposed connector between the Wanaan Building and the Kogod/Kenworthy Building, a total of six borings (three borings at each proposed location) were drilled to a depth of 30 feet within the two proposed locations for the New Quaker Meeting House, two borings were performed to a depth of 30 feet in the vicinity of the proposed additions on the east side of the Kogod/Kenworthy building, ten borings were drilled to depths of 30 feet in the area of the planned below-grade parking structure, two 25 foot-deep borings and one 55-foot boring were drilled in area of the new addition to the Zavitz Middle School Building, and four 10 foot-deep borings were drilled in areas where stormwater management ponds may be constructed. In addition, four of the borings performed (PSP-1, MSP-3, KKP-1, and QMP-3) were converted to temporary piezometers consiting of a 1-inch diameter pvc pipe to record groundwater levels at the site. Please note that the evaluation of the stability of existing site slopes was beyond the scope of our exploration.

The number and general locations of the stormwater management borings were selected by Vika, Inc., and the remaining number and locations of the borings performed for the subsurface exploration were selected by our office and approved by JFW, Inc. before representatives of ECS, Ltd. located them in the field for drilling purposes. The borings were located in the field using our Global Positioning Satellite (GPS) system. The GPS layout was based on the boundary survey contained on the current site plan provided to us by Kieran Timberlake Associates, LLP. The GPS System is capable of locating borings within 3 feet of the intended location.

The ground surface elevations noted on the boring logs were interpolated from the existing topographic information contained on the "Existing Conditions Plan" provided to us by Kieran Timberlake Associates, LLP, which gives elevation contours at 2 feet intervals. Considering the contour interval utilized on the site plan and the accuracy level of the GPS equipment, we would consider the elevations noted on the boring logs to be accurate to the nearest one foot.

Following drilling operations, laboratory tests were performed on selected soil samples to identify the soils and to assist in determination of the properties of the site soils. The results of the subsurface exploration along with the boring location diagram are included within the Appendix of this report.

EXPLORATION PROCEDURES

Subsurface Exploration Procedure

The soil borings were performed with ATV-mounted drill rigs, which utilized continuous flight, hollow stem augers to advance the boreholes. Drilling fluid was not used in this process.

Representative soil samples were obtained during the drilling program by means of the split-barrel sampling procedure in accordance with ASTM Specification D-1586. In this procedure, a 2-inch O.D., split-barrel sampler is driven into the soil a distance of 18 inches by a 140-pound hammer falling 30 inches. The number of blow required to drive the sampler through a 12-inch interval is termed the Standard Penetration Test (SPT) value and is indicated for each sample on the boring logs. This value can be used as a qualitative indication of the in-place relative density of cohesionless soils. In a less reliable way, it also indicates the consistency of cohesive soils. This indication is qualitative, since many factors can significantly affect the standard penetration resistance value and prevent a direct correlation between drill crews, drill rigs, drilling procedures, and hammer-rod-sampler assemblies. During drilling operations, four of the borings (PSP-1, MSP-3, KKP-1, and QMP-3) were converted to temporary piezometers consisting of a 1-inch diameter pvc pipe.

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

Laboratory Testing Program

Representative soil samples were selected and tested in our laboratory to check the field classification and to determine pertinent engineering properties. The laboratory testing program included visual sample classifications, moisture content tests, Atterberg Limit tests, and grain size analyses. All data obtained from the laboratory testing program is included on the respective boring logs or on separate laboratory sheets within the Appendix of this report.

Each soil sample was classified on the basis of texture and plasticity in accordance with the Unified Soil Classification System. The group symbols for each soil type are indicated in parentheses following the soil descriptions on the boring logs. A brief explanation of the Unified System is included with this report. The soil engineer grouped the various soil types into the major zones noted on the boring logs. The stratification lines designating the interfaces between earth materials on the boring logs and profiles are approximate; in situ, the transitions may be gradual.

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

EXPLORATION RESULTS

Site Description

Currently, the Sidwell Friends School campus is developed with numerous buildings, athletic areas, and landscaping, as well as drive and parking areas. The site of the proposed parking structure/athletic field is currently utilized as an athletic field. It is currently bordered with fencing, grassed covered, and is relatively flat and open. The proposed location for the Quaker Meeting House northwest of the existing Zartman House is currently occupied with existing tennis courts and the other proposed location southeast of the Zartman House is generally open and grassed sloping down (to the south) to the existing Ball Field at approximately 1.5H:1V. The additions on the east and south end of the Kenworthy Building are currently proposed in areas that slope down approximately 8 to 10 feet. The Kenworthy/Kogod Building is bordered with a concrete sidewalk and stairs are built into the existing slope on the south end of the Kenworthy Building. The area of the Zavitz Middle School addition is currently occupied with existing tennis courts and concrete sidewalks, and is adjacent to existing 10 to 12 feet slopes that border the property, sloping down toward 37th Street at approximately 1.5H:1V. The area of the proposed gym is currently occupied with a one-story brick building that includes a basement level, concrete sidewalks, landscaping, as well as asphalt parking and drive areas. The specific project boundaries, along with the location of the borings performed in the subsurface exploration program, are shown on the Boring Location Diagram included within the Appendix of this report.

In general, the site topography is gently sloping to the east and to the north. In general, the western most portion of the site that borders Wisconsin Avenue is the highest area of the site. Site elevations range from a topographic low of EL. 362 in the northeastern corner of the site to a topographic high of EL. 408 near the circular asphalt drive area west of the existing Zartman House.

The specific project boundaries, as well as existing and proposed site features and the locations of the borings performed in our subsurface exploration program, are shown on the Boring Location Diagram included in the Appendix of this report.

Regional Geology

The project site is located in the Piedmont Physiographic Province of Washington, D.C. The soils in this Province consist primarily of residual soils derived from the in situ weathering of the underlying parent bedrock. Although surficial materials normally retain some of the structure of the original bedrock, they typically have a much lower density. With depth, the soils exhibit more rock structure, but strengths are typical of soil and are termed saprolite. A typical mature weathering profile of the Piedmont Province, the soils are generally found to be finer grained at the surface where most weathering has occurred. Particle size of the soils generally increase with increasing depth, change first to weathered and finally to unweathered parent bedrock.

Existing fill soils are often present in areas of past development. The composition and strength of existing fills can be variable and it is often difficult to evaluate the engineering characteristics of existing fill soils. However, in some instances, a qualitative assessment of the condition of the existing fill can be made based on standard penetration test resistance values and visual observation of the fill materials.

Soil Conditions

The natural soils studied by our field exploration program were generally consistent with the regional geologic soil profile. The majority of the borings encountered approximately 1 to 8 inches of surficial topsoil. However, some of the borings encountered approximately 3 to 7 inches of asphalt, of which several were underlain by 2 to 3 inches of gravel subbase. Beneath the surficial layer of asphalt or topsoil, old fill and two natural soil strata were encountered within the 10 to 55 foot auger termination depths. These strata are described in the subsequent text. Please refer to the boring logs and presented in the Appendix for detailed information at specific boring locations.

Old Fill

Existing fill and possible fill were encountered in all of the borings drilled across the site at depths ranging from approximately 2 to 16 feet below the existing ground surface. The majority of the existing fill and possible fill material encountered generally consisted of Clayey or Silty SAND (SC, SM) with varying amounts of wood, quartz, brick, and asphalt fragments, and organics. The remainder of the fill material encountered consisted of GRAVEL (GM, GC, GP) and SILT (ML), and CLAY (CL). Standard Penetration Test (SPT) N-values in the cohesive soils indicated a medium stiff consistency, with SPT N-value resistances on the order of 7 blows per foot (bpf). SPT N-value resistances in the granular soils ranged from 4 bpf to more than 50 blows per 5 inches of penetration, which indicates a relative density of loose to very dense. Please note that the very dense relative density in this circumstance is likely due to the presence of coarse rock materials within the fill matrix. In addition, due to the previous site development old fill soils of varying depths and composition are expected to be present across the site.

Stratum I- Natural Soil

The natural soil stratum consisted of interbedded layers of SAND (SM, SC), SILT (ML, MH), CLAY (CL, CH), and GRAVEL (GM, GC). Generally, the majority of the soils contained varying amounts of sand, clay, silt, and quartz fragments. SPT N-value resistances in the granular soils ranged from 4 bpf to more than 71 bpf, which indicates a relative density of loose to very dense. SPT N-value resistances in the cohesive soils ranged from 4 bpf to 18 bpf, which indicates a consistency of soft to very stiff. All but Boring MSP-3 were terminated within the natural soil of Stratum I. Within Boring MSP-3, Stratum I extended to a depth of approximately 40 feet below the existing ground surface.

Stratum II- Weathered Rock

Underlying Stratum I, saprolitic material was encountered as the soils transitioned into the underlying bedrock. Boring MSP-3 encountered weathered rock at a depth of 40 feet below the existing ground surface and was extended approximately 55 feet at which the SPT N-values were on the order of 50 blows per 4 inches of penetration, after which a temporary piezometer was installed to record groundwater depths. For the purposes of this report, saprolite or highly weathered rock is defined as material that consistently exhibits SPT resistances in excess of 60 bpf and maintains a relic rock structure. The weathered rock at this site is expected to be GNEISS.

Please refer to the table below for the approximate depth and elevation of the existing fill material encountered across the site during our subsurface exploration.

Boring No.	Depth of Fill (ft)	Approx. Elevation of Fill (ft)	Notes
B-1	5.0	391.0	
B-2	8.0	397.0	
B-3	2.0	403.0	
B-4	2.0	376.0	
B-5	2.5	362.0	
KKP-1	13.0	377.0	
MS-1	8.0	360.0	
MS-2	8.0	356.0	
MSP-3	4.5	359.5	
NW-1	2.0	377.0	
NW-2	8.0	366.0	
NW-3	4.5	370.5	
NW-4	8.0	378.0	
NW-5	5.0	372.0	
PSP-1	3.5	388.5	
PS-2	2.5	389.5	
PS-3	8.0	391.0	
PS-4	13.0	386.0	
PS-5	16.0	383.0	
PS-6	4.5	396.5	
PS-7	8.0	395.0	Possible Fill 5'-8'
PS-8	4.5	399.0	Possible Fill at 2'-4.5'
PS-9	4.5	397.5	
PS-10	8.0	394.0	
QM-1	2.5	389.0	
QM-2	2.0	396.0	
QMP-3	2.0	382.0	
W-1	8.0	382.0	
W-2	4.5	385.5	
W-3	4.5	385.5	
W-4	2.0	362.0	

Groundwater Observations

Observations for groundwater were made during sampling and upon completion of drilling operations at each boring location. Groundwater seepage was observed during drilling operations in only 3 of the 31 borings: Borings PSP-1, PS-10, and QMP-3 at depths of approximately 22.0, 28.5, and 20.0 feet, respectively, below the existing ground surface. These groundwater depths correspond to elevations ranging from approximately EL. 364.0 to EL. 373.5.

Additionally, four of the borings (PSP-1, MSP-3, KKP-1, and QMP-3) were converted to temporary piezometers to record groundwater levels at the site. Based on our readings, groundwater was encountered at depths ranging from approximately EL. 346.8 to EL. 370.3 feet. With the exception of the Middle School basement level, groundwater was not encountered within the proposed excavation depth. Based on the depths to groundwater encountered and our understanding of the proposed development, we do not anticipate that groundwater will present a significant impact on construction procedures or that the construction procedures will impact the groundwater conditions in the vicinity of the project site.

In auger drilling operations, water is not introduced into the boreholes, and the groundwater position can often be determined by observing water flowing into or out of the boreholes. Furthermore, visual observation of the moisture content of soil samples retrieved during the auger drilling exploration can often be used in evaluating the groundwater conditions.

Please see the chart below for detailed groundwater information at each piezometer location.

Piezometer No.	Date	Approx. Depth of Piezometer (ft)	Water Level (ft)	Approx. Water Elevation (ft)	Notes
PSP-1	03/31/2004	30	-	-	Not Yet Installed
MSP-3	03/31/2004	40	15.4	348.6	
KKP-1	03/31/2004	18	DRY	DRY	Dry to bottom depth of 18'
QMP-3	03/31/2004	25	-	-	Not Yet Installed
PSP-1	04/08/2004	30	-	-	Not Yet Installed
MSP-3	04/08/2004	40	17.2	346.8	
KKP-1	04/08/2004	18	DRY	DRY	Dry to bottom depth of 18'
QMP-3	04/08/2004	25	-	-	Not Yet Installed
PSP-1	04/12/2004	30	22.3	369.7	
MSP-3	04/12/2004	40	39.5*	324.5	*Anomalous reading
KKP-1	04/12/2004	18	DRY	DRY	Dry to bottom depth of 18'
QMP-3	04/12/2004	25	18	366.0	
PSP-1	04/20/2004	30	21.7	370.3	
MSP-3	04/20/2004	40	17.1	346.9	
KKP-1	04/20/2004	18	DRY	DRY	Dry to bottom depth of 18'
QMP-3	04/20/2004	25	17.3	366.7	

During drilling operations the depth at which the borehole caves in is recorded at each test location. Generally, the borehole may cave in due to the presence of cohesionless soils. However, the cave in depth in some circumstances may be indicative of potential groundwater activity. Cave in depths during drilling operations ranged from approximately 1 to 40 feet below the existing ground surface, with typical depths of ranging approximately 15 to 18 feet below the existing surface.

The highest groundwater observations are normally encountered in the late winter and early spring. Generally, variations in the location of the long-term water table may occur as a result of changes in precipitation, evaporation, surface water runoff, and other factors not immediately apparent at the time of this exploration. The project site may also be subject to shallower perched water conditions where surface water becomes trapped within the variable composition of the existing fill or within granular deposits underlain by more cohesive soils. Where perched groundwater is encountered, surficial groundwater control, such as trenching or French Drains, may be required. For excavations which terminate above the groundwater table, dewatering can generally be performed by sump pit and pumping operations.

ANALYSIS AND RECOMMENDATIONS

Based on the results of our subsurface exploration, it appears that the site is suitable for the proposed development scheme. Based on the depths of groundwater encountered, we do not anticipate that localized dewatering operations during construction will present an impact on existing groundwater conditions. The primary factor that will affect the proposed development is the presence of existing fill material, the presence of high plasticity soils (CH, MH), and the proximity of the existing structures.

Existing fill was encountered in all of the borings performed at depths ranging from approximately 2 to 16 feet below the exiting surface. However, the majority of the deep fill areas (5 to 16 feet) were encountered within areas where proposed below grade levels are planned, with the exception of the proposed connector between the Wannan Gym and the Kenworthy/Kogod Building and the proposed alternate location of the Quaker Meeting house northwest of the existing Zartman House. In areas where below grade levels are planned, all or most of the old fill soils are expected to be removed during excavation operations. Given the lack of documentation that would substantiate that the fill soils were placed in a controlled manner, we do not recommend supporting any structure directly on the existing fill soils since undesirable differential settlements may occur. Subsequently, undercut and replacement, drilled shafts, or Geopiers may be required in the connector and alternate Quaker Meeting House areas.

The proximity of the adjacent existing structures may present construction related difficulties on this project. Underpinning of the Wannan Gym Building, the Harrison Upper School Building, and the Zavitz Middle School Building will most likely be required.

The following sections present additional analysis and recommendations with regards to the proposed construction, including recommendations concerning the adjacent structures, the presence of high plasticity soils (CH, MH), the presence of the existing fill, and recommendations for the allowable soil bearing pressure for the proposed structures.

Subgrade Preparation and Earthwork Operations

The initial subgrade preparation operations should include the removal and disposal of any existing structures within any proposed footprint, including all foundations, floor slabs, underground utilities and any other below grade structures.

Disposal of all demolition debris should be in accordance with local, state, and Federal regulations. Any existing utilities that are not planned to be reused should be removed, along with any unsuitable backfill materials, and capped at the property lines, or rerouted around the property and reconnected. The suitability of any existing utilities and utility trench backfill that will remain in place should be evaluated for structural support in the field by the Geotechnical Engineer. Care should be exercised during site grading operations so as to not damage any utilities that are to remain. Additionally, care should be exercised during demolition operations

to prevent damage to the original building which will remain, and to prevent undermining or disturbance of the footings of the structure.

Following demolition operations, the existing ground surface should be stripped of all vegetation, rootmat, topsoil, and any soft or unsuitable materials from the proposed building, parking structures and any other pavement areas. The stripping of the proposed building area should be extended at least 10 feet, where possible, beyond the planned limits of the proposed building and pavements. Stripping limits should be extended an additional 1 foot for each foot of fill required at the buildings exterior edge.

After stripping to the desired grade and performing all necessary excavation and prior to any engineered fill placement, the exposed soils should be carefully examined to identify any localized loose, yielding or otherwise unsuitable materials by an experienced Geotechnical Engineer or his authorized representative. After examining the exposed soils, loose and yielding areas can be identified by proofrolling with an approved piece of equipment, such as a loaded dump truck, having an axle weight of at least 10 tons. Any soft or unsuitable materials encountered during this proofrolling should be removed and replaced with an approved backfill compacted to the criteria given below.

The preparation of any areas to receive engineered fill should be observed on a full-time basis. These observations should be performed by an experienced geotechnical engineer, or his representative, to ensure that all unsuitable materials have been removed, and that the subgrade is suitable for support of the proposed construction and/or fills. In some areas, excessively soft and/or wet soils may be encountered for fill subgrades, especially in the winter or early spring months. We strongly recommend against utilizing soil bridging lifts to span over soft fill subgrade soils within the expanded building limits. All soft areas should be excavated and removed.

Fill Placement

Any soil placed as engineered fill should be an approved material, free of organic matter or debris, be a non-frost susceptible soil, and have a liquid limit and plasticity index less than 40 and 20, respectively. Unacceptable fill materials include topsoil, organic materials (OH, OL) and high plasticity silts and clays (CH, MH). All such materials removed during grading operations should be either stockpiled for later use in landscape fills, or placed in approved disposal areas either on site or off site.

The on-site materials may be reused as engineered fill provided that they do not contain organics, foreign debris, rock fragments greater than 4 inches in diameter, and conform to the criteria outlined below. Moisture adjustment will most likely be required to condition the on-site material before its placement in new structural fill areas. The suitability of the material encountered for reuse as engineered fill should be evaluated at the time of construction.

Fill should be placed in lifts not exceeding 8 inches in loose thickness, and moisture conditioned to within ±2 percentage points of the optimum moisture content. We recommend that each lift

be compacted to a minimum of 95% of the maximum dry density obtained in accordance with ASTM Specification D-698, Standard Proctor Method. The upper one foot of soils supporting slabs-on-grade, pavements, sidewalks, or gutters should be compacted to a minimum of 100% of the maximum dry density obtained in accordance with the ASTM Specification D-698, Standard Proctor Method discussed above.

All fill operations should be observed on a full-time basis by an authorized representative of the Geotechnical Engineer of Record to determine that compaction requirements are being met. All fill shall be periodically tested to confirm that compaction is being achieved. A sufficient number of tests shall be taken in each lift before the next lift is placed, on the order of at least one test per 2,500 square feet of area on each lift. The elevation and location of the tests should be clearly identified and recorded at the time of fill placement. We recommend that the expanded footprint of the building areas be well staked, including the limits of the fill zones, if any, at the time of fill placement. Grade control should be maintained throughout the earthwork operations. The elevation and location of all compaction tests should be clearly identified and recorded at the time of fill placement.

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

Building Foundations

Existing fill was encountered in all of the borings performed at depths ranging from approximately 2 to 16 feet below the exiting surface. However, the majority of the deep fill areas (5 to 16 feet) were encountered with areas where proposed below grade levels are planned, with the exception of the proposed connector between the Wannan Gym and the Kenworthy/Kogod Building and the proposed alternate location of the Quaker Meeting house northwest of the existing Zartman House. In order to explore the actual extent and depth of fill within the proposed building footprints it may be beneficial to perform test pitting operations before construction operations begin. Where deep existing fills are encountered (depths greater than 5 feet), either the implementation of an alternative ground improvement technique or the complete removal and replacement of the existing fill in a controlled manner will be required prior to building construction or the placement of additional engineered fill. It should be noted that given the lack of documentation that would substantiate that the fill soils were placed in a controlled manner, we do not recommend supporting the foundations directly on the existing fill soils since undesirable differential settlements may occur.

Shallow Foundations

Based on our findings we recommend that the majority of the proposed structures be supported on shallow spread and/or continuous foundation system. Please refer to the paragraphs below

for additional information pertaining to the recommended allowable bearing capacities for each structure.

In general, based on the finished floor elevations ranging from approximately EL. 387 to EL. 390 within the proposed parking structure we recommend a maximum allowable soil bearing pressure of 5,000 psf. Those soils suitable to support the 5,000 psf pressure may be identified in our boring logs as those natural materials having a minimum penetration value of 15 bpf. However, is should be noted that Boring PS-4 and PS-4 indicated existing fill soils to the approximate finished floor elevation, and in Boring PS-4 a loose layer of natural soil was encountered beneath the fill layer to a depth of approximately 10 feet. Please note that the footings in these areas will need to be stepped down into natural soils that exhibit a minimum N-value resistance of 15 bpf, or these footings will need to be designed for a reduced allowable soil bearing pressure of 3,000 psf. If the footings are stepped down, field testing at the time of excavation will be required in order to determine the exact depth at which the foundations should bear.

Based on our understanding of the proposed Middle School Building addition, the lowest finished floor elevation for the basement level is on the order of EL. 342. We recommend a maximum allowable soil bearing pressure of 5,000 psf for footings bearing at an elevation of EL. 354 or deeper within the Natural Soil Stratum. Those soils suitable to support the 5,000 psf pressure may be identified in our boring logs as those natural materials having a minimum penetration value of 10 bpf.

For the remainder of the buildings, with the exception of the connector between the Wannan Gym and the Kenworthy/Kogod Building, footings placed to bear on properly compacted and controlled engineered fill or approved natural soils should be designed for a maximum allowable soil bearing pressure of 3,000 psf. Those soils suitable to support the 3,000 psf pressure may be identified in our boring logs as those natural materials having a minimum penetration value of 10 bpf. It should be noted that, due to the potential variability of naturally occurring soils, some of the footings may require "stepping down" or overexcavation of the footings in order to achieve the recommended soil bearing pressure.

High plasticity soils (CH, MH) were encountered within the borings performed throughout the development area. Should any high plasticity soils be encountered at footing subgrades or within 2 feet below, it is recommended that the foundations be extended to a depth of 4 feet below the finished exterior grade or the depth of the high plasticity soils, which ever is less. This will extend the foundation bearing elevation to a sufficient depth below the anticipated depth of seasonal moisture change. At the recommended 4 foot embedded depth, the foundations may bear on either low or high plasticity soils. The foundations may either step down to depths of 4 feet below finished exterior grade or the footings may be undercut to a depth of 4 feet and backfilled to the original bearing elevation. Undercutting of the footing and backfill of granular backfill or gravel is not recommended as this would create a reservoir condition which would saturate the plastic soils. Footings constructed in plastic clay soils should be excavated using a neat excavation and backfilled entirely with concrete.

In order to reduce the possibility of foundation bearing failure and excessive settlement due to local shear or "punching" action, we recommend that continuous footings have a minimum width of 1.5 ft and that isolated column footings have a minimum lateral dimension of 2.5 ft. In addition, footings should be placed at a depth that provides adequate frost cover protection. For this region, we recommend footings in heated areas be placed at a minimum depth of 2 feet below finished grade. Footings in unheated areas should be placed at a minimum depth of 2.5 feet below finished grade.

The fine contents of the on-site clayey and silty soils are considered moisture and disturbance sensitive, and are especially sensitive to the combination of construction traffic under high moisture conditions. For this reason, footing excavations, formwork and pouring concrete for footings should be all performed on the same day. In the event footing excavations and construction cannot be completed on the same day, or if water is likely to intrude into the footing excavations and hinder construction operations, lean concrete "mud mat" should be used to protect the bearing soil surface.

All continuous wall foundations must be suitably reinforced with longitudinal reinforcing bars. To provide continuity and minimize differential movements, the longitudinal reinforcing steel should be continuous through the building corners. Should stepping of the continuous wall foundations occur due to changes in the exterior grades and/or the required minimum footing founding depths, the stepping should not exceed a slope of 2 horizontal to 1 vertical. The continuous steel reinforcement must conform to the stepping of the wall foundations.

Settlement of a structure is a function of the compressibility of the natural soils, the design bearing pressure, column loads, fill depths, and the elevation of the footing with respect to the original ground surface. Based on the anticipated loads, total settlement values of less than one inch are expected.

Prior to placing any foundation concrete, the soil conditions along continuous wall foundations and at all individual footing locations should be verified by a qualified soil technician or Geotechnical Engineer. The steel reinforcement must then be checked for proper size and position of steel bars as per the finalized project plans and specifications.

Deep Foundations

Due to the presence of existing fill material, deep foundations extending through the fill into natural soils are recommended for the connector between the Wannan Gym and the Kenworthy/Kogod Building. Additionally, if bearing capacities greater than 5,000 psf are desired for the proposed Zavitz Middle School Building addition, deep foundations bearing within the Weathered Rock Stratum would be an alternative.

Boring KKP-1 performed within the footprint of the proposed connector between the Wannan Gym and the Kenworthy/Kogod Building indicated up to 13 feet of existing fill. Due to the depth of fill and the proximity of the existing structures, removal and replacement of the fill in this area is not expected to be a feasible option. Therefore, a foundation system extending

through the existing fill, such as drilled shafts would be a feasible alternative. This system should consist of the use of straight shaft caissons or drilled piers extending through the existing fill material and bearing in natural soils. Based on our Boring KKP-1, the natural soils directly beneath the existing fill indicated SPT N-values ranging from 21 to 37 bpf. Caisson foundations supported by this layer may be designed for an allowable bearing pressure of 10,000 psf. For design and construction planning, materials capable of supporting this design bearing pressure may be identified on the boring log as those natural materials having Standard Penetration Test N-values of at least 20 bpf.

Based on our understanding of the anticipated column loads for the proposed Middle School Building addition, it may be more desirable to consider a deep foundations system such as drilled shafts. This system should consist of straight shaft caissons or drilled piers extending through the existing fill material and bearing in the Weathered Rock Stratum. Based on our Boring MSP-3, the Weathered Rock Stratum was encountered at an elevation of approximately EL. 324 feet. Caisson foundations supported by this layer may be designed for an allowable bearing pressure of 60 ksf. For design and construction planning, materials capable of supporting this design bearing pressure may be identified on the boring log as those natural materials having Standard Penetration Test N-values of at least 60 bpf. For uplift design, an ultimate skin friction value of 2 tsf may be used for rock materials which have N-values greater than or equal to about 50 blows per 4 inches.

Actual foundation bearing elevations may vary due to natural soil and rock variations which may occur between the test borings. Adjustments to these estimated elevations may also be necessary due to structural considerations. Individual caisson excavations should be evaluated at the time of construction in order to verify suitable bearing subgrade and minimum penetration into the weathered rock.

Drilled piers bearing on suitable weathered rock are expected to experience total settlements less than 1 inch. Differential settlement between any adjacent column locations is expected to be about half of the total settlement value.

We recommend that all caisson bottoms be observed and approved by a geotechnical engineer prior to concrete placement. Inspection of drilled piers for suitable bearing materials is a combination of visual inspection and physical testing. A minimum of 20 percent of all drilled shafts should be investigated by a small diameter rock probe procedure extended below the caisson bottom to at least 2 times the caisson diameter, but in no case less than 5 ft. An experienced geotechnical engineer or his authorized representative should observe the performance of these probes by the contractor to determine the suitability of the rock below the caisson bearing elevation. Although 20 percent of all caissons should be checked by this procedure, it is usually recommended that the initial caissons all be checked using probe holes, with only minimum probe hole verification used in subsequent caissons after familiarity with the rock conditions is established by all parties working on the drilled pier system. Drilled piers should be lined and sized with a minimum diameter of 30 inches, in order to permit access for cleaning and inspection. The contractor will be required to provide all necessary equipment for ingress and egress as well as compliance with VOSHA regulations.

We anticipate that temporary steel casing will be required when drilling through the upper layers of proposed fill and residual soil. Concrete may be placed using a direct fall method, as long as the concrete is not allowed to strike the sides of the caisson liner, or any reinforcing steel. If concrete free falls and strikes obstructions, it can segregate, resulting in undesirable strength properties. Otherwise, it has been our experience that the free fall method of installation results in compact concrete. In the upper 5 feet of the drilled pier, the use of vibratory equipment to further consolidate the concrete will be required.

Since temporary liners will be needed, the concrete may be placed using a "pour and pull" technique. In this operation, it is critically important that the depth of the concrete be monitored to ensure positive pressure of concrete as the liner is extracted and that the elevation of the concrete be maintained above the bottom of the liner until final extraction of the liner. During placement operations, the elevation of the concrete should be monitored. At no time should the relative elevation of the concrete increase during extraction. This implies that the concrete is adhering to the shaft of the liner, which can result in a vacuum pressure, resulting in contamination of the caisson shaft. If it is expected that any caisson shafts are contaminated in this method, then it will be necessary to core drill the caisson, to determine shaft integrity.

Geopiers^R

Geopiers^R are a ground improvement technique that are expected to be an applicable alternative where deep old fill soils are present, such as in the connector between the Wannan Gym and the Kenworthy/Kogod Building. Geopiers^R are drilled shafts (typically 30 inches in diameter) that are drilled into the old fill soils and filled with compacted aggregate. The aggregate is compacted in layers, and results in "bulging" of the shaft sidewalls that both densifies the existing soil matrix and promotes skin friction between the Geopiers^R and the soil matrix.

If Geopiers^R are selected as a ground improvement technique, the final design must be submitted and sealed by the Geopiers^R designer since Geopiers^R are a patented methodology. It is anticipated that bearing capacities on the order of 4,000 psf to 6,000 psf can be provided if Geopiers^R are used. These Geopiers^R will most likely be bearing within or through the existing fill at a depth of approximately 10 to 15 feet below the existing surface.

Geopiers^R are a structural element, and should be designed by the licensed Geopier^R foundation installer. Typically, this will require submission of design drawings to the Geopier^R license holder, who will also be responsible for designing the system in order to control settlement. We recommend that Geopiers^R be designed to limit maximum settlement to no greater than one inch, and differential settlement between any adjacent footings to less than ½ inch. These settlement estimates consistent with the estimates achieved using the spread footing alternative.

Seismic Design Consideration

In accordance with Table 1615.1.1 of the 2000 International Building Code (IBC), Site Class D should be utilized for seismic analysis. These classifications are based on the subsurface conditions encountered during our exploration and on our knowledge of the local geology.

Floor Slab/Garage Slab Design

Any new fill placed for slab-on-grade support should be performed in accordance with the guidelines set forth in the section entitled Subgrade Preparation and Earthwork Operations. Where unsuitable soils are encountered in the slab area, they should be removed and replaced with approved engineered fill materials.

If expansive soils are encountered immediately beneath the floor slab area, they should be excavated to a depth of 2 feet below the subgrade of the slab-on-grade, or the depth of the expansive soil, whichever is less. Furthermore, if fill is required to reach the slab on grade elevation, the expansive clay should be removed so that there is a minimum of 2 feet of non-expansive soil below the floor slab.

If floor loads in excess of 500 psf are expected, we recommend that the granular material beneath the floor be increased to a minimum thickness of 6 inches, with additional reinforcing placed, as determined by the structural engineer.

Since the garage slab-on-grade will serve as the pavement surface for the parking structure and will be subjected to vehicle traffic, we recommend that the garage slab consist of a minimum of 6 inch thick reinforced concrete pavement underlain by a minimum of 6 inch of compacted 21A base stone.

We recommend that the floor slab be isolated from the foundation footings so that differential settlement of the structure will not induce shear stresses in the floor slab. Also, in order to minimize the crack width of any shrinkage cracks that may develop near the surface of the slab, we recommend mesh reinforcement for the slab of the commercial structures and steel reinforcement for the garage floor slab be included in the design. The size distubution and spacing of the reinforcing steel should follow ACI guidelines and be determined by the project structural engineer. The mesh should be in the top half of the slab to be effective. Special attention should be given to the surface curing of the slab in order to minimize uneven drying of the slab and associated cracking.

We also recommend the slabs on grade be underlain by a minimum of 4 inches of granular material having a maximum aggregate size of 1.5 inches and no more than 2% passing the #200 sieve. This granular layer will facilitate the fine grading of the subgrade and help prevent the rise of water through the floor slab. Where the subgrade elevation of the slab-on-grade changes, the granular layers under the different levels of the slab should be all hydraulically connected to a suitable outfall to facilitate removal of water that may reach the stone layer under any of these levels. Prior to placing the granular material, the floor subgrade soil should be properly compacted, proofrolled, and free of standing water, mud, and frozen soil. Before the placement

of concrete, a vapor barrier may be placed on top of the granular material to provide additional moisture protection. This recommendation does not apply to the parking garage.

Below-Grade Wall Design

Below-grade walls should be designed for a linearly increasing active lateral pressure of 60 psf per vertical foot of the wall height, in addition to any surcharge load that may be placed within a 45 degree slope from the base of the walls. The influence of existing adjacent building loads must also be incorporated into the design. This lateral earth pressure assumes that a backfill composed of properly drained SILT (ML) or more granular soils, extending to a level of approximately one foot below the final outside grade, will be placed behind the walls in accordance with the fill placement guidelines provided in the Subgrade Preparation and Earthwork Operations section, and drainage of wall backfill will be provided. The "Lateral Earth Pressure Diagram" enclosed in the Appendix depicts our general recommendations concerning design lateral earth pressures.

The uppermost one-foot of fill should consist of a silty clay material (CL) that will minimize the amount of surface water infiltration into the granular material and, thus, reduce the excess water to be handled by the drainage system. Fill placed adjacent to the below grade walls should not be overcompacted. Heavy earthwork equipment should maintain a minimum horizontal distance away from the below grade walls of one foot per foot of vertical wall height. Lighter compaction equipment should be used close to the below grade walls.

To achieve a desirable balance between minimizing excessive pressures against the below grade walls and reducing the settlement of the wall backfill, we recommend that all wall backfill materials be compacted to 92% to 95% of the maximum dry density obtained in accordance with ASTM Specification D-698, Standard Proctor Method. Where the fill materials will be supporting walkways, driveways, stoops or gutters, the upper 1 foot should be compacted to 95% of the maximum dry density referenced above. All the recommendations above assume that a level backfill composed of properly drained SILT (ML) or more granular soils, extending to a level of approximately 1 foot below the final outside grade, will be placed behind the walls in accordance with the fill placement guidelines provided in the Subgrade Preparation and Earthwork Operations section of this report.

Below-Grade Drainage

We recommend the buildings with below grade walls be provided with a subdrainage system, designed to flow by gravity and discharged into suitable outfall. As required by the Building Code, all below grade walls must, at a minimum, be dampproofed, and the proposed buildings should also have an exterior perimeter drainage system. The dampproofing shall extend from top of the footings to above the finished exterior grade, and shall consist of sealing holes, recesses, joints and penetrations with an approved bituminous material, followed by parging the masonry walls with a 3/8-inch minimum coat of Portland Cement, and applying at least one coat of approved bituminous material at the recommended rate.

Drainage of the wall backfill may be accomplished by the use of longitudinal drain lines placed behind the below-grade walls, and sloped to discharge by gravity into suitable outfalls. The drainage systems should be exterior to the below-grade walls, and should include either granular backfill or manmade drainage materials to remove water from the soils retained behind the walls. A typical Below Grade Drainage Detail is included in the Appendix of this report.

A typical perimeter drainage system consists of slotted corrugated drain pipe located outside the perimeter of the below grade exterior walls and slightly below the basement floor level. These drain lines should be surrounded by a minimum of 6 inches of free draining granular material (VDOT No. 57). The granular drainage material should be wrapped with geotextile fabric. As previously mentioned, we recommend that the basement floor slab be underlain by a minimum of 4 inches of free draining granular material. The underslab drainage blanket and the drain tiles should be designed to discharge by gravity into suitable outfalls.

Construction Dewatering

Based on the depths to groundwater encountered and our experience on similar projects, we do not anticipate that groundwater will present a concern on this project. However, construction groundwater control methods may be necessary in order to facilitate the below grade level construction, specifically in the lowest level of the Zavitz Middle School addition. Where groundwater is encountered, we anticipate that sump pit and pumping operation will be sufficient for dewatering the bottoms of the excavations. Additionally, any below grade walls included in the final design should be properly drained in accordance with recommendations provided in the Below Grade Wall Drainage section of this report.

Ditching, and the use of sump pits and pumping, should be undertaken during the excavation to control the flow of perched or isolated groundwater as it is encountered. Multiple sump pits and pumps may be required as isolated and random pockets of groundwater are anticipated. We do not anticipate that dewatering procedures will impact the existing groundwater level in the vicinity of the project site.

Excavation Slopes and Support

Due to the proximity of the existing roadways (Wisconsin Avenue) and buildings on the campus to the proposed construction, laying back the side slopes with the excavations required to establish a below grade level may not be feasible. Therefore, where the proposed buildings will have below grade levels a temporary excavation support system may be required, a free draining system consisting of soldier piles and wood lagging with internal bracing or tie-backs would be appropriate. The spacing of the soldier piles and braces should be determined by a structural analysis. The design of the retention system is beyond this scope of work; however, we recommend that a maximum center-to-center spacing of soldier piles not exceed 8 feet. In addition, the wood lagging should have a minimum thickness of 4 inches. The design of the earth retention system is, however, beyond the scope of this report.

The soldier piles and wood lagging system should be braced externally using tieback anchors or internally using rakers. The soldier beam and wood lagging retention system should be freely draining, and designed to withstand lateral earth pressures of at least 35H in pounds per square feet, where H is the excavation height in feet. The influence of any surcharge loads should also be considered. This may consist of any additional lateral load transmitted by adjacent roadways and temporary construction loads. In the areas where adjacent structures have footings which would surcharge the earth retention system, an increase in the lateral earth pressure is necessary. This increase in pressure is recommended so that a stiffer system will be designed in these areas.

The contractor should avoid stockpiling excavated materials or equipment immediately adjacent to the excavation walls. We recommend that stockpiled materials be kept back from the excavation a minimum distance equal to 1/2 the excavation depth to limit surcharging the excavation walls. If this is impractical due to space constraints, the excavation walls should be retained with bracing designed for the anticipated surcharge load. In addition, the earth retention system design should consider surcharge loads from cranes and other construction equipment during construction as well as buildings.

Underpinning Considerations

Due to the close proximity of the adjacent Harrison Upper School Building to the proposed parking structure, the proximity of the Wannan Gym Building to the proposed new gym, and the proximity of the proposed addition to the Zavitz Middle School building, underpinning of the Wannan Gym Building, the Harrison Upper School Building, and the Zavitz Middle School Building will most likely be required. Although the actual foundation support of these building is unknown at this time, we anticipate that the structures are constructed on a system of shallow foundations and that that excavation required to establish the below grade level of the proposed buildings will extend below the adjacent footing subgrade elevation.

Underpinning may consist of concrete piers constructed using alternate pit-lagging systems bearing on suitable foundation materials below the proposed subgrade level. As an alternative, it may also be feasible to provide underpinning using a system of bracketed soldier beams (incorporating the temporary excavation bracing system), helical anchors, or mini-piles. As in the case for concrete pier underpinning, the soldier beam pile system should also bear below the proposed excavation subgrade. The design of a specific underpinning system was beyond the scope of this report. The final design of the underpinning should be performed by a specialty contractor. The design of the underpinning system should also be coordinated with the design of the earth retention system.

Adjacent Monitoring

Due to the proximity of adjacent (within a 1 block radius) buildings and roadways, we recommend that a settlement monitoring program be considered for implementation during

construction operations. The monitoring program should consist of monitoring nearby buildings, streets and utilities for settlement during construction.

Our experience in this area has indicated that settlement due to dewatering operations is not a major concern. However, settlements induced from lateral deformation of the temporary earth retention systems can cause significant settlement of adjacent structures.

While it is unlikely that significant settlement of adjacent structures and streets will occur if proper workmanship is employed during construction, it is prudent to perform such monitoring to defend against unfounded claims of structural damage by adjacent property owners. By having data available, such claims can be appropriately addressed.

In addition, if a monitoring program is implemented, we recommend a precondition survey of adjacent buildings and roadways to document existing structural distress prior to initiation of excavation operations. We would be pleased to provide these services as well as settlement monitoring services during construction.

Site Utilities

Special attention should be given to ensure that the utilities are not located within the zone of influence of new foundations. The influence zone of a foundation is defined as the area beneath a 45° line extending downward from the exterior edge of the exterior footing. A Zone of Influence Diagram is included in the Appendix of this report.

If it is determined that the foundations are to be located within the above described envelope, then the foundation should be lowered to an elevation where it is outside of this envelope. Special consideration should also be given to the extent of the utility easement. The utility itself may be outside of the zone of influence, however, any excavations made within the easement, such as for repairs, may fall within the influence zone and have an effect on adjacent house foundations. Undermining of adjacent foundations must be prevented. This may be accomplished by moving the utility easement outside of the zone of influence of the adjacent structures, by extending down the footings of the adjacent structures, by shoring during excavation, or by the placement of a permanent structure or sleeve so that excavations to a certain depth will not be necessary.

Construction Considerations

Major difficulties during construction of this project are not anticipated, provided that some precautionary measures are taken to ensure that preparation of the subgrade and footing bearing surfaces are accomplished by the recommended procedures. These precautions are necessary, as the materials observed in our borings are moisture and disturbance sensitive, and will become weakened if water intrudes into the footing excavations. Therefore, we recommend that all excavations be properly dewatered, if necessary, using conventional sump pit and pumping

operations. The site should be graded such that surface water runoff is directed away from the excavations.

Exposure to the environment may weaken the soils at the footing bearing level if the foundation excavations remain open for too long a time. Therefore, foundation concrete should be placed the same day that excavations are dug. If the bearing soils are softened by surface water intrusion or exposure, the softened soils must be removed from the foundation excavation bottom immediately prior to placement of concrete. If the excavation must remain open overnight, or if rainfall becomes imminent while the bearing soils are exposed, we recommend that a 1 to 3 inch thick "mud-mat" of "lean" concrete be placed on the bearing soils before the placement of reinforcing steel.

We recommend that all fill operations be observed on a full-time basis by a qualified soil technician to determine if the minimum compaction requirements are being met. Also, as a minimum, we recommend that all structural fills be observed full-time by a qualified soils technician.

The surface of the site should be kept properly graded in order to enhance drainage of the surface water away from the proposed building areas during the construction phase. We recommend that an attempt be made to enhance the natural drainage without interrupting its pattern. All erosion and sedimentation shall be controlled in accordance with sound engineering practices and current County requirements. We also recommend that temporary slopes be constructed no steeper than 1.5H:1V and be maintained for no more than 30 days. Permanent slopes should be constructed no steeper than 3H:1V, and protected against erosion, by providing a good vegetative cover.

The surficial soils contain fines which are considered moderately to highly erodible. The Contractor should provide and maintain good site drainage during earthwork operations to help maintain the integrity of the surficial soils. All erosion and sedimentation shall be controlled in accordance with sound engineering practice and current County requirements.

We do not anticipate that the groundwater will present any unusual problems at this site during construction, although if excavations are performed at the site during or shortly following precipitation events, perched water conditions can be encountered and should be handled with conventional pumping and trenching operations. Additionally, it should be anticipated that some discing and/or drying of the site soils may be required prior to using the site soils for placement as engineered fill.

Closing

This report has been prepared for your use and for the use of other design professionals involved with the design and construction of this project. The recommendations included in this report as well as the analysis performed in order to arrive at those recommendations, are based on information provided to us by your office and other members of the design team, as well as our own assumptions based upon our experience with similar projects. If the design for the proposed project should change from that described herein, we recommend that ECS, Ltd. been consulted

for any additional or alternate recommendations that may be warranted. Also, if the need for any additional information or recommendations arises during the project design, we recommend that we be contacted. We will work with the design team in order to aid in the proper implementation of the recommendations included in this report.

APPENDIX

Unified Soil Classification System

Reference Notes For Boring Logs

Boring Logs

Laboratory Testing Summary

Plasticity Chart

Grain Size Analysis

Below-Grade Drainage Details

Lateral Earth Pressure Diagram

Zone of Influence Diagram

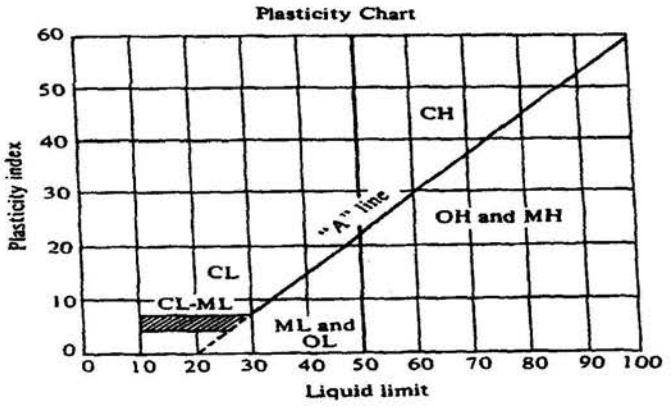
Boring Summary

Boring Location Diagram/Vicinity Map

Unified Soil Unified Classification System (ASTM D-2487)

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

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:
Less than 5 per cent — GW, GP, SW, SP
More than 12 per cent — GM, GC, SM, SC
5 to 12 per cent — *Borderline cases* requiring dual symbols[b]



[a] Division of GM and SM groups into subdivisions of d and u are for roads and airfields only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 28 or less and the P.I. is 6 or less; the suffix u used when L.L. is greater than 28.
[b] Borderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC, well-graded gravel-sand mixture with clay binder.

From Winterkorn and Fang, 1975

REFERENCE NOTES FOR BORING LOGS

I. Drilling and Sampling Symbols:

SS - Split Spoon Sampler
ST - Shelby Tube Sampler
RC - Rock Core: NX, BX, AX
PM - Pressuremeter
DC - Dutch Cone Penetrometer
RB - Rock Bit Drilling
BS - Bulk Sample of Cuttings
PA - Power Auger (no sample)
HSA - Hollow Stem Auger
WS - Wash Sample

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

II. Correlation of Penetration Resistances to Soil Properties:

Relative Density-Sands, Silts

SPT-N	Relative Density
0 - 3	Very Loose
4 - 9	Loose
10 - 29	Medium Dense
30 - 49	Dense
50 - 80	Very Dense

Consistency of Cohesive Soils

Unconfined Compressive Strength, Qp, tsf	Consistency
under 0.25	Very Soft
0.25 - 0.49	Soft
0.50 - 0.99	Firm
1.00 - 1.99	Stiff
2.00 - 3.99	Very Stiff
4.00 - 8.00	Hard
over 8.00	Very Hard

III. Unified Soil Classification Symbols:

GP - Poorly Graded Gravel
GW - Well Graded Gravel
GM - Silty Gravel
GC - Clayey Gravels
SP - Poorly Graded Sands
SW - Well Graded Sands
SM - Silty Sands
SC - Clayey Sands
ML - Low Plasticity Silts
MH - High Plasticity Silts
CL - Low Plasticity Clays
CH - High Plasticity Clays
OL - Low Plasticity Organics
OH - High Plasticity Organics
CL-ML - Dual Classification (Typical)

IV. Water Level Measurement Symbols:

WL - Water Level
WS - While Sampling
WD - While Drilling
BCR - Before Casing Removal
ACR - After Casing Removal
WCI - Wet Cave In
DCI - Dry Cave In

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

CLIENT: JFW, INC.

JOB #: 9807 | BORING #: B-1 | SHEET: 1 OF 1

PROJECT NAME: SIDWELL FRIENDS SCHOOL WISCONSIN AVE.

ARCHITECT-ENGINEER:

SITE LOCATION: WASHINGTON, DC, NW

ECS LTD

ENGLISH UNITS

SURFACE ELEVATION: 404

CALIBRATED PENETROMETER TONS/FT.² (1, 2, 3, 4, 5+)

PLASTIC LIMIT % (X) — WATER CONTENT % (●) — LIQUID LIMIT % (△)

ROCK QUALITY DESIGNATION & RECOVERY RQD% — — — REC.% — 20% 40% 60% 80% 100%

STANDARD PENETRATION BLOWS/FT. (⊗) 10 20 30 40 50+

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0	1	SS	18	14	Topsoil Depth 4"			16
					Silty SAND, Trace Quartz Fragments, Red, Moist, Medium Dense to Dense, (SM-FILL)		400	
	2	SS	18	16				22
5	3	SS	18	16	Silty SAND, With Quartz Fragments, Trace Clay, Yellowish Brown, Moist, Medium Dense to Dense, (SM)			27
								24.2
	4	SS	18	6			395	34
10								
	5	SS	18	12			390	21
15								
	6	SS	18	10			385	25
20								
	7	SS	18	8			380	38
25								
	8	SS	18	4			375	42
30								

END OF BORING @ 30.00'

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

▽WL DRY WS OR (7D)	BORING STARTED 03-25-04	
▽WL(AB) DRY ▽WL(AC)	BORING COMPLETED 03-25-04	CAVE IN DEPTH ● 15.5'
▽WL	RIG 750 FOREMAN D&S	DRILLING METHOD HOLLOW STEM AUGER

RC (04-12-04) RC (04-13-04) RC (04-19-04) RC (04-28-04)

Tmp(10/29/2004)

CLIENT	JOB #	BORING #	SHEET
JFW, INC.	9807	B-2	1 OF 1

PROJECT NAME: SIDWELL FRIENDS SCHOOL WISCONSIN AVE.

ARCHITECT-ENGINEER:

SITE LOCATION: WASHINGTON, DC, NW

ENGLISH UNITS

SURFACE ELEVATION: 405

CALIBRATED PENETROMETER TONS/FT.² (1, 2, 3, 4, 5+)

PLASTIC LIMIT % (X) — WATER CONTENT % (●) — LIQUID LIMIT % (Δ)

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — — — REC.% — 20% 40% 60% 80% 100%

STANDARD PENETRATION BLOWS/FT. (⊗) (10, 20, 30, 40, 50+)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0					Asphalt Depth 3"			
	1	SS	18	14	Silty SAND, With Quartz Fragments, Trace Asphalt Fragments and Mica, Red, Moist, Medium Dense, (SM-FILL)			17
	2	SS	18	14				21
5	3	SS	18	14			400	23
	4	SS	18	14	Silty SAND, With Quartz Fragments, Trace Clay, Brown, Moist, Medium Dense to Dense, (SM)			29
10							395	
	5	SS	18	12				34
15							390	
	6	SS	18	12				39
20							385	
	7	SS	18	10				24
25							380	
	8	SS	18	8				27
30					END OF BORING @ 30.00'			

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

▽WL DRY WS OR WD	BORING STARTED 03-25-04	
▽WL(AB) DRY ▽WL(AC)	BORING COMPLETED 03-25-04	CAVE IN DEPTH ● 17.3'
▽WL	RIG 750 FOREMAN D&S	DRILLING METHOD HOLLOW STEM AUGER

AC (04-12-04) RC (04-12-04) RC (04-19-04) RC (04-29-04)

Time(03/29/2004)

CLIENT: JFW, INC.

JOB #: 9807 | BORING #: B-3 | SHEET: 1 OF 1

PROJECT NAME: SIDWELL FRIENDS SCHOOL WISCONSIN AVE.

ARCHITECT-ENGINEER:

SITE LOCATION: WASHINGTON, DC, NW

ECS LTD

ENGLISH UNITS

SURFACE ELEVATION: 405

CALIBRATED PENETROMETER TONS/FT.² 1 2 3 4 5+

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

ROCK QUALITY DESIGNATION & RECOVERY RQD% — — — REC.% ——— 20% 40% 60% 80% 100%

STANDARD PENETRATION BLOWS/FT. ⊗ 10 20 30 40 50+

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0					Asphalt Depth 4"			
	1	SS	18	12	Clayey SAND, With Quartz and Asphalt Fragments, Grayish Brown, Moist, Medium Dense, (SC-FILL)			
	2	SS	18	14				28
5	3	SS	18	6	Silty SAND, Trace Quartz Fragments, Trace Clay, Brown to Reddish Brown, Moist, Loose to Medium Dense, (SM)		400	32
								17
	4	SS	18	8				20.8 ●
10							395	22
	5	SS	18	4	Silty SAND, With Quartz Fragments, Trace Clay, Yellowish Brown, Moist, Medium Dense to Dense, (SM)			
15							390	20
	6	SS	18	8				
20							385	23
	7	SS	18	5				
25							380	30
	8	SS	18	8				37
30					END OF BORING @ 30.00'			

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

▽WL DRY WS OR ▽WD	BORING STARTED 03-25-04	
▽WL(AB) DRY ▽WL(AC)	BORING COMPLETED 03-25-04	CAVE IN DEPTH ● 14.3'
▽WL	RIG 750 FOREMAN D&S	DRILLING METHOD HOLLOW STEM AUGER

BC (04-12-04) BC (04-13-04) BC (04-19-04) BC (04-29-04)

Time(03/29/2004)

CLIENT: JFW, INC.

JOB #: 9807 | BORING #: B-4 | SHEET: 1 OF 1

PROJECT NAME: SIDWELL FRIENDS SCHOOL WISCONSIN AVE.

ARCHITECT-ENGINEER:

SITE LOCATION: WASHINGTON, DC, NW

ECS LTD

ENGLISH UNITS

SURFACE ELEVATION: 378

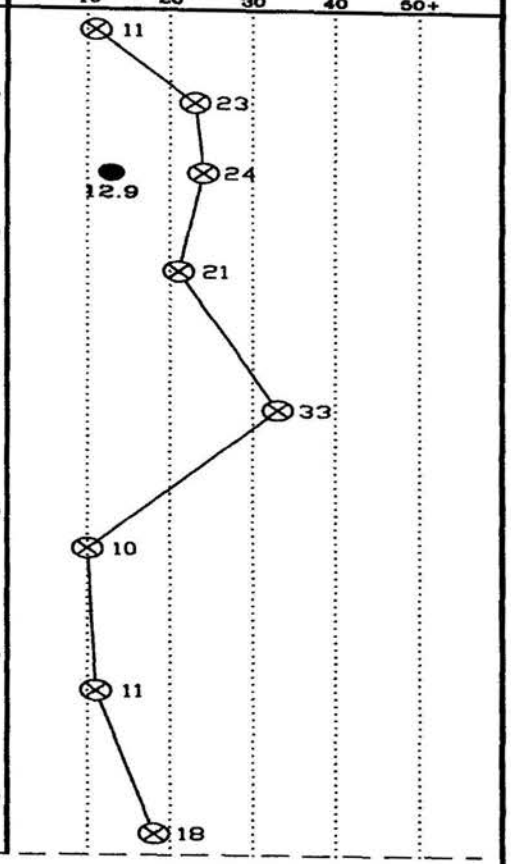
DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)
0	1	SS	18	12	Topsoil Depth 4"		
					Silty SAND, Trace Quartz Fragments, Brownish Red, Moist, Medium Dense, (SM-FILL)		
	2	SS	18	10			375
5	3	SS	18	12	Silty SAND, With Quartz Fragments, Red, Moist, Medium Dense to Dense, (SM)		
	4	SS	18	12			370
10							
	5	SS	18	6			365
15							
	6	SS	18	16	SILT, With Sand, Yellowish Brown, Wet, Medium Dense, (ML)		360
20							
	7	SS	18	16			355
25							
	8	SS	18	16	SILT, With Fine Sand, Yellowish Brown, Moist, Very Stiff, (ML)		350
30							

CALIBRATED PENETROMETER TONS/FT. (1, 2, 3, 4, 5+)

PLASTIC LIMIT % (X) — WATER CONTENT % (●) — LIQUID LIMIT % (Δ)

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — — — REC.% — 20% 40% 60% 80% 100%

STANDARD PENETRATION BLOWS/FT. (⊗): 10 20 30 40 50+



END OF BORING @ 30.00'

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

▽WL DRY	WS OR WD	BORING STARTED 03-28-04	
▽WL(AB) DRY ▽WL(AC)		BORING COMPLETED 03-28-04	CAVE IN DEPTH ● 15.5'
▽WL		RIG 750 FOREMAN D&S	DRILLING METHOD HOLLOW STEM AUGER

RC (04-12-04) RC (04-13-04) RC (04-19-04) RC (04-28-04)

Time(03/28/2004)

CLIENT: JFW, INC.

JOB #: 9807 | BORING #: B-5 | SHEET: 1 OF 1

PROJECT NAME: SIDWELL FRIENDS SCHOOL WISCONSIN AVE.

ARCHITECT-ENGINEER:

SITE LOCATION: WASHINGTON, DC, NW

ECS LTD

DESCRIPTION OF MATERIAL

ENGLISH UNITS

SURFACE ELEVATION: 380

CALIBRATED PENETROMETER TONS/FT.² (1, 2, 3, 4, 5+)

PLASTIC LIMIT % (X) — WATER CONTENT % (●) — LIQUID LIMIT % (△)

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — — — REC.% — 20% — 40% — 60% — 80% — 100%

STANDARD PENETRATION BLOWS/FT. (⊗) (10, 20, 30, 40, 50+)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0	1	SS	18	5	Asphalt Depth 3"		16
					Silty SAND, With Quartz Fragments, Brown to Reddish Brown, Moist, Medium Dense, (SM-FILL)		
	2	SS	18	8			26
5	3	SS	18	10	Silty SAND, With Quartz Fragments, Reddish Brown, Moist, Medium Dense, (SM)	375	24
	4	SS	18	6			22
10						370	
	5	SS	18	3			12
15						365	
	6	SS	18	14	SILT, With Sand, Yellowish Brown, Moist to Wet, Medium Dense, (ML)		10
20						360	
	7	SS	18	16			12
25						355	
	8	SS	18	16	SILT, Trace Sand, Yellowish Brown, Moist, Very Stiff, (MH)		16
30							

END OF BORING @ 30.00'

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

▽WL DRY WS OR WD	BORING STARTED 03-26-04	
▽WL(AB) DRY ▽WL(AC)	BORING COMPLETED 03-26-04	CAVE IN DEPTH ● 18.0'
▽WL	RIG 750 FOREMAN D&S	DRILLING METHOD HOLLOW STEM AUGER

BC (04-12-04) BC (04-13-04) BC (04-19-04) BC (04-28-04)

Time(03/29/2004)

CLIENT: JFW, INC.

JOB #: 9807 | BORING #: KKP-1 | SHEET: 1 OF 1

PROJECT NAME: SIDWELL FRIENDS SCHOOL WISCONSIN AVE.

ARCHITECT-ENGINEER:

SITE LOCATION: WASHINGTON, DC, NW

ENGLISH UNITS

SURFACE ELEVATION: 390

CALIBRATED PENETROMETER TONS/FT.² (1, 2, 3, 4, 5+)

PLASTIC LIMIT % (X) — WATER CONTENT % (●) — LIQUID LIMIT % (Δ)

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — — — REC.% — 20% 40% 60% 80% 100%

STANDARD PENETRATION BLOWS/FT. (⊗) (10, 20, 30, 40, 50+)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0	1	SS	18	12	Topsoil Depth 4"			5
					Clayey SAND, With Quartz Fragments and Rock Fragments, Trace Brick and Coal Fragments, Grayish Brown, Moist, Loose to Dense, (SC-FILL)			
	2	SS	18	8				4
5	3	SS	18	12			385	41
	4	SS	18	3				20
10							380	
	5	SS	18	8	Silty SAND, With Quartz Fragments, Trace Clay, Yellowish Brown, Moist, Medium Dense to Dense, (SM)			21
15							375	
	6	SS	18	2				4.8
20							370	37
	7	SS	18	16	Clayey SILT, Trace Sand, Yellowish Brown, Wet, Medium Stiff, (ML)			5
25							365	
	8	SS	18	16	SILT, With Sand, Yellowish Brown, Moist, Medium Dense, (ML)			16
30								

END OF BORING @ 30.00'

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

▽WL DRY WS OR WD	BORING STARTED 03-28-04	
▽WL(AB) DRY ▽WL(AC)	BORING COMPLETED 03-28-04	CAVE IN DEPTH ● 26.0'
▽WL	RIG 750 FOREMAN D&S	DRILLING METHOD HOLLOW STEM AUGER

BC (04-12-04) RC (04-13-04) RC (04-19-04) RC (04-29-04)

Time(03/29/2004)

CLIENT	JOB #	BORING #	SHEET
JFW, INC.	9807	MS-1	1 OF 1
PROJECT NAME	**ARCHITECT-ENGINEER**		
SIDWELL FRIENDS SCHOOL WISCONSIN AVE.			
SITE LOCATION			
WASHINGTON, DC, NW			

ECS LTD

CALIBRATED PENETROMETER TONS/FT.² (1, 2, 3, 4, 5+)

PLASTIC LIMIT % (X) — WATER CONTENT % (●) — LIQUID LIMIT % (△)

ROCK QUALITY DESIGNATION & RECOVERY RQD% — — — REC.% ——— (20%, 40%, 60%, 80%, 100%)

STANDARD PENETRATION BLOWS/FT. (10, 20, 30, 40, 50+)

DESCRIPTION OF MATERIAL

ENGLISH UNITS

SURFACE ELEVATION 368

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	STANDARD PENETRATION BLOWS/FT.
0						368		
	1	SS	18	12			Silty SAND, With Quartz Fragments, Trace Asphalt Fragments, Grayish Brown to Red, Moist, Medium Dense, (SM-FILL)	11
	2	SS	18	12				
5	3	SS	18	6		365		20
								15
	4	SS	18	16		360	Sandy SILT, Yellowish Brown, Moist, Loose, (ML)	4
10								
	5	SS	18	16		355	Sandy SILT, Trace Clay, Yellowish Brown, Moist to Wet, Loose to Medium Dense, (ML)	7
15								
	6	SS	18	16		350		9
20								
	7	SS	18	16		345		11
25							END OF BORING @ 25.00'	
30						340		

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

▼WL DRY WS OR (FD)	BORING STARTED 03-26-04	
▼WL(AB) DRY ▼WL(AC)	BORING COMPLETED 03-26-04	CAVE IN DEPTH @ 13.3'
▼WL	RIG 750 FOREMAN D&S	DRILLING METHOD HOLLOW STEM AUGER

RC (04-12-04) RC (04-13-04) RC (04-19-04) RC (04-26-04)

Tbrw(03/29/2004)

CLIENT	JOB #	BORING #	SHEET
JFW, INC.	9807	MS-2	1 OF 1
PROJECT NAME	ARCHITECT-ENGINEER		
SIDWELL FRIENDS SCHOOL WISCONSIN AVE.			
SITE LOCATION			
WASHINGTON, DC, NW			

ECS LTD

CALIBRATED PENETROMETER TONS/FT.² (1, 2, 3, 4, 5+)

PLASTIC LIMIT % (X) — WATER CONTENT % (●) — LIQUID LIMIT % (Δ)

ROCK QUALITY DESIGNATION & RECOVERY
RQD% — — — REC.%
20% 40% 60% 80% 100%

STANDARD PENETRATION BLOWS/FT. (⊗)
10 20 30 40 50+

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
					ENGLISH UNITS			
					SURFACE ELEVATION 364			
0					Asphalt Depth 3"			
	1	SS	18	14	Clayey SAND, Trace Rock Fragments, Brown, Moist, Medium Dense, (SC-FILL)			19
	2	SS	18	12				30
5	3	SS	18	6	Silty SAND, With Quartz Fragments, Trace Clay, Brown, Moist, Medium Dense, (SM-FILL)		360	10
	4	SS	18	16	Silty SAND, Trace Quartz and Rock Fragments, Brown, Moist, Medium Dense, (SM-FILL)		355	9
10					Sandy SILT, With Clay, Yellow, Moist, Loose, (ML)			
	5	SS	18	16			350	5
15								
	6	SS	18	14	Silty SAND, Brownish Gray, Moist, Medium Dense, (SM)		345	14
20								89.5
	7	SS	18	8	Sandy SILT, Green, Moist, Medium Dense, (ML)		340	18
25					END OF BORING @ 25.00'			
30							335	

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

▽WL DRY WS OR WD	BORING STARTED 03-24-04	
▽WL(AB) DRY ▽WL(AC)	BORING COMPLETED 03-24-04	CAVE IN DEPTH ● 17.0'
▽WL	RIG 750 FOREMAN D&S	DRILLING METHOD HOLLOW STEM AUGER

RE (04-12-04) RC (04-13-04) RE (04-19-04) RE (04-28-04)

Tmw(03/25/2004)

CLIENT: JFW, INC.

JOB #: 9807 | BORING #: MSP-3 | SHEET: 1 OF 2

PROJECT NAME: SIDWELL FRIENDS SCHOOL WISCONSIN AVE.

ARCHITECT-ENGINEER:

SITE LOCATION: WASHINGTON, DC, NW

ENGLISH UNITS

SURFACE ELEVATION: 364

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)
0					Asphalt Depth 3"		
	1	SS	18	12	Silty SAND, With Quartz Fragments, Reddish Brown, Moist, Medium Dense to Dense, (SM-FILL)		
	2	SS	18	14			
5	3	SS	18	16	SILT, Trace Sand, Yellowish Brown, Moist, Medium Stiff to Stiff, (MH)		360
	4	SS	18	16			
10							355
	5	SS	18	16			
15							350
	6	SS	18	14	Silty SAND, Trace Mica, Green, Moist, Medium Dense to Very Dense, (SM)		
20							345
	7	SS	18	14			
25							340
	8	SS	18	12			335
30							

CALIBRATED PENETROMETER TONS/FT.^{2} (1, 2, 3, 4, 5+)

PLASTIC LIMIT % (X) — WATER CONTENT % (●) — LIQUID LIMIT % (Δ)

ROCK QUALITY DESIGNATION & RECOVERY RQD% — — — REC.% — 20% 40% 60% 80% 100%

STANDARD PENETRATION BLOWS/FT. (⊗) 10 20 30 40 50+

26, 30, 8, 12, 6, 29, 61.1, 51, 14, 27, 51

CONTINUED ON NEXT PAGE.

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

▽WL DRY WS OR (WD)	BORING STARTED 03-24-04	
▽WL(AB) DRY ▽WL(AC)	BORING COMPLETED 03-24-04	CAVE IN DEPTH ● 40.0'
▽WL	RIG 750 FOREMAN D&S	DRILLING METHOD HOLLOW STEM AUGER

BC (04-12-04) BC (04-13-04) BC (04-19-04) BC (04-29-04)

Time(03/29/2004)

CLIENT	JOB #	BORING #	SHEET
JFW, INC.	9807	MSP-3	2 OF 2
PROJECT NAME	ARCHITECT-ENGINEER		
SIDWELL FRIENDS SCHOOL WISCONSIN AVE.			
SITE LOCATION			
WASHINGTON, DC, NW			

ECS LTD

CALIBRATED PENETROMETER TONS/FT.² (1, 2, 3, 4, 5+)

PLASTIC LIMIT % (X) — WATER CONTENT % (●) — LIQUID LIMIT % (△)

ROCK QUALITY DESIGNATION & RECOVERY ROD% — — — REC.% — 20% 40% 60% 80% 100%

STANDARD PENETRATION BLOWS/FT. (⊗) 10 20 30 40 50+

DESCRIPTION OF MATERIAL

ENGLISH UNITS

SURFACE ELEVATION 364

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)	WATER LEVELS	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
30							
	9	SS	18	16			26
35						330	
	10	SS	18	16			54
40						325	
	11	SS	18	12			63
45						320	
	12	SS	18	12			71
50						315	
	13	SS	4	4		310	50/4
55							
60						305	

Silty SAND, Trace Mica, Green, Moist, Medium Dense to Very Dense, (SM)

WEATHERED ROCK- Sampled as Silty SAND, With Mica, Trace Clay, Green, Moist, Very Dense to Extremely Dense, [WEATHERED ROCK]

END OF BORING @ 55.00'

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

▽WL DRY WS OR ▽D	BORING STARTED 03-24-04	
▽WL(AB) DRY ▽WL(AC)	BORING COMPLETED 03-24-04	CAVE IN DEPTH ● 40.0'
▽WL	RIG 750 FOREMAN D&S	DRILLING METHOD HOLLOW STEM AUGER

RC (04-12-04) RC (04-13-04) RC (04-19-04) RC (04-29-04)

Tmp(03/29/2004)

CLIENT: JFW, INC.

JOB #: 9807 | BORING #: NW-1 | SHEET: 1 OF 1

PROJECT NAME: SIDWELL FRIENDS SCHOOL WISCONSIN AVE.

ARCHITECT-ENGINEER:

SITE LOCATION: WASHINGTON, DC, NW

ECS LTD

ENGLISH UNITS

SURFACE ELEVATION: 385

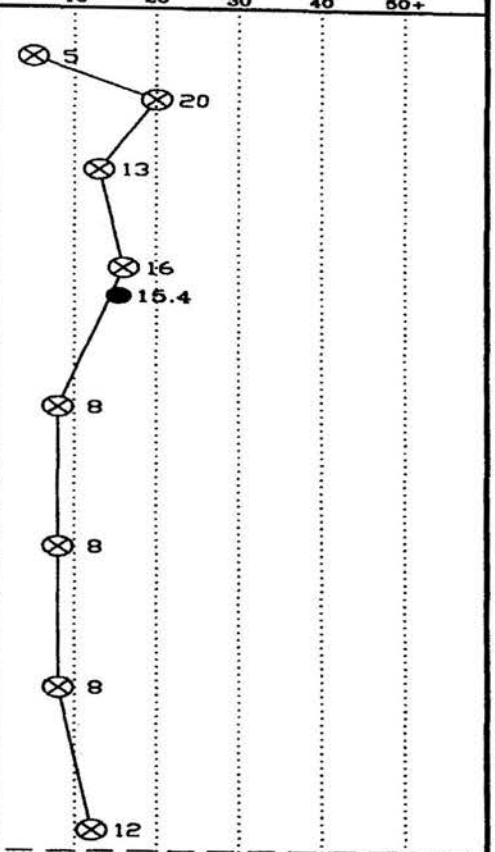
DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)
0					Asphalt Depth 4"		
	1	SS	18	8	Clayey GRAVEL, With SAND, Brownish Gray, Moist, Loose, (GC-FILL)		
	2	SS	18	10			
5	3	SS	18	8	Silty SAND, With Quartz Fragments, Trace Clay, Yellowish Brown, Moist, Loose to Medium Dense, (SM)		380
	4	SS	18	12			
10							375
	5	SS	18	10			
15							370
	6	SS	18	12	SILT, With Sand, Trace Clay, Brownish Moist to Wet, Loose to Medium Dense, (ML)		
20							365
	7	SS	18	12			
25							360
	8	SS	18	14			
30							

CALIBRATED PENETROMETER TONS/FT.²: 1 2 3 4 5+

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

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — — — REC.% ——— 20% 40% 60% 80% 100%

STANDARD PENETRATION BLOWS/FT.: 10 20 30 40 50+



END OF BORING @ 30.00'

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

▼WL DRY WS OR WD	BORING STARTED 03-28-04	
▼WL(AB) DRY ▼WL(AC)	BORING COMPLETED 03-28-04	CAVE IN DEPTH @ 16.0'
▼WL	RIG 750 FOREMAN D&S	DRILLING METHOD HOLLOW STEM AUGER

RC (04-12-04) RC (04-13-04) RC (04-19-04) RC (04-29-04)

Thm(01/29/2004)

CLIENT	JOB #	BORING #	SHEET
JFW, INC.	9807	NW-2	1 OF 1

PROJECT NAME: SIDWELL FRIENDS SCHOOL WISCONSIN AVE.

ARCHITECT-ENGINEER:

SITE LOCATION: WASHINGTON, DC, NW

ENGLISH UNITS

SURFACE ELEVATION: 374

CALIBRATED PENETROMETER TONS/FT.² (1, 2, 3, 4, 5+)

PLASTIC LIMIT % (X) — WATER CONTENT % (●) — LIQUID LIMIT % (△)

ROCK QUALITY DESIGNATION & RECOVERY ROD% — — — REC.% — 20% — 40% — 60% — 80% — 100%

STANDARD PENETRATION BLOWS/FT. (⊗) (10, 20, 30, 40, 50+)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0					Asphalt Depth 4"		
	1	SS	18	12	Clayey SAND, With Quartz Fragments and Asphalt, Grayish Brown to Reddish Brown, Moist, Loose to Medium Dense, (SC-FILL)		7
	2	SS	18	14			9
5						370	
	3	SS	18	7			16
	4	SS	18	10	Silty SAND, With Quartz Fragments, Trace Clay, Reddish Brown, Moist, Dense, (SM)	365	37
10							
	5	SS	18	12		360	32
15							
	6	SS	18	16	Sandy SILT, Trace Clay, Yellowish Brown, Wet, Loose, (ML)	355	5
20							
	7	SS	18	16	SILT, Trace Sand, Yellowish Brown, Moist, Stiff, (MH)	350	9
25							34 / 50.5 / 57
	8	SS	18	16		345	11
30							

END OF BORING @ 30.00'

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

▼WL DRY	WS OR ▽D	BORING STARTED 03-26-04	
▼WL(AB) DRY ▼WL(AC)		BORING COMPLETED 03-26-04	CAVE IN DEPTH @ 17.0'
▼WL		RIG 750 FOREMAN D&S	DRILLING METHOD HOLLOW STEM AUGER

RE (04-12-04) RE (04-13-04) RE (04-19-04) RE (04-29-04)

Thor(03/29/2004)

CLIENT: JFW, INC.

JOB #: 9807 | BORING #: NW-3 | SHEET: 1 OF 1

PROJECT NAME: SIDWELL FRIENDS SCHOOL WISCONSIN AVE.

ARCHITECT-ENGINEER:

SITE LOCATION: WASHINGTON, DC, NW

ENGLISH UNITS

SURFACE ELEVATION: 375

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)
0					Asphalt Depth 4"		
	1	SS	18	12	Silty SAND, With Quartz Fragments, Trace Clay, Brown, Moist, Medium Dense, (SM-FILL)		
	2	SS	18	12			
5	3	SS	18	12	Silty SAND, With Quartz Fragments, Brown, Moist, Medium Dense, (SM)		370
	4	SS	18	12			
10							365
	5	SS	18	14			
15							360
	6	SS	18	14	Sandy SILT, Yellowish Brown, Moist, Loose to Medium Dense, (ML)		
20							355
	7	SS	18	16			
25							350
	8	SS	18	16	SILT, Trace Sand, Yellowish Brown, Moist, Stiff, (MH)		
30							

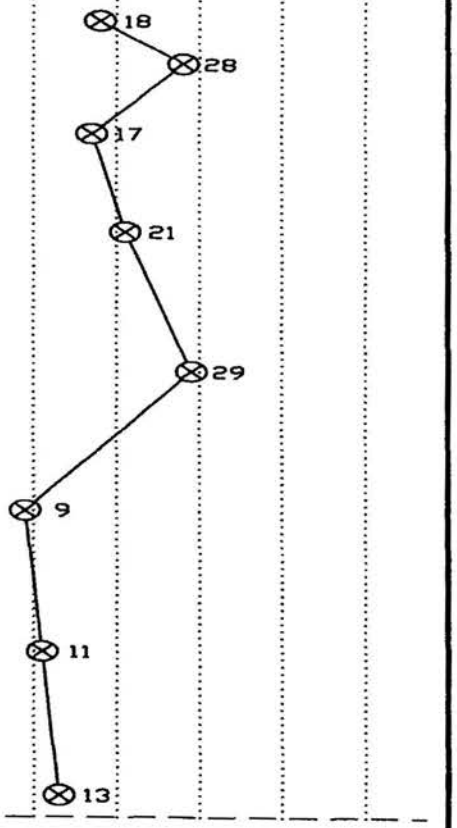
END OF BORING @ 30.00'

CALIBRATED PENETROMETER TONS/FT.²: 1 2 3 4 5+

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

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — — — REC.% ——— 20% 40% 60% 80% 100%

STANDARD PENETRATION BLOWS/FT.: 10 20 30 40 50+



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

▽WL DRY WS OR WD	BORING STARTED 03-26-04	
▽WL(AB) DRY ▽WL(AC)	BORING COMPLETED 03-26-04	CAVE IN DEPTH @ 16.0'
▽WL	RIG 750 FOREMAN D&S	DRILLING METHOD HOLLOW STEM AUGER

AC (04-12-04) AC (04-13-04) AC (04-19-04) AC (04-29-04)

Thm(03/29/2004)

CLIENT	JOB #	BORING #	SHEET
JFW, INC.	9807	NW–4	1 OF 1
PROJECT NAME	ARCHITECT–ENGINEER		
SIDWELL FRIENDS SCHOOL WISCONSIN AVE.			
SITE LOCATION			
WASHINGTON, DC, NW			

ECS LTD

CALIBRATED PENETROMETER TONS/FT.²: 1 2 3 4 5+

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

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — — — REC.% — 20% 40% 60% 80% 100%

STANDARD PENETRATION BLOWS/FT.: ⊗ 10 20 30 40 50+

ENGLISH UNITS

SURFACE ELEVATION 386

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0	1	SS	18	8	Topsoil Depth 4"		385	5
	2	SS	18	10	Sandy SILT, Trace Asphalt Fragments and Roots, Gray, Moist, Loose, (ML–FILL)			7
5	3	SS	18	10	Sandy SILT, Trace Coal and Wood Fragments, Grayish Brown, Moist, Medium Stiff, (ML–FILL)		380	11
10	4	SS	18	12	Silty GRAVEL, With Sand, Trace Brick Fragments, Yellowish Brown, Moist, Medium Dense, (GM–FILL)			9
					Silty SAND, With Quartz Fragments, Trace Clay, Yellowish Brown, Moist, Loose to Medium Dense, (SM)		375	
15	5	SS	18	12				10
							370	6.1
20	6	SS	18	14	SILT, With Sand, Trace Clay, Yellowish Brown, Moist to Wet, Loose to Medium Dense, (ML)			5
							365	
25	7	SS	18	14				9
							360	
30	8	SS	18	14				15

END OF BORING @ 30.00'

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

▽WL DRY WS OR WD	BORING STARTED 03–26–04	
▽WL(AB) DRY ▽WL(AC)	BORING COMPLETED 03–26–04	CAVE IN DEPTH ●
▽WL	RIG 750 FOREMAN D&S	DRILLING METHOD HOLLOW STEM AUGER

RC (04-12-04) RC (04-13-04) RC (04-19-04) RC (04-29-04)

Time(03/29/2004)

CLIENT: JFW, INC.

JOB #: 9807 | BORING #: NW-5 | SHEET: 1 OF 1

PROJECT NAME: SIDWELL FRIENDS SCHOOL WISCONSIN AVE.

ARCHITECT-ENGINEER:

SITE LOCATION: WASHINGTON, DC, NW

ECS LTD

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	CALIBRATED PENETROMETER TONS/FT.² (1 2 3 4 5+) / PLASTIC LIMIT % X / WATER CONTENT % ● / LIQUID LIMIT % Δ / ROCK QUALITY DESIGNATION & RECOVERY RQD% — — REC.% (20% 40% 60% 80% 100%) / STANDARD PENETRATION BLOWS/FT. (10 20 30 40 50+)
					ENGLISH UNITS			
					SURFACE ELEVATION 374			
0					Asphalt Depth 4"			
	1	SS	18	8	Clayey SAND, With Quartz and Rock Fragments, Brown, Moist, Loose, (SC-FILL)			4
	2	SS	18	12				6
5					Sandy SILT, Yellowish Brown, Moist, Loose to Medium Dense, (ML-FILL)		370	
	3	SS	18	16				9
					Sandy SILT, Yellowish Brown, Moist, Loose, (ML)			
10	4	SS	18	16			365	10
	5	SS	18	14			360	7
15								
20	6	SS	18	14			355	8
	7	SS	18	12	SILT, With Sand, Trace Mica, Yellowish Brown, Moist, Stiff, (MH)		350	9
25								
30	8	SS	18	14			345	12

END OF BORING @ 30.00'

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

▼WL DRY WS OR WD	BORING STARTED 03-26-04	
▼WL(AB) DRY ▼WL(AC)	BORING COMPLETED 03-26-04	CAVE IN DEPTH ● 15.4'
▼WL	RIG 750 FOREMAN D&S	DRILLING METHOD HOLLOW STEM AUGER

BC (04-12-04) BC (04-13-04) BC (04-19-04) BC (04-29-04)

Time(03/29/2004)

CLIENT	JOB #	BORING #	SHEET
JFW, INC.	9807	PS-2	1 OF 1
PROJECT NAME	**ARCHITECT-ENGINEER**		
SIDWELL FRIENDS SCHOOL WISCONSIN AVE.			
SITE LOCATION			
WASHINGTON, DC, NW			

ECS LTD

CALIBRATED PENETROMETER TONS/FT.^{2} (1, 2, 3, 4, 5+)

PLASTIC LIMIT % (X) — WATER CONTENT % (●) — LIQUID LIMIT % (Δ)

ROCK QUALITY DESIGNATION & RECOVERY ROD% — — — REC.% — 20% 40% 60% 80% 100%

STANDARD PENETRATION BLOWS/FT. (⊗) 10 20 30 40 50+

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS ELEVATION (FT)
					ENGLISH UNITS	
					SURFACE ELEVATION 392	
0					Asphalt Depth 4"	
	1	SS	18	18	Gravel Depth 2"	
					Clayey SAND, With Quartz Fragments, Trace Roots, Gray, Moist, Medium Dense, (SC-FILL)	390
5	2	SS	18	18		
	3	SS	18	18	Silty SAND, With Quartz Fragments, Reddish Brown, Moist, Medium Dense, (SM)	385
	4	SS	18	18		
10						380
	5	SS	18	18	Silty GRAVEL, With Sand, Trace Clay, Yellowish Brown, Moist, Medium Dense to Dense, (GM)	
15						375
	6	SS	18	18		
20						370
	7	SS	18	18	SILT, Trace Sand, Reddish Brown, Moist, Loose to Medium Dense, (ML)	
25						365
	8	SS	18	18	Sandy SILT, Yellowish Brown, Wet, Loose, (ML)	
30						

N: 16, 21, 20, 25, 32, 20, 10, 7; 33.2

END OF BORING @ 30.00'

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

▽WL DRY WS OR ▽D	BORING STARTED 03-26-04	
▽WL(AB) DRY ▽WL(AC)	BORING COMPLETED 03-26-04	CAVE IN DEPTH ● 6.0'
▽WL	RIG CME450 FOREMAN RECON	DRILLING METHOD HOLLOW STEM AUGER

BC (04-12-04) BC (04-13-04) BC (04-19-04) BC (04-28-04)

TTmpl(03/29/2004)

CLIENT	JOB #	BORING #	SHEET
JFW, INC.	9807	PS-3	1 OF 1

PROJECT NAME: SIDWELL FRIENDS SCHOOL WISCONSIN AVE.

ARCHITECT-ENGINEER:

SITE LOCATION: WASHINGTON, DC, NW

ECS LTD

CALIBRATED PENETROMETER TONS/FT.² (1, 2, 3, 4, 5+)

PLASTIC LIMIT % (X) — WATER CONTENT % (●) — LIQUID LIMIT % (Δ)

ROCK QUALITY DESIGNATION & RECOVERY RQD% — — — REC.% — 20% 40% 60% 80% 100%

STANDARD PENETRATION BLOWS/FT. (⊗) (10, 20, 30, 40, 50+)

ENGLISH UNITS

SURFACE ELEVATION 399

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0	1	SS	18	12	Topsoil Depth 4"			6
					Clayey SAND, With Quartz and Asphalt Fragments, Grayish Brown, Moist, Loose to Medium Dense, (SC-FILL)			
5	2	SS	18	8			395	7
	3	SS	18	12				12
					Silty SAND, With Quartz Fragments, Trace Clay, Grayish Red to Brown, Moist, Medium Dense, (SM)			
10	4	SS	18	14			390	19
15	5	SS	18	12			385	21
20	6	SS	18	12			380	28
	7	SS	18	12	Silty SAND, With Quartz Fragments, Trace Clay, Yellowish Brown, Moist, Dense, (SM)		375	42
25	8	SS	18	3	Silty SAND, With Quartz and Rock Fragments, Trace Clay, Grayish Brown, Moist, Dense, (SM)		370	47
30								

END OF BORING @ 30.00'

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

▽WL DRY WS OR WD	BORING STARTED 03-24-04	
▽WL(AB) DRY ▽WL(AC)	BORING COMPLETED 03-24-04	CAVE IN DEPTH ●
▽WL	RIG 750 FOREMAN D&S	DRILLING METHOD HOLLOW STEM AUGER

RIC (04-12-04) RIC (04-13-04) RIC (04-19-04) RIC (04-29-04)

Thes(03/25/2004)