HYNES

JOHN D. HYNES & ASSOCIATES, INC.

Geotechnical and Environmental Consultants
Monitoring Well Installation
Construction Inspection and Materials Testing

November 3, 2010

Sean Sokolowski
Capital School District
c/o Kevin Parsons
Becker Morgan Group
Port Exchange, Suite 300
312 West Main Street
Salisbury, Maryland 21801

Re: Report of Subsurface Exploration and Geotechnical Engineering Services
Capital School District New District Office and Maintenance Facility
Dover, Delaware
Project No.: JDH-10/10/388

Dear Mr. Sokolowski:

Hynes & Associates, Inc. has completed the authorized subsurface exploration and geotechnical engineering evaluations for the Capital School District New District Office and Maintenance Facility project in Dover, Delaware. Our services were provided generally in accordance with our October 15, 2010 contract proposal. As requested, we provide geotechnical engineering recommendations for the District Office and Maintenance Buildings, parking and driveway pavements, and stormwater management areas.

This report describes the exploration methods employed, exhibits the data obtained, and presents our evaluations and recommendations. In summary, we recommend that the building's structural elements be supported by spread footing foundations bearing on firm, natural soils or controlled structural fill. If the recommendations of this report regarding subgrade preparation and construction are followed, then 3,500 psf bearing may be used to proportion the footings for the foundation elements of the proposed new District Office Building and the new Maintenance Building.

We appreciate the opportunity to be of service to you. If you have any questions regarding the contents of this report or if we may be of further assistance, please contact our office.

Respectfully,

JOHN D. HYNES & ASSOCIATES, INC.

Jennifer S. Townsend FOR

Travis G. Ewing
Staff Engineer

John D. Hynes, P.E.
President

JOHN D. HYNES REGISTERED NO. 7581 DELAWARE PROFESSIONAL ENGINEER

TGE: JDH/jst

32185 Beaver Run Drive • Salisbury, Maryland 21804 • 410-546-6462 • Fax 410-548-5346
Email: jdhynes@aol.com

HYNES

REPORT OF
SUBSURFACE EXPLORATION
AND
GEOTECHNICAL ENGINEERING SERVICES

CAPITAL SCHOOL DISTRICT
NEW DISTRICT OFFICE AND MAINTENANCE FACILITY
DOVER, DELAWARE

PREPARED FOR
CAPITAL SCHOOL DISTRICT

NOVEMBER 3, 2010
PROJECT NO.: JDH-10/10/388

32185 Beaver Run Drive • Salisbury, Maryland 21804 • 410-546-6462 • Fax 410-548-5346
Email: jdhynes@aol.com

HYNES

TABLE OF CONTENTS

32185 Beaver Run Drive • Salisbury, Maryland 21804 • 410-546-6462 • Fax 410-548-5346
Email: jdhynes@aol.com

PURPOSE AND SCOPE

The subsurface exploration study was performed to evaluate the subsurface conditions with respect to the following:

1. General site and subgrade preparation;
2. Fill and backfill construction;
3. Foundation recommendations, including allowable capacity and estimated embedment depths of spread footings;
4. Foundation construction and inspection procedures;
5. Floor slab support and modulus of subgrade reaction;
6. Pavement cross sections;
7. Soil and groundwater conditions, and infiltration rates at stormwater management structure locations;
8. Seismic Site Class in accordance with the IBC;
9. Location of groundwater and applicable construction dewatering control procedures; and
10. Other aspects of the design and construction for the proposed structures indicated by the exploration.

An evaluation of the site, with respect to potential construction problems and recommendations dealing with earthwork and inspection during construction, is included. The inspection is considered necessary both to confirm the subsurface conditions and to verify that the soils related construction phases are performed properly.

EXISTING SITE CONDITIONS

As shown on the "Project Location Map" (Drawing JDH-10/10/388-A) and the in the Appendix, the site is located on the northwest corner of the intersection of Hazlettville Road (State Route 15) and Commerce Way in Dover, Delaware. Access to the site is from the east, from Commerce Way.

The area of the proposed Maintenance Building currently contains an approximately 15,000 sf one story metal retail/storage building, asphalt pavements, lawn area, and chain link fencing. The area of the proposed District Office Building currently contains lawn area, asphalt pavement and chain link fencing. New pavement and stormwater management areas currently contain asphalt pavements, lawn area, and 2 existing one story storage buildings, measuring approximately 4,500 sf and 6,700 sf, respectively. The project site is relatively level. A chain link fence topped with barbed wire currently encloses the northern two thirds (⅔) of the site

FIELD EXPLORATION AND STUDY

In order to determine the nature of the subsurface conditions at the project site, we drilled 12 building area (B) test borings, 5 stormwater management area (SWM) borings, and 2 pavement area (P) borings at the locations indicated on the attached "Boring Location Plan" (Drawing JDH-10/10/388-B). Piezometers were installed in borings B-1 and B-10 to provide 24 hour groundwater depth data. Borings B-1, B-4, B-9, and B-12 were drilled to depths of 25 feet. Boring B-11 was drilled to a depth of 50 feet. All other building area borings were drilled to depths of 20 feet. Stormwater area borings were drilled to depths of 10 feet and pavement area borings were drilled to depths of 5 feet. Boring B-11 was drilled to a depth of 50 feet to be used in the determination of the Seismic Site Class in accordance with the 2003 IBC.

32185 Beaver Run Drive • Salisbury, Maryland 21804 • 410-546-6462 • Fax 410-548-5346
Email: jdhynes@aol.com

Soil sampling and testing were carried out in accordance with ASTM Specification D-1586. A brief description of our field procedures is included in the Appendix. The results of all boring and sampling operations are shown on the boring logs.

Samples of the subsurface soils were examined by our engineering staff and were visually classified in accordance with the Unified Soil Classification System (USCS) and ASTM Specification D-2488. The estimated USCS symbols appear on the boring logs and a key to the system nomenclature is provided in the Appendix of this report. USDA soil classifications were added to the USCS and ASTM D-2488 classifications for samples obtained from stormwater management borings. Included in the Appendix are reference sheets which define the terms and symbols used on the boring logs and explain the Standard Penetration Test procedures.

We note that the test boring records represent our interpretation of the field data based on visual examination and selected soil classification tests. Indicated interfaces between materials may be gradual.

We performed field infiltration tests in companion excavations adjacent to each of the SWM boring locations. Tests were performed in accordance with DNREC guidelines for stormwater management structures using a 12 inch diameter ring infiltrometer using the constant head test method.

The field exploration data was supplemented with laboratory testing data. The laboratory at John D. Hynes & Associates, Inc. performed three Atterberg Limits (Liquid and Plastic) tests, two Sieve Analysis tests, and eight natural moisture content tests. Two California Bearing Ratio (CBR) test were performed on soil samples collected from pavement area borings from soil excavated from below the existing surficial pavement and stone layers. The CBR tests were not complete at the time of this report. They will be reported in a supplement to this report. The test results for the Atterberg Limits, Sieve Analysis, and Natural Moisture Content tests are noted on the boring logs in the Appendix.

SUBSURFACE CONDITIONS

Borings in the existing lawn area generally encountered 7 to 12 inches of organic bearing soil at the ground surface. Boring S-2 encountered 18 inches of organic bearing soil. Borings drilled through existing asphalt pavements encountered 2 to 4 inches of asphalt on 2.5 to 4 inches of stone. Other thicknesses of other surficial materials may be encountered at other locations on site. Refer to the attached boring logs for the thicknesses of the surficial material at each boring, and the soil profiles encountered in each boring.

Shallow soils encountered just below the organic bearing soil horizon and pavement layers were classified as Silty SAND (SM, SM/ML), Clayey SILT (ML) and Silty CLAY (CL, CL-ML). Generally below a depth of 3 feet borings encountered Silty SAND (SM, SP-SM) and SAND (SP) to depths of 22 feet or boring termination depths. Borings SWM-2 and B-11 encountered CL and ML soils at depths of 5 feet, respectively. Borings drilled to depths deeper than 22 feet encountered SAND (SP) from a depth of 22 feet to boring termination depths.

The stormwater management area (SWM) borings were, also, visually classified in accordance with the USDA soil classification system. These soil layers were described as Loam, Silty clay loam, Clay loam, Clay, Sandy loam, Loamy sand, and Sand. The fines content (percent of material passing the No. 200 sieve) of soils encountered in SWM borings generally decreased with depth. Sand, Sandy loam, and Loamy sand were generally encountered below depths of 5 feet. Loam, Silty clay loam, Clay, and Clay loam were encountered at shallow

32185 Beaver Run Drive • Salisbury, Maryland 21804 • 410-546-6462 • Fax 410-548-5346
Email: jdhynes@aol.com

depths (above 5 foot depth). Refer to the boring logs for the specific soil layering encountered in each SWM boring.

The non-cohesive SM, SM/ML, SP-SM, and SP soils were characterized by N-values of 4 to 66 blows per foot indicating in place relative densities of very loose to very dense. Soils above a depth of 25 feet were generally considered to be loose to medium dense. The cohesive CL and ML soils were characterized by Standard Penetration Test (SPT) values (N-values) of 7 to 19 blows per foot. This range of penetration resistance indicates in place consistencies of medium stiff to very stiff.

Groundwater was encountered at depths of 14 to 14.5 feet in the borings. Following drilling operations groundwater was at depths of 14.5 to 17 feet. Piezometers were installed in borings B-1 and B-10. One week following drilling operations, groundwater was at depths of 15.4 and 15.2 feet, in borings B-1 and B-10, respectively. Groundwater depths may vary at other times during the year depending on the amount of precipitation and the extent of surface development.

PROJECT CHARACTERISTICS

A two story District Office Building with an approximate building footprint of 20,000 sf, and a two story pre-engineered metal Maintenance Building with an approximate building footprint of 14,000 sf are planned. The Maintenance Building will only have a partial second floor with a second floor measuring approximately 2,000 sf. Both structures are planned to have a concrete slab-on-grade and shallow spread footing foundations. The District Office Building will be comprised of a steel frame, composite steel floor framing, and a combination of CMU block and steel stud with masonry veneer exterior walls. The maintenance building is planned to have a pre-engineered steel frame and roof system. The buildings' descriptions and structural loadings were provided to us by Baker, Ingram & Associates, the Project Structural Engineers. Anticipated foundation loadings are tabulated below:

District Office Building

Maximum Wall Load: Dead Load	2 k/ft.
Maximum Column Load: Dead Load	75 kips
Maximum Column Load: Live Load	75 kips

Maintenance Building

Maximum Wall Load: Dead Load	2 k/ft.
Maximum Column Load: Dead Load	20 kips
Maximum Column Load: Live Load	60 kips

The grades will be increased slightly at the building areas to promote stormwater drainage away from the buildings. Other site grading will include the construction of stormwater management swales, depressions or catch basins at the areas of test borings SWM-1 through SWM-5.

Pavements for driveways and parking areas are planned over the majority of the site, as shown on the Boring Location Plan in the Appendix. Heavy Duty pavement sections are planned for the Bus Access and Parking areas located on the northern portion of the site. Portions of the new Bus Access and Parking areas are proposed to include new pavement sections and portions are proposed to be milled and overlayed with an asphalt surface course. Light duty pavement for normal automobile traffic is proposed for the southern portion of the site,

32185 Beaver Run Drive • Salisbury, Maryland 21804 • 410-546-6462 • Fax 410-548-5346
Email: jdhynes@aol.com

surrounding the proposed District Office Building. All light duty pavement areas are planned to be new full depth pavement sections.

RECOMMENDATIONS

The following recommendations and considerations are based on our understanding of the proposed construction, the data obtained from the exploration, and our previous experience with similar subsurface conditions and projects. If there are any significant changes to the project characteristics, such as revised structural loadings differing significantly from those noted above, building geometry, building location, elevations, etc., we request that this office be advised so the recommendations of this report can be re-evaluated.

A. Site Preparation

Prior to the construction of foundations, or ground slabs, or the placement of fill in any structural areas, all existing organic materials, frozen or wet, excessively soft or loose soils, demolition debris, existing slabs on grade, asphalt pavements, old foundations, and other deleterious materials should be removed and wasted. The existing organic bearing soil should be stripped and can be stockpiled for reuse in landscape areas. Abandoned utilities, and old foundation elements, should, also, be removed from structural areas. The associated excavations should be backfilled in accordance with Section B below. If perched surface water is encountered during any grading or excavation process, Hynes & Associates should be consulted for additional recommendations regarding the stabilization of the bases of the excavations and backfilling.

After the stripping operations have been completed, the exposed subgrade soils should be inspected by the Geotechnical Engineer or his approved representative. The inspector should verify that organic matter, organic soils, demolition debris, old utilities, etc., have been removed from structural subgrade areas. The inspector should require that the exposed subgrade materials be proofrolled to provide surficial densification and to locate any isolated areas of soft or loose soils requiring undercutting. Proofrolling is not advised in wet areas which may deteriorate under repeated vehicular loading. Wet areas should be drained and be allowed to dry prior to proofrolling. Proofrolling should be monitored by a qualified geotechnical engineer to avoid causing the destabilization of subgrade soils. Precipitation may result in standing water (perched water) at low areas. Surface water will pond on silts and clays (where present). If the water is allowed to pond, the natural soils may deteriorate, and overexcavation or subgrade improvement may be necessary at those areas. The Geotechnical Engineer should be consulted to evaluate poor subgrade conditions during construction. The site should be effectively graded so that stormwater runs off the structural subgrades.

Care should be exercised during the grading operations at the site. Shallow SM, ML, and CL materials were identified at the boring locations. These materials are sensitive to changes in moisture conditions and should therefore be protected. If earthwork is conducted in the presence of moisture, the traffic of heavy equipment, including heavy compaction equipment, may create pumping and a general deterioration of the subgrade soils. Construction traffic should be minimized at structural subgrade areas. If subgrade problems arise, the Geotechnical Engineer should be consulted for an evaluation of the conditions. Overexcavated areas resulting from the removal of organic matter, old foundations, or otherwise unsuitable materials should be backfilled with properly compacted materials in accordance with the procedures discussed in the following section.

32185 Beaver Run Drive • Salisbury, Maryland 21804 • 410-546-6462 • Fax 410-548-5346
Email: jdhynes@aol.com

HYNES

B. Fill Selection, Placement and Compaction

It is recommended that all materials to be used as structural fill be inspected, tested and approved by the Geotechnical Engineer prior to use. The existing SP and SM soils that do not contain organics may be re-used for structural fill. Acceptable borrow material should include GW, GP, GM, SM, SW and SP classified in accordance with the USCS. Furthermore, the material to be utilized as structural fill should have a Plasticity Index (PI) less than 20. Silty CLAYs (CL) and Clayey SILTs (ML) should not be reused as structural fill.

The importation of high quality, granular material should be allowed for use as structural fill, and acceptable unit rates for importation and placement should be established. Sand, gravel or sand/gravel mixtures would be appropriate for wet weather placement. Otherwise, the materials noted above will be acceptable for use as structural fill. Native or imported SM soils will be sensitive to alteration in moisture content and will become unworkable during and following periods of precipitation. For this reason, if earthwork is attempted in late autumn, winter or early spring, the above mentioned high quality imported granular material should be limited to those soils better than SM. SM materials become unworkable at moisture contents greater than 3 percentage points above optimum. The contractor would have to dry these materials or set them aside for use in landscaping areas.

Structural fill should be placed in lifts which are eight inches or less in loose thickness and should be compacted to at least 95 percent of the Modified Proctor maximum dry density (ASTM D-1557). Adjustments to the natural moisture content of the soils may be required in order to obtain specified compaction levels. Should utility construction be performed after earthwork, the Contractor should be responsible for achieving 95 percent compaction in all trench backfill. These guidelines should be set for all structural fill and backfill at the site including, but not limited to building, ground slab and pavement fills.

For the proofrolling and fill compaction operations, fill limits should be extended at least five feet beyond the building's exterior walls, and exterior columns. A sufficient number of in-place density tests should be performed by an engineering technician to verify that the proper degree of compaction is being obtained in all fill soils.

C. District Office and Maintenance Building Foundations

Considering current and proposed grade levels, the in-situ soil conditions and the proposed structural loadings, we recommend that the new building's structural elements be supported on spread footing foundations bearing on firm, natural soils or controlled, structural fill. Footings supporting building elements may be proportioned based upon a maximum allowable soil pressure not in excess of 3,500 psf.

Some locations may be encountered where less than the required bearing is available. At those locations, compaction in the footing trenches may be necessary or minor overexcavation may yield greater soil support. For this reason, the inspection of the footing excavations by the Geotechnical Engineer is advised. Note that all of the organic materials and demolition debris should be removed from the proposed structural areas.

32185 Beaver Run Drive • Salisbury, Maryland 21804 • 410-546-6462 • Fax 410-548-5346
Email: jdhynes@aol.com

Minimum dimensions of 24 inches for square footings and 18 inches for continuous or rectangular footings should be used in foundation design to minimize the possibility of a local shear failure. Grade beams for turned down slabs may be 12 inches wide. All foundation excavations should be inspected by the Geotechnical Engineer or his approved representative prior to the placement of concrete. The purpose of the inspection would be to verify that the exposed bearing materials are suitable for the design soil bearing pressure and that loose, wet, frozen or compressible soils are not present.

Where continuous wall footings may need to be raised or lowered in elevation in a direction away from and perpendicular to other footings, footings may be gradually changed to the desired elevation using step construction procedures with a 2H:1V, or more gentle, slope. In addition, discrete column, pier or wall footings bearing at a higher elevation than lower footings should be located at a distance apart which is equal to or greater than the difference in the elevations of the footings.

Exterior footings and footings in unheated areas should be located at least 24 inches to bottom of footing below the outside final grade to provide adequate frost cover protection. If the building is to be constructed during the winter months or if the building will be subjected to freezing temperatures after footing construction, then all footings should be adequately protected during freezing periods.

Soils exposed at the bases of all satisfactory foundation excavations should be protected against any detrimental change in condition, such as disturbance from rain or frost. Surface runoff should be drained away from the excavations and not be allowed to pond.

If our recommendations are followed, we estimate total settlements of one inch or less. Differential settlements within the structure are estimated to be of one half inch or less.

D. Floor Slab Support

Ground supported slabs may be supported on firm, natural soils or on a layer of controlled, structural fill. The subgrade should be prepared in accordance with the procedures described in Sections A and B of this report. It is also recommended that a 4 to 6 inch clean, granular, leveling and load-distributing material such as washed gravel, or screened crushed stone, be used beneath the floor slabs. This material will require acquisition from off-site sources. Prior to placing the leveling and load distributing material, the slab subgrade should be free of standing water or mud. A suitable moisture barrier should also be provided for the building slab. These procedures will help to prevent capillary rise and damp floor slab conditions. For native soil or fill material placed and compacted according to the procedures outlined in this report, we recommend using a value of modulus of subgrade reaction of 175 pounds per cubic inch.

E. Pavement Subgrade Preparation

Two borings, P-1 and P-2, were drilled in pavement areas to depths of 5 feet below the existing pavement surface. Below the surficial asphalt pavement, borings identified silty SANDs (SM) and Clay SILT (ML). Boring P-2 encountered ML soils from just below the surficial pavement to a depth of 2.5 feet. Boring P-1 encountered ML soils from 3 to 4 feet.

All pavement subgrade areas should be inspected and proofrolled in accordance with Section A and B of this report. The pavement subgrade soils consist of materials having the classifications of "SM, ML, and CL,"

32185 Beaver Run Drive • Salisbury, Maryland 21804 • 410-546-6462 • Fax 410-548-5346
Email: jdhynes@aol.com

in accordance with the USCS. The top 12 inches of the natural subgrades at pavement areas should be compacted to 95 percent of the Modified Proctor maximum dry density (ASTM D-1557) prior to fill or stone placement. The subgrade preparation should be monitored closely by a qualified geotechnical engineer to avoid overworking the subgrade and the destabilization of the subgrade. Refer to Sections A and B for recommendations for subgrade preparation and fill construction related to areas that have roots, demolition debris or other obstructions at the pavement subgrade.

CBR tests are being performed on soil samples collected from boring pavement borings P-1 and P-2. The CBR tests were not completed at the time of this report. The CBR test results and recommended pavement cross sections will be presented in a supplement to this report.

The pavement materials and construction should be in general accordance with the Delaware Department of Transportation, State Highway Administration, STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MATERIALS latest edition, and this report.

The pavement subgrade and pavement layers should be graded such that surface water is carried off of the pavement areas and away from building areas. The surface water should not be allowed to pond. Runoff onto adjacent properties should be controlled property.

Hynes & Associates recommends that rigid pavement be designed and installed for use at trash container storage and pick-up locations. These "dumpster pad" locations receive extreme wheel loads during emptying and placement. Also, hydraulic oils usually accumulate at these areas causing a breakdown in asphalt pavement mixtures.

F. Stormwater Management Areas

On October 29, 2010, Hynes & Associates completed five single ring, constant head, infiltration tests. Becker Morgan Group, Inc. provided the infiltration test depths and test locations. The tests were completed in companion test pits located adjacent to borings SWM-1 through SWM-5. Boring locations are noted on the Boring Location Plan in the Appendix. The single ring infiltration testing was conducted in general accordance with industry standard guidelines and in accordance with DNREC guidelines. The test location, depth and steady state infiltration rate are summarized in the table below:

Location	Depth of Boring (ft.)	Depth to Groundwater (ft.)	Test Depth (ft.)	Steady State Infiltration Rate (in./hr)
SWM-1	10	Not Encountered	3.33	0.00
SWM-2	10	Not Encountered	5.0	2.69*
SWM-3	10	Not Encountered	3.5	0.07*
SWM-4	10	Not Encountered	3.0	0.02*
SWM-5	10	Not Encountered	3.0	2.76*

* - Average infiltration rate was used due to variable infiltration rates.

Infiltration tests at SWM-1, SWM-3, and SWM-4 locations, at the noted test depths, produced nearly impermeable results, poorly draining. These tests were performed on Silty SAND (SM, Loam, Sandy loam)

32185 Beaver Run Drive • Salisbury, Maryland 21804 • 410-546-6462 • Fax 410-548-5346
Email: jdhynes@aol.com

soils. The noted borings encountered more permeable soils at deeper depths. Boring SWM-1 encountered Silty SAND (SM, Sandy loam) and SAND (SP, Sand) soils at depths of 4.5 to 6.5 feet and 8.5 to 10 feet, respectively. Boring SWM-3 encountered Sand from depths of 6 to 10 feet and boring SWM-4 encountered Sandy loam and Sand from depths of 2.5 to 10 feet. Refer to the structural boring logs to supplement boring data showing the depths of SP and SM/SP soils.

Stormwater management borings generally encountered better draining soils at deeper depths. Lower permeability soils (Loam, Clay, Silty clay loam, Clay loam) were encountered from just below the surficial material to depths of 4 to 5 feet at borings SWM-1 through SWM-3. Borings SWM-4 and SWM-5 encountered these less permeable soils to depths of 2.5 feet. If higher infiltration rates are required, Hynes & Associates recommends running tests in the soil layers containing a higher percentage of sand particles (Sandy loam, Loamy sand, Sand). Refer to the boring logs for the specific soil layering encountered in each SWM boring.

G. Groundwater and Drainage

One week following drilling operations, groundwater was measured at depths of 15.4 and 15.2 feet in piezometers in borings B-1 and B-10, respectively. Groundwater depths may vary at other times during the year depending on the amount of precipitation and the extent of surface development.

Considering the probable foundation depths expected, the Contractor should not experience foundation construction problems relating to the groundwater. However, the Contractor should be prepared to dewater the lowest excavations in the event of infiltration of precipitation. If required, suitable measures for dewatering should be implemented. Efforts should be made to keep exposed subgrade areas dry during construction, primarily, because the soils will be susceptible to deterioration and loss of strength in the presence of moisture. Adequate drainage should be provided at the site to minimize any increase in moisture content of the foundation and pavement subgrade soils. The final site drainage should be designed such that run-off onto adjacent properties is controlled properly.

H. Seismic Site Class

As stated in our proposal, we drilled one boring to a depth of 50 feet to evaluate the seismic site class. Very dense SAND (SP) soils were encountered below a depth of 42 feet. We have drilled other test borings to greater depths locally. We have found that the very dense soils extend to depths of greater than 100 feet once these dense soils are encountered.

In consideration of the soil layering and test data, Hynes & Associates recommends using "Seismic Site Class D" in the design of the Capital School District New District Office and Maintenance Buildings. Refer to Chapter 16 of the IBC for earthquake requirements associated with Site Class D.

32185 Beaver Run Drive • Salisbury, Maryland 21804 • 410-546-6462 • Fax 410-548-5346
Email: jdhynes@aol.com

HYNES

ADDITIONAL SERVICES RECOMMENDED

Additional engineering, testing and consulting services recommended for this project are summarized below.

A. Site Preparation Inspection

The Geotechnical Engineer or experienced soils inspector should inspect the site after existing structures have been removed from structural areas and the site has been stripped and excavated. The inspector should determine if any undercutting or in-place densification is necessary to prepare a subgrade for fill placement, or slab and pavement support. The geotechnical Engineer should provide additional recommendations as needed to fill at wet areas and to stabilize the subgrade where needed.

B. Fill Placement and Compaction

The Geotechnical Engineer or experienced soils inspector should witness all fill operations and take sufficient in-place density tests to verify that the specified degree of fill compaction is achieved. The inspector should observe and approve borrow materials used and should determine if their existing moisture contents are suitable.

C. Footing Excavation Inspections

The Geotechnical Engineer should inspect all footing excavations for the structure. He should verify that the design bearing pressures are available and that no soft or loose soils exist beneath the bearing surfaces of the footing excavations.

D. Pavement Construction Inspections

Pavement subgrade soils should be inspected prior to the placement of pavement materials to verify that proper compaction has been achieved and that project specifications are being followed. In addition, the pavement subbase stone compaction should be verified by an engineering technician prior to the installation of the asphalt pavement.

REMARKS

This report has been prepared solely and exclusively for the Capital School District to provide guidance to design professionals in developing facilities plans for the Capital School District New District Office and Maintenance Facility project in Dover, Delaware. It has not been developed to meet the needs of others, and application of this report for other than its intended purpose could result in substantial difficulties. The Consulting Engineer cannot be held accountable for any problems which occur due to the application of this report to other than its intended purpose. This report in its entirety should be attached to the project specifications.

These analyses and recommendations are, of necessity, based on the concepts made available to us at the time of the writing of this report, and on-site conditions, surface and subsurface that existed at the time the exploratory borings were drilled. Further assumption has been made that the limited exploratory borings, in relation both to the areal extent of the site and to depth, are representative of conditions across the site. It is also recommended

32185 Beaver Run Drive • Salisbury, Maryland 21804 • 410-546-6462 • Fax 410-548-5346
Email: jdhynes@aol.com

that we be given the opportunity to review all plans for the project in order to comment on the interaction of soil conditions as described herein and the design requirements.

Our professional services have been performed, our findings obtained and our recommendations prepared in accordance with generally accepted engineering principles and practices.

32185 Beaver Run Drive • Salisbury, Maryland 21804 • 410-546-6462 • Fax 410-548-5346
Email: jdhynes@aol.com

APPENDIX

1. Investigative Procedures
2. Project Location Map
3. Boring Location Plan
4. Boring Logs
5. Unified Soil Classification Sheet
6. Field Classification Sheet
7. USDA Soil Classification Sheet
8. Information Sheet

32185 Beaver Run Drive • Salisbury, Maryland 21804 • 410-546-6462 • Fax 410-548-5346
Email: jdhynes@aol.com

HYNES

INVESTIGATIVE PROCEDURES

SOIL TEST BORINGS

Soil drilling and sampling operations were conducted in accordance with ASTM Specification D-1586. The borings were advanced by mechanically turning continuous hollow stem auger flights into the ground. At regular intervals, samples were obtained with a standard 1.4 inch I.D., 2.0 inch O.D. splitspoon sampler. The sampler was first seated 6 inches to penetrate any loose cuttings and then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot is the "Standard Penetration Resistance". The penetration resistance, when properly evaluated, is an index to the soil's strength, density and behavior under applied loads. The soil descriptions and penetration resistances for each boring are presented on the Test Boring Records in the Appendix.

SOIL CLASSIFICATION

Soil classifications provide a general guide to the engineering properties of various soil types and enable the engineer to apply his past experience to current problems. In our investigation, jar samples obtained during drilling operations are examined in our laboratory and visually classified by the geotechnical engineer in accordance with ASTM Specification D 2488. The soils are classified according to the AASHTO or Unified Classification System (ASTM D 2487). Each of these classification systems and the in-place physical soil properties provides an index for estimating the soil's behavior.

ATTERBERG LIMITS TEST

Portions from representative soil samples obtained during drilling operations were selected for Atterberg Limits tests. The Atterberg Limits are indicative of the soil's plasticity characteristics. The liquid limit is the moisture content at which the soil will flow as a heavy viscous fluid and is determined in accordance with ASTM Specification D-4318. The plastic limit is the moisture content at which the soil begins to lose its plasticity and is determined in accordance with ASTM Specification D-4318.

NATURAL MOISTURE

Portions from representative soil samples obtained during drilling operations were selected for Natural Moisture Content tests. The Natural Moisture Content Test determines the water content of soils by drying into a oven with a standard drying temperature of 110 °C. The lost of mass drying the sample, determines the water content into the soil. The water content of the sample is calculated in percentage. The water content of soils (natural moisture) is determined in accordance with ASTM Specification D-2216.

32185 Beaver Run Drive • Salisbury, Maryland 21804 • 410-546-6462 • Fax 410-548-5346
Email: jdhynes@aol.com

INVESTIGATIVE PROCEDURES (CONTINUED)

HAND AUGER SOIL TEST BORINGS

Test borings were conducted using a 3 inch O.D. hand auger. The auger is manually advanced by rotating the shaft of the auger. The auger is withdrawn at short intervals for inspection of soils collected in the auger head. Soil samples are taken when soil conditions are noted to change. The soil descriptions for each boring are presented on the boring logs in the Appendix.

MODIFIED PROCTOR

Bulk samples were obtained from the pavement area test borings. A Modified Proctor compaction test (ASTM D 1557) was performed on this soil to determine its compaction characteristics, including its maximum dry density and optimum moisture content.

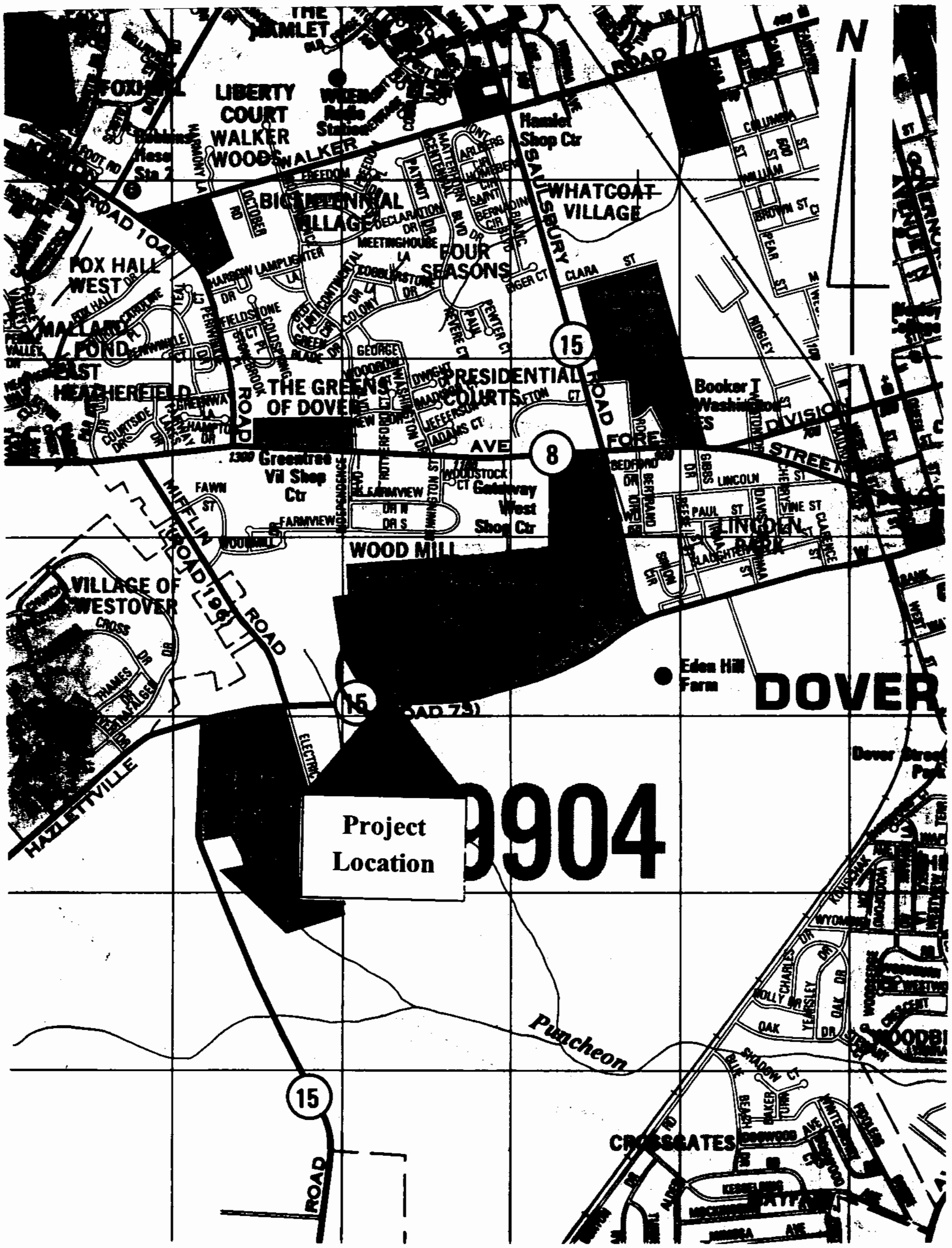
CALIFORNIA BEARING RATIO

The results of the compaction testing described above were utilized in compacting samples for the laboratory California Bearing Ratio tests. The California Bearing Ratio, abbreviated as CBR, is a punching shear test. It provides data that are a semi-empirical index of the strength and deflection characteristics of a soil that has been correlated with pavement performance. This correlation has resulted in the establishment of design curves for pavement thickness.

The test is performed on a 6-inch diameter, 5-inch thick, disc of compacted soil which is confined in a steel cylinder. The specimens are first tested immediately after compaction and then soaked for four (4) days to simulate a saturated pavement subgrade.

A 1.95-inch diameter piston is forced into the soil at a standard rate and the resistance of the piston penetration is measured. The CBR is the ratio expressed as a percentage of the load at 1.0-inch piston penetration compared to the load required to produce the same penetration in a standard crushed stone.

32185 Beaver Run Drive • Salisbury, Maryland 21804 • 410-546-6462 • Fax 410-548-5346
Email: jdhynes@aol.com

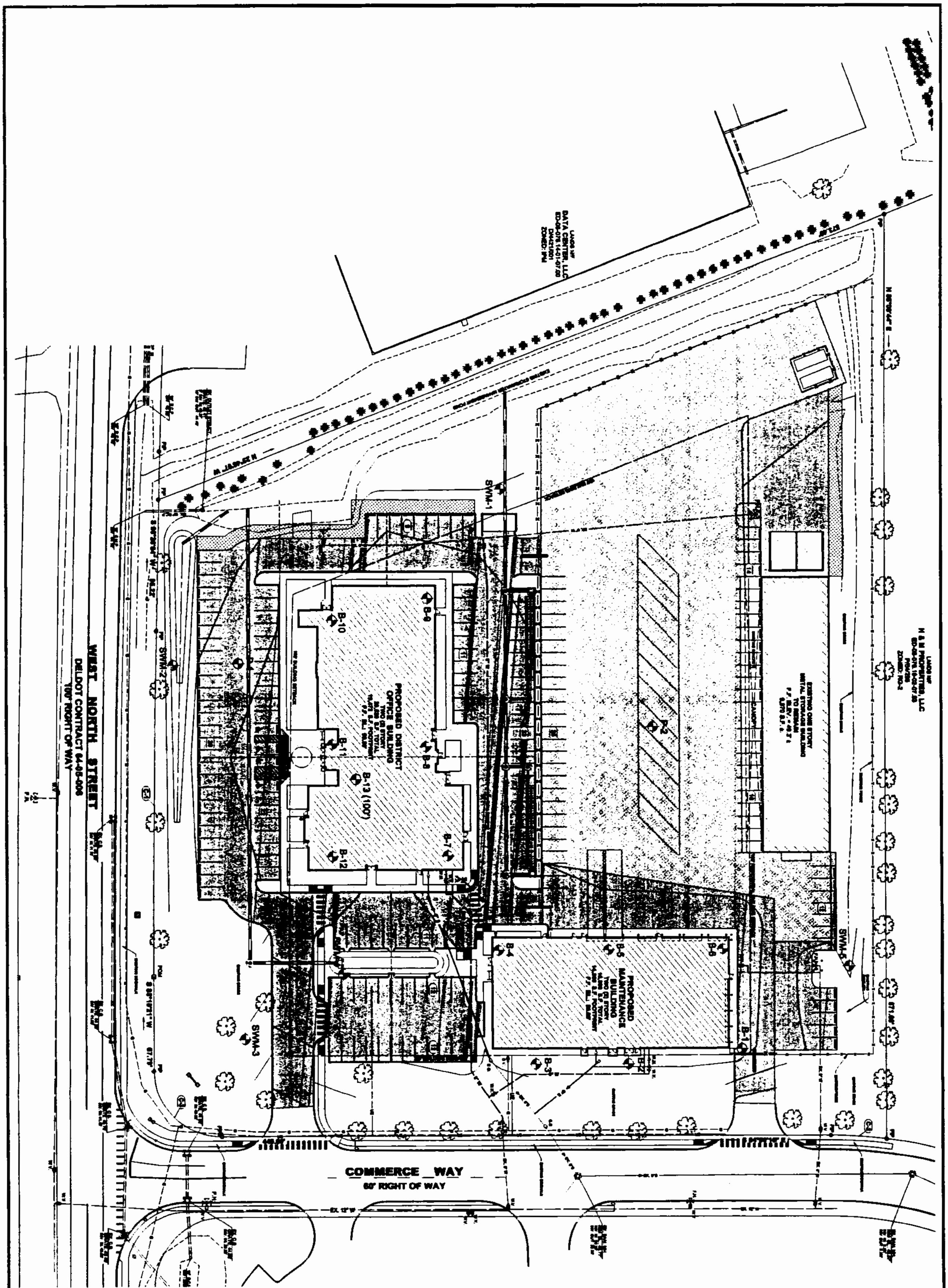


HYNES **JOHN D. HYNES & ASSOCIATES, INC.**
32185 Beaver Run Drive • Salisbury, Maryland 21804
410-546-6462 / Fax: 410-548-5346

Date: October 27, 2010
Scale: 1" = 2000'
Drawn: ADC

Project Location Map
Capital School District New District Office and Maintenance Building
Dover, Delaware

DWG. No.
JDH-10/10/388-A



JOHN D. HYNES & ASSOCIATES, INC.
32185 Beaver Run Drive • Salisbury, Maryland 21804
410-546-6462 / Fax: 410-548-5346

Boring Location Plan Capital School District New District Office and Maintenance Building Dover, Delaware	**Date: October 27, 2010** **Scale: NTS** **Drawn: Becker Morgan**
	DWG. No. **JDH-10/10/388-B**

HYNES & ASSOCIATES

LOG OF BORING B-1

Capital School District
c/o Becker Morgan Group, Inc.
Port Exchange, Suite 300
312 West Main Street
Salisbury, Maryland 21801

Project Name:.	: Capital School District New : District Office & Maint. Facilty	Logged By:	: T. Ewing
		Driller:	: M. Hynes
Project Number:	: JDH-10/10/388	Drilling Method:	: HSA (Mobile B-47 HD)
Start Date:	: 10/22/10	Total Depth:	: 25.5 feet
End Date:	: 10/22/10		

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches	REMARKS
0–2.5	Orange-brown, wet, medium dense, silty, fine to coarse SAND, with trace gravel		SM	1	7-6-5	Scale 1" ~ 7.75 feet
2.5–5	Brown, wet, very loose, silty, fine to medium SAND, with trace gravel		SM	2	6-2-3	Approximately 4 inches of asphalt on 4 inches of stone was encountered at the ground surface.
5–8	Orange-brown, wet, medium dense, fine to medium SAND, with little silt		SM	3	9-12-11	Groundwater was encountered at 14.5 feet during drilling operations.
8–12	Brown, wet, medium dense, fine to medium SAND, with some silt, trace clay, trace gravel		SM	4	8-6-6	Boring caved in at 14 feet. Piezometer was installed.
12–17	Brown, wet to saturated, medium dense, fine to medium SAND, with trace to little silt		SP-SM	5	5-6-6	On 10/29/10 groundwater was at 15.41 feet. Laboratory Test Results
17–22	Brown, saturated, medium dense, fine to medium SAND, with little to some silt		SM	6	4-6-7	Sample No. 3 From 6 to 7.5 feet Natural Moisture = 7.8 %
22–25.5	Brown, saturated, medium dense, fine to coarse SAND, with trace gravel, trace silt		SP	7	11-9-10	
26	Boring terminated at 25.5 feet.					

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52

HYNES & ASSOCIATES

LOG OF BORING B-2

(Page 1 of 1)

Capital School District
c/o Becker Morgan Group, Inc.
Port Exchange, Suite 300
312 West Main Street
Salisbury, Maryland 21801

Project Name:.	: Capital School District New : District Office & Maint. Facilty	Logged By:	: T. Ewing
		Driller:	: M. Hynes
Project Number:	: JDH-10/10/388	Drilling Method:	: HSA (Mobile B-47 HD)
Start Date:	: 10/22/10	Total Depth:	: 20.5 feet
End Date:	: 10/22/10		

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches	REMARKS
0	Brown, wet, medium dense, silty, fine to coarse SAND, with little clay		SM/ML	1	7-10-11-13	Scale 1" ~ 7.75 feet
2–4	Orange-brown, wet, medium dense, fine to medium SAND, with some silt, trace clay		SM	2	5-5-7	Approximately 12 inches of organic bearing soil was encountered at the ground surface.
6	Orange-brown, wet, loose, fine to medium SAND, with little silt		SM	3	6-5-5	Groundwater was encountered at 14 feet during drilling operations.
8–16	Orange-brown, wet, loose, fine SAND, with little silt		SM	4	8-5-5	Boring caved in at 15.5 feet.
				5	4-4-4	
18	Light brown, saturated, loose, fine to medium SAND, with little silt		SM	6	6-5-5	
20	Boring terminated at 20.5 feet.					

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52

Laboratory Test Results

Sample No. 2
From 3 to 4.5 feet

Sieve Analysis

Sieve Size	Passing %
3/8	100
No. 4	99.2
No. 10	97.5
No. 20	86.6
No. 40	42.9
No. 60	22.5
No. 100	16.2
No. 200	12.7

Natural Moisture = 12.8 %

11-03-2010 S:\Mtech2002\Capital School District New District Office and Maintenance Facility-10388\B-2.bor

HYNES & ASSOCIATES

LOG OF BORING B-3

Capital School District
c/o Becker Morgan Group, Inc.
Port Exchange, Suite 300
312 West Main Street
Salisbury, Maryland 21801

Project Name:.	: Capital School District New : District Office & Maint. Facilty	Logged By:	: T. Ewing
		Driller:	: M. Hynes
Project Number:	: JDH-10/10/388	Drilling Method:	: HSA (Mobile B-47 HD)
Start Date:	: 10/22/10	Total Depth:	: 20.5 feet
End Date:	: 10/22/10		

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches
0–2	Brown, wet, very stiff, silty CLAY, with little sand		CL	1	3-6-14-15
2–8	Brown, wet, medium dense, silty, fine to medium SAND, with trace clay		SM	2	13-11-7
				3	17-7-6
8–12	Brown, wet, medium dense, fine SAND, with some silt, trace clay		SM	4	7-6-7
12–17	Red-brown, wet to saturated, loose, fine SAND, with some silt, trace clay		SM	5	4-4-5
17–20.5	Brown, saturated, medium dense, fine to medium SAND, with some silt, trace clay		SM	6	5-6-6
20.5	Boring terminated at 20.5 feet.				

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52

REMARKS

Scale 1" ~ 7.75 feet

Approximately 12 inches of organic bearing soil was encountered at the ground surface.

Groundwater was encountered at 14 feet during drilling operations.

At completion water was at 14.5 feet; boring caved in at 14.5 feet.

Laboratory Test Results

Sample No. 1
From 0 to 2 feet

Atterberg Limits

Liquid Limit = 24
Plasticity Index = 8
Natural Moisture = 11.2 %

Sample No. 4
From 9 to 10.5 feet

Natural Moisture = 14.8 %

HYNES & ASSOCIATES

LOG OF BORING B-4

(Page 1 of 1)

Capital School District
c/o Becker Morgan Group, Inc.
Port Exchange, Suite 300
312 West Main Street
Salisbury, Maryland 21801

Project Name:.	: Capital School District New : District Office & Maint. Facilty	Logged By:	: T. Ewing
		Driller:	: J. Thomas
Project Number:	: JDH-10/10/388	Drilling Method:	: HSA (Mobile B-47 HD)
Start Date:	: 10/22/10	Total Depth:	: 25.5 feet
End Date:	: 10/22/10		

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches	REMARKS
0–2.5	Brown, wet, medium dense, silty, fine to medium SAND, with trace gravel, trace clay		SM	1	6-8-8	Scale 1" ~ 7.75 feet
2.5–8	Orange-brown, wet, medium dense, fine to medium SAND, with little silt		SM	2	7-9-10	Approximately 4 inches of asphalt on 4 inches of stone was encountered at the ground surface.
				3	7-8-6	Groundwater was encountered at 14 feet during drilling operations.
8–17	Brown, wet to saturated, medium dense, fine to medium SAND, with little to some silt, trace clay		SM	4	11-12-11	At completion water was at 15 feet; boring caved in at 15 feet.
				5	5-6-6	
17–25.5	Brown, saturated, medium dense, fine to coarse SAND, with trace silt		SP	6	6-5-6	
				7	10-9-10	
25.5	Boring terminated at 25.5 feet.					

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52

11-03-2010 S:\Mitech2002\Capital School District New District Office and Maintenance Facility-10388\B-4.bor

HYNES & ASSOCIATES

LOG OF BORING B-5

Capital School District
c/o Becker Morgan Group, Inc.
Port Exchange, Suite 300
312 West Main Street
Salisbury, Maryland 21801

Project Name:.	: Capital School District New : District Office & Maint. Facilty	Logged By:	: T. Ewing
		Driller:	: W. Anderson
Project Number:	: JDH-10/10/388	Drilling Method:	: HSA (Mobile B-47 HD)
Start Date:	: 10/22/10	Total Depth:	: 20.5 feet
End Date:	: 10/22/10		

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches	REMARKS
0–2.5	Brown, wet, very stiff, clayey SILT, with some sand		ML	1	7-9-10	Scale 1" ~ 7.75 feet
2.5–5	Light brown, wet, medium dense, fine to coarse SAND, with some silt, trace clay		SM	2	8-9-11	Approximately 4 inches of asphalt on 4 inches of stone was encountered at the ground surface.
5–12	Brown, wet, medium dense to loose, fine to coarse SAND, with little to some silt, trace clay		SM	3	7-8-7	Groundwater was encountered at 14 feet during drilling operations.
				4	6-5-4	Boring caved in at 16 feet.
12–17	Brown, wet to saturated, medium dense, fine to medium SAND, with little silt		SM	5	4-6-5	
17–20.5	Brown, saturated, medium dense, fine to medium SAND, with trace to little silt		SP-SM	6	8-9-8	

Boring terminated at 20.5 feet.

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52

HYNES & ASSOCIATES

LOG OF BORING B-6

(Page 1 of 1)

Capital School District c/o Becker Morgan Group, Inc. Port Exchange, Suite 300 312 West Main Street Salisbury, Maryland 21801	Project Name:. : Capital School District New : District Office & Maint. Facilty Project Number: : JDH-10/10/388 Start Date: : 10/22/10 End Date: : 10/22/10	Logged By: : T. Ewing Driller: : M. Hynes Drilling Method: : HSA (Mobile B-47 HD) Total Depth: : 20.5 feet	

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches	REMARKS
0–2.5	Brown, wet, very loose, silty, fine to coarse SAND, with trace clay		SM	1	3-2-2	Scale 1" ~ 7.75 feet
2.5–5	Orange-brown, wet, medium dense, silty, fine to medium SAND, with trace clay, trace gravel		SM	2	6-10-8	Approximately 4 inches of asphalt on 4 inches of stone was encountered at the ground surface.
5–17	Brown, wet to saturated, medium dense to loose, fine to coarse SAND, with trace to little silt		SP-SM	3	5-7-7	Groundwater was encountered at 14 feet during drilling operations.
				4	5-6-5	Boring caved in at 15 feet.
				5	4-4-5	
17–20.5	Brown, saturated, medium dense, fine to medium SAND, with little to some silt, trace clay		SM	6	5-7-8	
20.5	Boring terminated at 20.5 feet.					

Depth scale: 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52

11-03-2010 S:\Mtech2002\Capital School District New District Office and Maintenance Facility-10388\B-6.bor

HYNES & ASSOCIATES

LOG OF BORING B-7

Capital School District
c/o Becker Morgan Group, Inc.
Port Exchange, Suite 300
312 West Main Street
Salisbury, Maryland 21801

Project Name:	: Capital School District New District Office & Maint. Facilty	Logged By:	: T. Ewing
		Driller:	: W. Anderson
Project Number:	: JDH-10/10/388	Drilling Method:	: HSA (Mobile B-47 HD)
Start Date:	: 10/22/10	Total Depth:	: 20.5 feet
End Date:	: 10/22/10		

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches	REMARKS
0–2.5	Brown, wet, medium stiff, clayey SILT, with some sand, trace gravel		CL-ML	1	4-3-4	Scale 1" ~ 7.75 feet
2.5–5	Orange-brown, wet, medium dense, silty, fine to coarse SAND, with trace clay		SM	2	7-9-9	Approximately 4 inches of asphalt on 4 inches of stone was encountered at the ground surface.
5–12	Orange-brown, wet, medium dense, fine to medium SAND, with little to some silt		SM	3	6-7-7	Groundwater was encountered at 14 feet during drilling operations.
				4	5-8-8	At completion water was at 15 feet; boring caved in at 15 feet.
12–20.5	Brown, wet to saturated, loose, fine to medium SAND, with trace to little silt		SM			Laboratory Test Results
				5	6-4-5	Sample No. 1 From 0 to 1.5 feet Natural Moisture = 14.9 %
				6	9-10-11	Sample No. 3 From 0 to 1.5 feet Natural Moisture = 10.6 %
20.5	Boring terminated at 20.5 feet.					

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52

HYNES & ASSOCIATES

LOG OF BORING B-8

Capital School District
c/o Becker Morgan Group, Inc.
Port Exchange, Suite 300
312 West Main Street
Salisbury, Maryland 21801

Project Name:.	: Capital School District New : District Office & Maint. Facilty	Logged By:	: T. Ewing
		Driller:	: W. Anderson
Project Number:	: JDH-10/10/388	Drilling Method:	: HSA (Mobile B-47 HD)
Start Date:	: 10/22/10	Total Depth:	: 20.5 feet
End Date:	: 10/22/10		

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches
0	Brown, wet, medium stiff, silty CLAY, with trace to little sand		CL-ML	1	3-4-4
2.5	Orange-brown, wet, medium dense, silty, fine to medium SAND, with little clay		SM	2	5-8-12
5	Orange-brown, wet, medium dense, fine to medium SAND, with trace to little silt		SP-SM	3	9-11-11
8	Orange-brown, wet, medium dense, fine to medium SAND, with little silt		SM	4	9-6-7
12	Brown, wet to saturated, loose, fine SAND, with little silt		SM	5	5-4-5
17	Brown, saturated, medium dense, fine to medium SAND, with trace silt		SP-SM	6	7-11-10
20.5	Boring terminated at 20.5 feet.				

REMARKS

Scale 1" ~ 7.75 feet

Approximately 4 inches of asphalt on 4 inches of stone was encountered at the ground surface.

Groundwater was encountered at 14 feet during drilling operations.

Boring caved in at 14 feet.

Laboratory Test Results

Sample No. 1
From 0 to 1.5 feet

Atterberg Limits

Liquid Limit = 24
Plasticity Index = 6
Natural Moisture = 17.6 %

Sample No. 2
From 3 to 4.5 feet

Natural Moisture = 12.7 %

HYNES & ASSOCIATES

LOG OF BORING B-9

Capital School District
c/o Becker Morgan Group, Inc.
Port Exchange, Suite 300
312 West Main Street
Salisbury, Maryland 21801

Project Name:.	: Capital School District New : District Office & Maint. Facilty	Logged By:	: T. Ewing
		Driller:	: W. Anderson
Project Number:	: JDH-10/10/388	Drilling Method:	: HSA (Mobile B-47 HD)
Start Date:	: 10/22/10	Total Depth:	: 25.5 feet
End Date:	: 10/22/10		

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches	REMARKS
0	Brown, wet, medium dense, fine to medium SAND, with some silt, trace clay		SM	1	5-6-5	Scale 1" ~ 7.75 feet
2	Brown, wet, medium dense, fine to medium SAND, with little silt		SM	2	7-5-7	Approximately 4 inches of asphalt on 4 inches of stone was encountered at the ground surface.
6	Orange-brown, wet, medium dense, fine to medium SAND, with trace silt, trace gravel		SP-SM	3	10-10-10	Groundwater was encountered at 14.5 feet during drilling operations.
8	Orange-brown, wet, loose, fine to medium SAND, with little silt		SM	4	6-5-5	Boring caved in at 14 feet.
12	Brown, wet to saturated, loose, fine to medium SAND, with trace to little silt		SP-SM	5	2-3-5	
17	Brown, saturated, medium dense, fine to medium SAND, with little silt		SM	6	5-8-9	
22	Brown, saturated, medium dense, fine to coarse SAND, with trace silt		SP	7	12-13-12	
25.5	Boring terminated at 25.5 feet.					

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52

HYNES & ASSOCIATES

LOG OF BORING B-10

Capital School District
c/o Becker Morgan Group, Inc.
Port Exchange, Suite 300
312 West Main Street
Salisbury, Maryland 21801

Project Name:.	: Capital School District New : District Office & Maint. Facilty	Logged By:	: T. Ewing
		Driller:	: M. Hynes
Project Number:	: JDH-10/10/388	Drilling Method:	: HSA (Mobile B-47 HD)
Start Date:	: 10/22/10	Total Depth:	: 20.5 feet
End Date:	: 10/22/10		

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches	REMARKS
0	Brown, wet, loose, silty, fine to medium SAND, with trace clay, trace gravel		SM	1	4-9-5-4	Scale 1" ~ 7.75 feet
2	Brown, wet, medium dense, SILT and fine to medium SAND, with little clay		ML/SM	2	9-10-12	Approximately 10 inches of organic bearing soil was encountered at the ground surface.
5	Orange-brown, wet, medium dense, fine to medium SAND, with trace silt		SP	3	4-9-7	Groundwater was encountered at 14 feet during drilling operations.
8	Orange-brown, wet, medium dense, fine to medium SAND, with little silt		SM	4	9-9-9	Boring caved in at 15 feet.
12	Brown, wet to saturated, loose, fine to coarse SAND, with trace to little silt		SP-SM	5	4-5-5	A piexometer was installed on 10/29/10. Groundwater was at 15.2 feet.
				6	4-6-6	
20.5	Boring terminated at 20.5 feet.					

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52

11-03-2010 S:\Mtech2002\Capital School District New District Office and Maintenance Facility-10388\B-10.bor

HYNES & ASSOCIATES

LOG OF BORING B-11

(Page 1 of 1)

Capital School District
c/o Becker Morgan Group, Inc.
Port Exchange, Suite 300
312 West Main Street
Salisbury, Maryland 21801

Project Name:.	: Capital School District New : District Office & Maint. Facilty	Logged By:	: T. Ewing
		Driller:	: M. Hynes
Project Number:	: JDH-10/10/388	Drilling Method:	: HSA (Mobile B-47 HD)
Start Date:	: 10/22/10	Total Depth:	: 50.5 feet
End Date:	: 10/22/10		

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches	REMARKS
0–2	Brown, wet, loose, silty, fine to medium SAND, with little clay, trace gravel		SM/ML	1	4-4-4-4	Scale 1" ~ 7.75 feet
2–4.5	Brown, wet, loose, silty CLAY, with little sand		CL	2	4-3-5	Approximately 10 inches of organic bearing soil was encountered at the ground surface.
4.5–8	Orange-brown, wet to saturated, medium dense, fine to medium SAND, with trace silt		SP	3	15-14-12	Groundwater was encountered at 14 feet during drilling operations.
8–17	Orange-brown, wet, medium dense, fine to medium SAND, with trace to little silt		SP-SM	4	7-6-5	At completion groundwater was at 17 feet; boring caved in at 17.5 feet.
						Laboratory Test Results
				5	3-4-6	Sample No. 1 From 0 to 2 feet
						Natural Moisture = 11.6%
17–22	Brown, saturated, medium dense, fine to coarse SAND, with trace to little silt		SP-SM	6	4-8-6	Sample No. 2 From 3 to 4.5 feet
						Atterberg Limits
22–37	Brown, saturated, dense to very dense, fine to coarse SAND, with trace silt		SP	7	12-16-19	Liquid Limit = 25 Plasticity Index = 10 Natural Moisture = 18.2%
				8	16-20-21	
				9	21-25-29	
37–42	Light gray, saturated, medium dense, fine SAND, with trace silt		SP	10	5-6-7	
42–50.5	Light brown, saturated, very dense, fine to medium SAND, with trace silt		SP	11	25-29-34	
				12	24-30-36	
50.5	Boring terminated at 50.5 feet.					

HYNES & ASSOCIATES

LOG OF BORING B-12

Capital School District
c/o Becker Morgan Group, Inc.
Port Exchange, Suite 300
312 West Main Street
Salisbury, Maryland 21801

Project Name:.	: Capital School District New : District Office & Maint. Facilty	Logged By:	: T. Ewing
		Driller:	: M. Hynes
Project Number:	: JDH-10/10/388	Drilling Method:	: HSA (Mobile B-47 HD)
Start Date:	: 10/22/10	Total Depth:	: 25.5 feet
End Date:	: 10/22/10		

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches
0–2.5	Orange-brown, wet, medium dense, silty, fine to medium SAND, with trace clay		SM	1	2-3-7-10
2.5–5	Brown, wet, medium dense, silty, fine to medium SAND, with trace clay, trace gravel		SM	2	7-12-9
5–8	Orange-brown, wet, medium dense, fine to medium SAND, with little to some silt, trace clay		SM	3	8-11-9
8–17	Orange-brown, wet, medium dense to loose, fine to medium SAND, with trace to little silt		SP-SM	4	8-7-7
				5	5-4-4
17–22	Brown, saturated, medium dense, fine to medium SAND, with little silt		SM	6	10-12-16
22–25.5	Brown, saturated, medium dense, fine to coarse SANd, with trace silt		SP	7	11-9-11
25.5	Boring terminated at 25.5 feet.				

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52

REMARKS

Scale 1" ~ 7.75 feet

Approximately 11 inches of organic bearing soil was encountered at the ground surface.

Groundwater was encountered at 14 feet during drilling operations.

Boring caved in at 14 feet.

Laboratory Test Results

Sample No. 2
From 3 to 4.5 feet

Sieve Analysis

Sieve Size	Passing %
1/2	100
3/8	98.2
No. 4	94.9
No. 10	93.0
No. 20	90.3
No. 40	74.4
No. 60	39.0
No. 100	16.7
No. 200	27.1

Sample No. 4
From 9 to 10.5 feet

Natural Moisture = 11.1%

HYNES & ASSOCIATES

LOG OF BORING P-1

(Page 1 of 1)

Capital School District
c/o Becker Morgan Group, Inc.
Port Exchange, Suite 300
312 West Main Street
Salisbury, Maryland 21801

Project Name:.	: Capital School District New : District Office & Maint. Facilty	Logged By:	: T. Ewing
		Driller:	: M. Hynes
Project Number:	: JDH-10/10/388	Drilling Method:	: Hand Auger
Start Date:	: 10/22/10	Total Depth:	: 5 feet
End Date:	: 10/22/10		

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	REMARKS
0	Brown, wet, silty, fine to medium SAND, with trace clay		SM	1	Scale 1" ~ 7.75 feet
2	Brown, wet, fine to medium SAND, with some silt, trace clay		SM	2	Approximately 2 inches of asphalt on 3 inches of stone was encountered at the ground surface.
4	Brown, wet, clayey SILT, with some sand		ML	3	
6	Brown, wet, silty, fine to medium SAND, with little clay		SM	4	Groundwater was not encountered during augering operations.
8	Boring terminated at 5 feet.				
10					
12					
14					
16					
18					
20					
22					
24					
26					
28					
30					
32					
34					
36					
38					
40					
42					
44					
46					
48					
50					
52					

11-03-2010 S:\Mtech2002\Capital School District New District Office and Maintenance Facility-10388\P-1.bor

HYNES & ASSOCIATES

LOG OF BORING P-2

(Page 1 of 1)

Capital School District
c/o Becker Morgan Group, Inc.
Port Exchange, Suite 300
312 West Main Street
Salisbury, Maryland 21801

Project Name:.	: Capital School District New : District Office & Maint. Facilty	Logged By:	: T. Ewing
		Driller:	: M. Hynes
Project Number:	: JDH-10/10/388	Drilling Method:	: Hand Auger
Start Date:	: 10/22/10	Total Depth:	: 5 feet
End Date:	: 10/22/10		

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	REMARKS
0	Brown, wet, clayey SILT, with little sand		ML	1	Scale 1" ~ 7.75 feet
2–4	Brown, wet, fine to medium SAND, with some silt, trace clay		SM	2	Approximately 2 3/4 inches of asphalt on 2 1/2 inches of stone was encountered at the ground surface.
4–5	Brown, wet, fine to coarse SAND, with little silt		SM	3	
	Boring terminated at 5 feet.				Groundwater was not encountered during augering operations.

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52

11-03-2010 S:\Mtech2002\Capital School District New District Office and Maintenance Facility-10388\P-2.bor

HYNES & ASSOCIATES

LOG OF BORING SWM-1

(Page 1 of 1)

Capital School District
c/o Becker Morgan Group, Inc.
Port Exchange, Suite 300
312 West Main Street
Salisbury, Maryland 21801

Project Name:.	: Capital School District New : District Office & Maint. Facilty	Logged By:	: T. Ewing
		Driller:	: M. Hynes
Project Number:	: JDH-10/10/388	Drilling Method:	: Hand Auger
Start Date:	: 10/22/10	Total Depth:	: 10 feet
End Date:	: 10/22/10		

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	REMARKS
0–2	Brown, wet, silty, fine to medium SAND, with little clay (Loam)		SM/ML	1	Scale 1" ~ 7.75 feet Approximately 4 inches of asphalt on 3 inches of stone was encountered at the ground surface. Groundwater was not encountered during augering operations.
2–4	Brown, wet, fine to medium SAND, with trace to little clay, little silt (Loam)		SM/SC	2	
4–6	Brown, wet, fine to medium SAND, with little to some silt (Loamy sand)		SM	3	
6–8	Brown, wet, silty, fine to medium SAND, with trace clay (Loam)		SM	4	
8–10	Orange-brown, wet, fine to medium SAND, with trace silt (Sand)		SP	5	
10	Boring terminated at 10 feet.				

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52

HYNES & ASSOCIATES

LOG OF BORING SWM-2

Capital School District
c/o Becker Morgan Group, Inc.
Port Exchange, Suite 300
312 West Main Street
Salisbury, Maryland 21801

Project Name:.	: Capital School District New District Office & Maint. Facilty	Logged By:	: T. Ewing
Project Number:	: JDH-10/10/388	Driller:	: M. Hynes
Start Date:	: 10/22/10	Drilling Method:	: Hand Auger
End Date:	: 10/22/10	Total Depth:	: 10 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	REMARKS
0–3	Brown, wet, clayey SILT, with little sand (Silty clay loam)		ML	1	Scale 1" ~ 7.75 feet Approximately 18 inches of organic bearing soil was encountered at the ground surface. Groundwater was not encountered during augering operations.
3–5	Brown, wet, silty CLAY, with trace to little sand (Clay)		CL	2	
5–8.5	Orange-brown, wet, fine to medium SAND, with trace silt (Sand)		SP	3, 4	
8.5–10	Orange-brown, wet, silty, fine to medium SAND, with trace gravel (Sandy loam)		SM	5	
10	Boring terminated at 10 feet.				

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52

HYNES & ASSOCIATES

LOG OF BORING SWM-3

(Page 1 of 1)

Capital School District c/o Becker Morgan Group, Inc. Port Exchange, Suite 300 312 West Main Street Salisbury, Maryland 21801	Project Name:. : Capital School District New : District Office & Maint. Facilty Project Number: : JDH-10/10/388 Start Date: : 10/22/10 End Date: : 10/22/10	Logged By: : T. Ewing Driller: : M. Hynes Drilling Method: : Hand Auger Total Depth: : 10 feet	

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	REMARKS
0–2	Brown, wet, silty, fine to medium SAND, with trace clay (Loam)		SM/ML	1	Scale 1" ~ 7.75 feet Approximately 12 inches of organic bearing soil was encountered at the ground surface. Groundwater was not encountered during augering operations.
4	Brown, wet, silty, fine to medium SAND, with trace clay (Loam)		SM	2	
			SM	3	
6	Orange-brown, wet, silty, fine to medium SAND, with trace clay (Loam)		SP-SM	4	
8	Orange-brown, wet, fine to medium SAND, with trace to little silt (Sand)		SP	5	
10	Orange-brown, wet, fine to medium SAND, with trace silt (Sand)				
12	Boring terminated at 10 feet.				

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52

11-03-2010 S:\Mtech2002\Capital School District New District Office and Maintenance Facility-10388\SWM-3.bor

HYNES & ASSOCIATES

LOG OF BORING SWM-4

Capital School District
c/o Becker Morgan Group, Inc.
Port Exchange, Suite 300
312 West Main Street
Salisbury, Maryland 21801

Project Name:.	: Capital School District New District Office & Maint. Facilty	Logged By:	: T. Ewing
Project Number:	: JDH-10/10/388	Driller:	: M. Hynes
Start Date:	: 10/22/10	Drilling Method:	: Hand Auger
End Date:	: 10/22/10	Total Depth:	: 10 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	REMARKS
0–2	Brown, wet, silty, fine to medium SAND, with trace to little clay (Loam)		SM/ML	1	Scale 1" ~ 7.75 feet Approximately 7 inches of organic bearing soil was encountered at the ground surface. Groundwater was not encountered during augering operations.
2–4.5	Brown, wet, silty, fine to medium SAND, with trace clay, trace gravel (Sandy loam)		SM	2	
4.5–8	Orange-brown, wet, fine to medium SAND, with little to some silt, trace clay (Sandy loam)		SM	3, 4	
8–10	Orange-brown, wet, fine to medium SAND, with trace to little silt (Sand)		SP-SM	5	
10	Boring terminated at 10 feet.				

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52

LOG OF BORING SWM-5

HYNES & ASSOCIATES

(Page 1 of 1)

Capital School District
c/o Becker Morgan Group, Inc.
Port Exchange, Suite 300
312 West Main Street
Salisbury, Maryland 21801

Project Name:.	: Capital School District New : District Office & Maint. Facilty	Logged By:	: T. Ewing
		Driller:	: M. Hynes
Project Number:	: JDH-10/10/388	Drilling Method:	: Hand Auger
Start Date:	: 10/22/10	Total Depth:	: 10 feet
End Date:	: 10/22/10		

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	REMARKS
0	Brown, wet, clayey SILT, with little sand (Clay loam)		ML	1	Scale 1" ~ 7.75 feet
2	Brown, wet, fine to medium SAND, with some silt, trace clay (Sandy loam)		SM	2	Approximately 10 inches of organic bearing soil was encountered at the ground surface.
4	Orange-brown, wet, fine to medium SAND, with trace to little silt (Loamy sand)		SP-SM	3	
6	Orange-brown, wet, fine to medium SAND, with little silt (Loamy sand)		SM	4	Groundwater was not encountered during augering operations.
8	Orange-brown, wet, fine to medium SAND, with trace to little silt (Sand)		SP-SM	5	
10	Boring terminated at 10 feet.				
12					
14					
16					
18					
20					
22					
24					
26					
28					
30					
32					
34					
36					
38					
40					
42					
44					
46					
48					
50					
52					

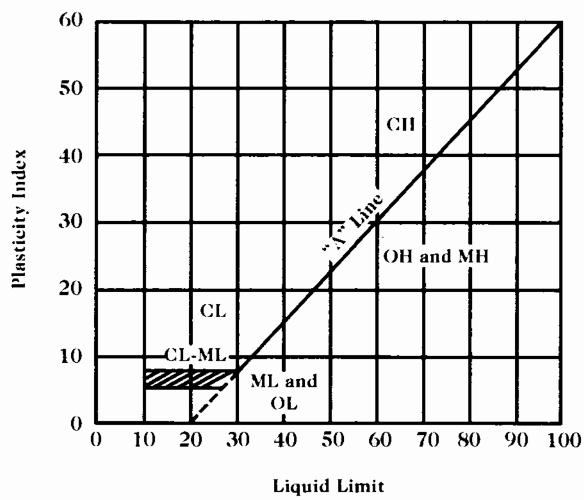
JOHN D. HYNES & ASSOCIATES, INC.

Geotechnical and Environmental Consultants
Monitoring Well Installation
Construction Inspection and Materials Testing

UNIFIED SOIL CLASSIFICATION SYSTEM

Major Divisions			*Group Symbols*	*Typical Names*	*Laboratory Classification Criteria*		
Coarse-grained soils (More than half of material is larger than No 200 sieve size)	Gravels (More than half of coarse fraction is larger than No 4 sieve size)	Clean gravels (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No 200 sieve size), coarse grained soils are classified as follows: Less than 5 percent GW, GP, SW, SP; More than 12 percent GM, GC, SM, SC; 5 to 12 percent *Borderline cases requiring dual symbols*[b]	$C_u=\frac{D_{60}}{D_{10}}$ 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 graduation 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 above "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.		$C_u=\frac{D_{60}}{D_{10}}$ 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 graduation requirements for SW	
		Sands with fines (Appreciable amount of fines)	SM[a] d / u	Silty sands, 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.
			SC	Clayey sands, sand-clay mixtures		Atterberg limits above "A" line with P.I. greater than 7	
Fine-grained soils (More than half material is smaller than No 200 sieve)	Silts and clays (Liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity	Plasticity Chart (see below)		
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays			
			OL	Organic silts and organic silty clays of low plasticity			
	Silts and clays (Liquid limit greater than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts			
			CH	Inorganic clays of high plasticity, fat clays			
			OH	Organic clays of medium to high plasticity, organic silts			
	Highly organic soils		Pt	Peat and other highly organic soils			

Plasticity Chart



☐ ***Main Office*** - 32185 Beaver Run Drive • Salisbury, Maryland 21804 • 410-546-6462 • Fax 410-548-5346
☐ ***Dover Office*** - 1039 Fowler Court • Dover, Delaware 19901 • 302-678-9718 • Fax 302-678-9733
E-mail - Salisbury jdhynes@aol.com

HYNES

FIELD CLASSIFICATION SYSTEM FOR SOIL EXPLORATION

NON-COHESIVE SOILS
(Silt, Sand, Gravel and Combinations)

DENSITY

Very Loose	- 5 blows/ft. or less
Loose	- 6 to 10 blows/ft.
Medium Dense	- 11 to 30 blows/ft.
Dense	- 31 to 50 blows/ft.
Very Dense	- 51 blows/ft. or more

RELATIVE PROPORTIONS

Descriptive Term	Percent
Trace	1 - 10
Little	11 - 20
Some	21 - 35
And	36 - 50

PARTICLE SIZE IDENTIFICATION

Boulders	- 8 inch diameter or more
Cobbles	- 3 to 8 inch diameter
Gravel	- Coarse - 1 to 3 inch
	- Medium - 1/2 to 1 inch
	- Fine - 4.75 mm to 1/2 inch
Sand	- Coarse - 2.0 mm to 4.75 mm
	- Medium - 0.425 mm to 2.0 mm
	- Fine - 0.075 mm to 0.425 mm
Silt	- 0.075 mm to 0.002 mm

COHESIVE SOILS
(Clay, Silt and Combinations)

CONSISTENCY

Very Soft	- 3 blows/ft. or less
Soft	- 4 to 5 blows/ft.
Medium Stiff	- 6 to 10 blows/ft.
Stiff	- 11 to 15 blows/ft.
Very Stiff	- 16 to 30 blows/ft.
Hard	- 31 blows/ft. or more

PLASTICITY

Degree of Plasticity	Plasticity Index
None to Slight	0 - 4
Slight	5 - 7
Medium	8 - 22
High to Very High	over 22

Classification on logs are made by visual inspection of samples unless a sample has been subjected to laboratory classification testing.

Standard Penetration Test - Driving a 2.0" O.D., 1-3/8" I.D., splitspoon sampler a distance of 1.0 foot into undisturbed soil with a 140 pound hammer free falling a distance of 30.0 inches. It is customary to drive the spoon 6 inches to seat into undisturbed soil, then perform the test. The number of hammer blows for seating the spoon and making the test are recorded for each 6 inches of penetration on the drill log (Example - 6/8/9). The standard penetration test value (N - value) can be obtained by adding the last two figures (i.e. 8 + 9 = 17 blows/ft.). (ASTM D-1586)

Strata Changes - In the column "Soil Descriptions," on the drill log, the horizontal lines represent strata changes. A solid line (—) represents an actually observed change, a dashed line (----) represents an estimated change.

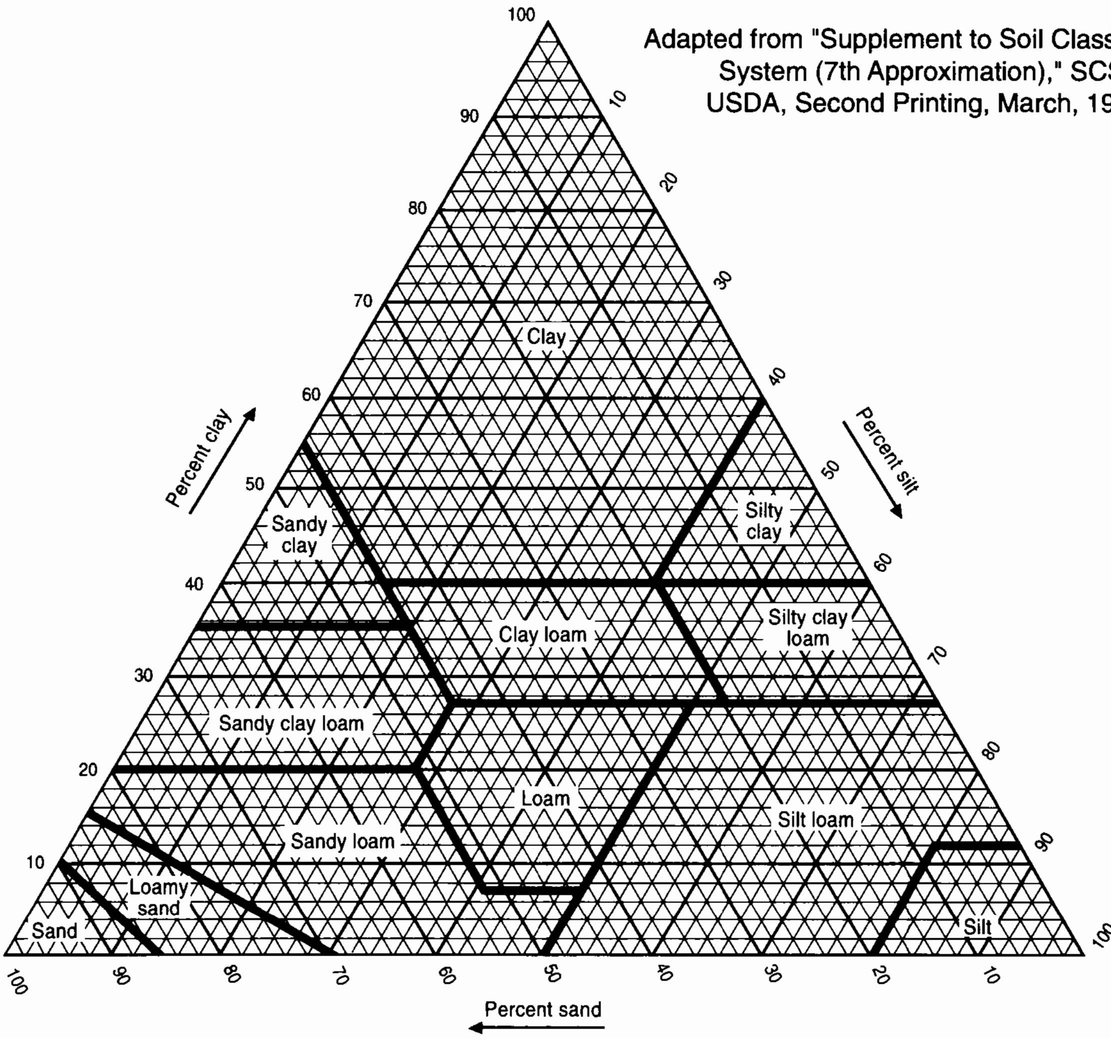
Groundwater - Observations were made at the times indicated. Porosity of soil strata, weather conditions, site topography, etc. may cause changes in the water levels indicated on the logs.

32185 Beaver Run Drive • Salisbury, Maryland 21804
410-546-6462 • Fax 410-548-5346

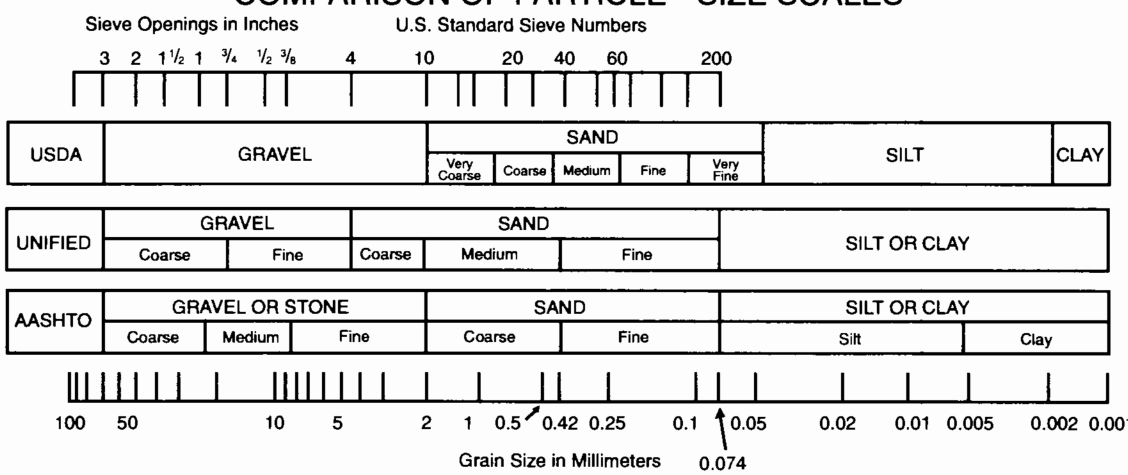
HYNES

USDA SOIL CLASSIFICATION SYSTEM

Adapted from "Supplement to Soil Classification System (7th Approximation)," SCS, USDA, Second Printing, March, 1967



COMPARISON OF PARTICLE - SIZE SCALES



Soil triangle of the basic soil textural classes. (U.S. Soil Conservation Service.) 288-D-2782.

☐ *Main Office* - 32185 Beaver Run Drive • Salisbury, Maryland 21804 • 410-546-6462 • Fax 410-548-5346
E-mail Salisbury jdhynes@aol.com

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. *No one except you* should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one—not even you*—should apply the report for any purpose or project except the one originally contemplated.

Read the full report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, *do not rely on a geotechnical engineering report* that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions *only* at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an *opinion* about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject To Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce such risks, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations", many of these provisions indicate where geotechnical engineers responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Rely on Your Geotechnical Engineer for Additional Assistance

Membership in ASFE exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.

ASFE

8811 Colesville Road Suite G106 Silver Spring, MD 20910

Telephone: 301-565-2733 Facsimile: 301-589-2017

email: info@asfe.org www.asfe.org

UGER1000.10M