HYNES

JOHN D. HYNES & ASSOCIATES, INC.

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

June 14, 2010

Heather Smith
Becker Morgan Group
Port Exchange
312 West Main Street, Suite 300
Salisbury, Maryland 21801

Re: Report of Subsurface Exploration and Geotechnical Engineering Services
Tri-County Council/Shore Transit/Transit Bus Service and Maintenance Facility
Wicomico County, Maryland
Project No.: JDH-10/10/211

Dear Ms. Smith:

Hynes & Associates, Inc. has completed the authorized subsurface exploration and geotechnical engineering evaluations for the Tri-County Council/Shore Transit/Transit Bus Service and Maintenance Facility in Wicomico County, Maryland. Our services were provided generally in accordance with our April 13, 2010 contract proposal. As requested, we provide geotechnical engineering recommendations for the proposed new building, pavement areas, and the stormwater management structures.

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 2,000 psf bearing may be used to proportion the footings for the foundation elements of the proposed new 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.

Travis G. Ewing
Staff Engineer

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HYNES

REPORT OF
SUBSURFACE EXPLORATION
AND
GEOTECHNICAL ENGINEERING RECOMMENDATIONS

TRI-COUNTY COUNCIL/SHORE TRANSIT/TRANSIT BUS
SERVICE AND MAITENANCE FACILITY
WICOMICO COUNTY, MARYLAND

PREPARED FOR
BECKER MORGAN GROUP

JUNE 14, 2010
PROJECT NO.: JDH-10/10/211

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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. Location of groundwater and applicable construction dewatering control procedures; and
8. 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-10/10/211-A), the project site formerly known as Comtek, is located on the northwest corner of Walston Switch Road and Ocean Gateway (U.S. Route 50), in Salisbury, Maryland. Access to the site is from Comtek Lane which projects west from Walston Switch Road.

The project site currently contains an existing building with an approximate 63,000 sf footprint located approximately 700 feet west of Walston Switch Road and approximately 150 feet north of Ocean Gateway. Approximately 89,000 sf of asphalt parking area is located northwest of the existing building. An asphalt access road (Comtek Lane) connects the existing parking area and building area with Walston Switch Road. A pond is located east of the existing building with a small waterway projecting beneath Comtek Lane. This water feature is manmade. A small bridge carries Comtek Lane over the pond. To the south and west of the existing parking area is forested areas and lowlands. A field with spot areas of trees are located on the northeast of the property.

FIELD EXPLORATION AND STUDY

In order to determine the nature of the subsurface conditions at the proposed new building, we drilled 6 Standard Penetration Test (SPT) borings (SB-6 through SB-11) to depths of 35 feet. We drilled 9 test borings (SB-1, 2, 3, 5, 12, 15, 16, 17 and 19) to depths of 10 feet at pavement areas, and 4 test borings (SB-4, 13, 14, and 18) to depths of 10 feet at stormwater pond areas. We, also, drilled 1 test boring to a depth of 5 feet (SB-20) to sample the "pond" bottom soils near boring SB-19.

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.

The field exploration data was supplemented with laboratory testing data. The laboratory at John D. Hynes & Associates, Inc. performed five Atterberg Limits (Liquid and Plastic) tests and five natural moisture content tests. California Bearing Ratio (CBR) tests were performed on soil samples collected from boring SB-2, SB-17 and SB-19 from soil excavated from below the organic bearing soil layer. The CBR test results are included in the Appendix. The test results for the Atterberg Limits and Natural Moisture Content tests are noted on the boring logs in the Appendix.

SUBSURFACE CONDITIONS

We encountered 6 to 20 inches of organic bearing soil at the ground surface of the borings located off of the existing pavements. Other thicknesses of organic bearing soils may be encountered at other locations on site. At borings drilled through existing pavements, we encountered pavement thicknesses of 3 to 4.5 inches and gravel base thicknesses of 4.5 to 16 inches. Boring SB-20 was drilled in 1 foot of standing water and encountered organic bearing soils to a depth of 3 feet below the soil surface. Refer to the attached boring logs for the thicknesses of the surficial materials encountered at each boring, and the soil profiles in each boring.

Below the organic bearing soil horizon at the borings, soils were visually classified in accordance with USCS and consisted of interbedded layers of Silty SAND (SM, SM/ML), SAND (SP, SP/SM), Clayey SAND (SC), Silty Clay (CL,CL/CH,CH), and Clayey SILT (ML,ML/MH, MH) to boring termination depths. The stormwater management area borings were, also, visually classified in accordance with the USDA soil classification system. These soil layers were described as Silty clay, Sandy loam, Silt loam, Sandy clay, Loamy sand, Clay, and Silty clay loam.

In the building area borings, cohesive soils were characterized by Standard Penetration Test (SPT) values (N-values) of 4 to 20 blows per foot. This range of penetration resistance indicates in place consistencies of soft to very stiff. The non-cohesive soils (sands) were characterized by N-values of 7 to 20 blows per foot indicating in place relative densities of loose to medium dense.

At completion of each building footprint boring, groundwater was measured at depths of 9.5 to 16 feet. SB-18 encountered groundwater at a depth of 9 feet. Groundwater was not encountered in any other stormwater management borings. Pavement borings SB-2, SB-3, SB-16, and SB-17 encountered groundwater at depths of 8 to 9 feet. Groundwater was not encountered in any other pavement area borings. Boring SB-20 was hand augered in the existing pond at an area with 1 foot of standing water. Groundwater elevations may vary at other times during the year depending on the amount of precipitation and the extent of surface development.

PROJECT CHARACTERISTICS

The existing project site is to be redeveloped with a new bus maintenance facility. The new bus maintenance facility will be located behind (northwest of) the existing 63,000 sf office/shop facility. Existing pavements onsite are planned to be demolished and removed or recycled. New heavy and light duty pavements are proposed. A new approximately 8,350 sf bus maintenance facility is proposed. The new bus maintenance facility will contain 5 transit bus bays (approximately 700 sf each), 2 restrooms, a break room, parts/tool/exterior storage rooms, 3 offices, and a wash bay/mechanical room. The structure's exterior will be 10 inch concrete masonry unit walls, projecting to a height of approximately 21 to 23 feet above finish floor. Finished floor elevation will be raised slightly (1 foot or less) above existing top of pavement elevations. Morabito Consultants estimate maximum foundation loading for the proposed building to be 5 kips/ft at exterior walls and 4 kips/ft at interior walls and 30 kips at columns. Top of new pavement elevations are proposed to be set approximately at the top of existing pavements to allow for the reuse of the existing stormwater drainage system. Stormwater management system improvements are, also, planned. These may include ponds, bioswales, and below grade infiltration structures. Consideration is being made regarding the filling of a portion of the existing manmade stormwater pond system.

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 pavements on grade, old foundations, and other deleterious materials should be removed and wasted. Recycled asphalt and stone may be set aside for reuse. The existing organic bearing soil should be stripped and can be stockpiled for reuse in landscape areas. Abandoned utilities, etc. should, also, be removed from structural areas. The associated excavations should be backfilled in accordance with Section B below. If groundwater or perched surface water are 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 and organic soils have been removed from structural subgrade areas. The inspector should require that the exposed subgrade materials be compacted 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 due to shallow groundwater conditions. Precipitation may result in standing water (perched water) at low areas. Surface water will pond on silts and clays. 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. CL, CH, SM and ML materials were identified at shallow depths 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.

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 SM soils that do not contain organics may be re-used for structural fill. Stone and asphalt millings may, also, be reused as structural fill or for pavement base or subbase material. 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 CH), Clayey SILTs (ML and MH) and Clayey SANDs (SC) 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, pavement, and slab on grade boundaries. 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. 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 2,000 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.

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. 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 2 feet 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 150 pounds per cubic inch.

E. Pavement Subgrade Preparation and Design

Borings, SB-3, 5, 12, 15, 16, and 17 were drilled in heavy duty pavement areas to depths of 10 feet below the ground surface. Borings SB-1, 2, and 19 were drilled in light duty pavement areas to depths of 10 feet. Below surficial materials, borings identified Silty SANDs (SM), Clayey SANDs (SC) and Silty CLAYs (CL, CL-ML, CH). Sandy SILT (ML) was, also, encountered in boring SB-19.

All pavement subgrade areas should be inspected and proofrolled in accordance with Sections A and B of this report. As noted, the pavement subgrade soils will consist of materials having the classifications of CH, CL, or SM 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. Refer to Sections A and B for recommendations for subgrade preparation and fill construction related to areas that have roots or other obstructions at the pavement subgrade.

We note that SM materials may be borrowed from other areas of the site to be used as fill at pavement areas. Native SC, ML, CH and CL materials should not be borrowed for use as pavement area fill materials. SM soils will need to be kept moist to compact but should not be wetter than 3 percentage points over the "Optimum Moisture Content". SM soils that are too wet will have to be dried or set aside to be used in landscape areas.

CBR tests were performed on soil samples collected from borings SB-2, SB-17 and SB-19, representing heavy and light duty pavements respectively. The CBR values were determined to be 20 at SB-2 (light duty), 18 at SB-17 (heavy duty) and 16 at SB-19 (light duty) which were used in the design of the pavement cross sections.

The following recommendations are provided assuming compacted subgrade soils, organic bearing soils have been removed from pavement subgrade areas and approved subgrade soil types (see Section A and B recommendations).

HEAVY DUTY FLEXIBLE PAVEMENT

Hot Mix Asphalt Surface Course (Superpave 9.5 mm, PG 64-22)	1.5 inches
Hot Mix Asphalt Base Course (Superpave 19 mm, PG 64-22)	2.5 inches
Graded Aggregate Subbase (Maryland Type CR-6 or GA Subbase)	8 inches

HEAVY DUTY RIGID PAVEMENT

Concrete (*air entrained, 28 day compressive strength of 4,000 psi)	6 inches
Graded Aggregate Subbase (Maryland Type CR-6 or GA Subbase)	4 inches

LIGHT DUTY FLEXIBLE PAVEMENT

Hot Mix Asphalt Surface Course (Superpave 9.5 mm, PG 64-22)	1.5 inches
Hot Mix Asphalt Base Course (Superpave 19 mm, PG 64-22)	2.5 inches
Graded Aggregate Subbase (Maryland Type CR-6 or GA Subbase)	5 inches

LIGHT DUTY RIGID PAVEMENT

Concrete (*air entrained, 28 day compressive strength of 4,000 psi)	5 inches
Graded Aggregate Subbase (Maryland Type CR-6 or GA Subbase)	4 inches

*We also include heavy and light duty pavement designs using demolished and milled onsite asphalt pavement as a base or subbase. The reclaimed asphalt pavement (RAP) thicknesses are given below in the cross section design below.

HEAVY DUTY FLEXIBLE PAVEMENT:

Hot Mix Asphalt Surface Course (Superpave 9.5 mm, PG 64-22)	1.5 inches
Hot Mix Asphalt Base Course (Superpave 19 mm, PG 64-22)	2.5 inches
RAP Subbase (Reclaimed Asphalt Pavement)	12 inches

HEAVY DUTY RIGID PAVEMENT:

Concrete (*air entrained, 28 day compressive strength of 4,000 psi)	6 inches
RAP Base (Reclaimed Asphalt Pavement)	6 inches

LIGHT DUTY FLEXIBLE PAVEMENT:

Hot Mix Asphalt Surface Course (Superpave 9.5 mm, PG 64-22)	1.5 inches
Hot Mix Asphalt Base Course (Superpave 19 mm, PG 64-22)	2.5 inches
RAP Subbase (Reclaimed Asphalt Pavement)	7.5 inches

LIGHT DUTY RIGID PAVMENT:

Concrete (*air entrained, 28 day compressive strength of 4,000 psi)	4 inches
RAP Base (Reclaimed Asphalt Pavement)	6 inches

The pavement materials and construction should be in general accordance with the Maryland 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

Five borings, SB-4, 13, 14, and 18 were drilled in areas being considered for stormwater management structures. Borings were drilled to 10 feet at the proposed stormwater management areas at locations given on the Boring Location Plan in the Appendix.

Groundwater was only encountered in boring SB-18 at a depth of 9 feet. Groundwater elevations may vary at other times during the year depending on the amount of precipitation and the extent of surface development. Note that groundwater was encountered at depths of 9.5 to 16 feet in the building area borings.

Below surficial materials, at stormwater borings SB-4, 13, and 14, Silty CLAY (CL, CH) was encountered to depths of 4 to 5.5 feet. Borings SB-13 and 14 encountered Silty SANDs (SM, Sandy loam), Sandy SILTs (ML, Silt loam) and Clayey SANDs (SC, Sandy clay) from 4 and 5.5 feet to boring termination depths. Boring SB-4 encountered Silty SAND (SM, Sandy loam) from 5 to 7 feet and Silty CLAY (CL, Silty clay) was encountered from 7 feet to boring termination depths. Boring SB-18 encountered silty SANDs (SM, Loamy sand) to a depth of 3 feet, Silty CLAY (CL, Silty clay) and Clayey SILT (ML, Silty clay loam) from depths of 3 feet to 9 feet, and Clayey SAND (SC, Sandy loam) from a depth of 9 feet to boring termination depth. The USDA and USCS classifications are given in the description of each soil type encountered on the boring logs.

Below surficial materials, mottling was observed in SB-13 to a depth of 4 feet. In boring SB-14, mottling was observed from depths of 2.5 to 5.5 feet, and in boring SB-18 mottling was observed from a depth of 5 feet to 9 feet.

The SM materials encountered in the stormwater management areas may be reused as structural fill. We note that the only shallow (within 4 feet of the surface) SM material encountered was at boring SB-18.

G. Below Grade Walls

It is recommended that below grade structure walls or retaining walls, designed with restricted or unrestricted rotation at the top of the wall (i.e., cantilevered or with a single lateral support) subject to lateral earth pressure, be designed to resist an equivalent fluid weight of 65 pcf provided that the backfill meets the requirements specified in this report.

The lateral earth pressure intensity is based on long term soil loading conditions using an at-rest soil coefficient of 0.5. Soils suitable for backfill behind permanent retaining walls are SP or SM-SP sands. For these materials compacted in place, applicable engineering characteristics suitable for design are as follows:

Cohesion	zero
Angle of Internal Friction	30°
Maximum moist density, compacted backfill	130 pcf

In design of walls to resist lateral loading, where hydrostatic loading is applied, the equivalent fluid weight of soil may be reduced to 32 pcf within the height of the hydrostatic load distribution. A lateral surcharge loading should also be applied in wall designs to account for all construction and future traffic loading to be applied adjacent to the wall. Please see the sketch (Drawing No: JDH- JDH-10/10/211-C) in the Appendix, for loading parameters for the undrained condition.

Backfill immediately behind walls should be relatively clean, granular material containing less than 10 percent passing the No. 200 sieve (0.074 mm). In addition, the compaction behind these walls should be 92 to 95 percent of the Modified Proctor maximum dry density in accordance with ASTM D-1557. Since excessive compaction may cause yielding or damage to foundation and retaining walls, hand operated equipment should be used near the walls.

H. Existing Pond Backfill

Pumps should be installed to drain ponds or areas of ponds to be backfilled. Water levels should be lowered as much as possible to facilitate the backfilling operation. The existing organic soils and "muck" should be stripped or excavated from pond subgrades. The pond should be prepared and filled in accordance with sections A and B of this report. If the pond is unable to be completely drained, the following steps should be followed:

1. Remove "muck" and organic soils from pond subgrades to be filled.
2. Place a nonwoven filter fabric along the sides of the pond/portion of the pond to be filled that contain water.
3. Place No. 2 or No. 3 stone across pond subgrade so that the stone surface is at least 4 inches above the water level.
4. Place a nonwoven filter fabric on top of the stone.
5. The sides and top of the placed stone should be completely covered with filter fabric.
6. Place and compact fill to desired elevation in accordance with Section B of this report.

I. Groundwater and Drainage

At the building borings, groundwater was measured at depths of 9.5 to 16 feet. SB-18 encountered groundwater at a depth of 9 feet. Groundwater was not encountered in any other stormwater management borings. Pavement borings SB-2, SB-3, SB-16, and SB-17 encountered groundwater at depths of 8 to 9 feet. Groundwater was not encountered in any other pavement area borings. Groundwater elevations may vary at other times during the year depending on the amount of precipitation and the extent of surface development.

We do not expect foundation construction problems associated with groundwater. The Contractor however should be prepared to dewater the lowest excavations in the event of infiltration of precipitation. The contractor and subcontractors (e.g. utility line contractors) should be prepared to dewater, as necessary. If required, acceptable measures for dewatering should be implemented. These methods may include sumping and pumping, dewatering wells, etc.

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 subgrade soils. All pavements and ground surfaces should be sloped away from the building to prevent ponding of water around the building.

J. Seismic Site Class

As stated in our proposal, we have deep boring information that we drilled a project across the street from the project site. We have two local test borings to depths of 100 feet. We use the 100 foot test boring data together with the project site boring data to evaluate the seismic site class in accordance with the IBC.

In consideration of the soil layering and test data, Hynes & Associates recommends using "Seismic Site Class D" in the design of the Tri-County Council/Shore Transit Maintenance Facility. Refer to Chapter 16 of the IBC for earthquake requirements associated with Site Class D.

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 it 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 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 or concrete pavement.

REMARKS

This report has been prepared solely and exclusively for Becker Morgan Group to provide guidance to design professionals in developing facilities plans for the Tri-County Council/Shore Transit/Transit Bus Service and Maintenance Facility in Wicomico County, Maryland. 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 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.

APPENDIX

1. Investigative Procedures
2. Project Location Map
3. Boring Location Plan
4. Boring Logs
5. Proctor Test Results
6. CBR Test Results
7. Earth Pressure Requirements for Permanent Retaining Walls (undrained)
8. Unified Soil Classification Sheet
9. Field Classification Sheet
10. USDA Soil Classification Sheet
11. Information Sheet

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.

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

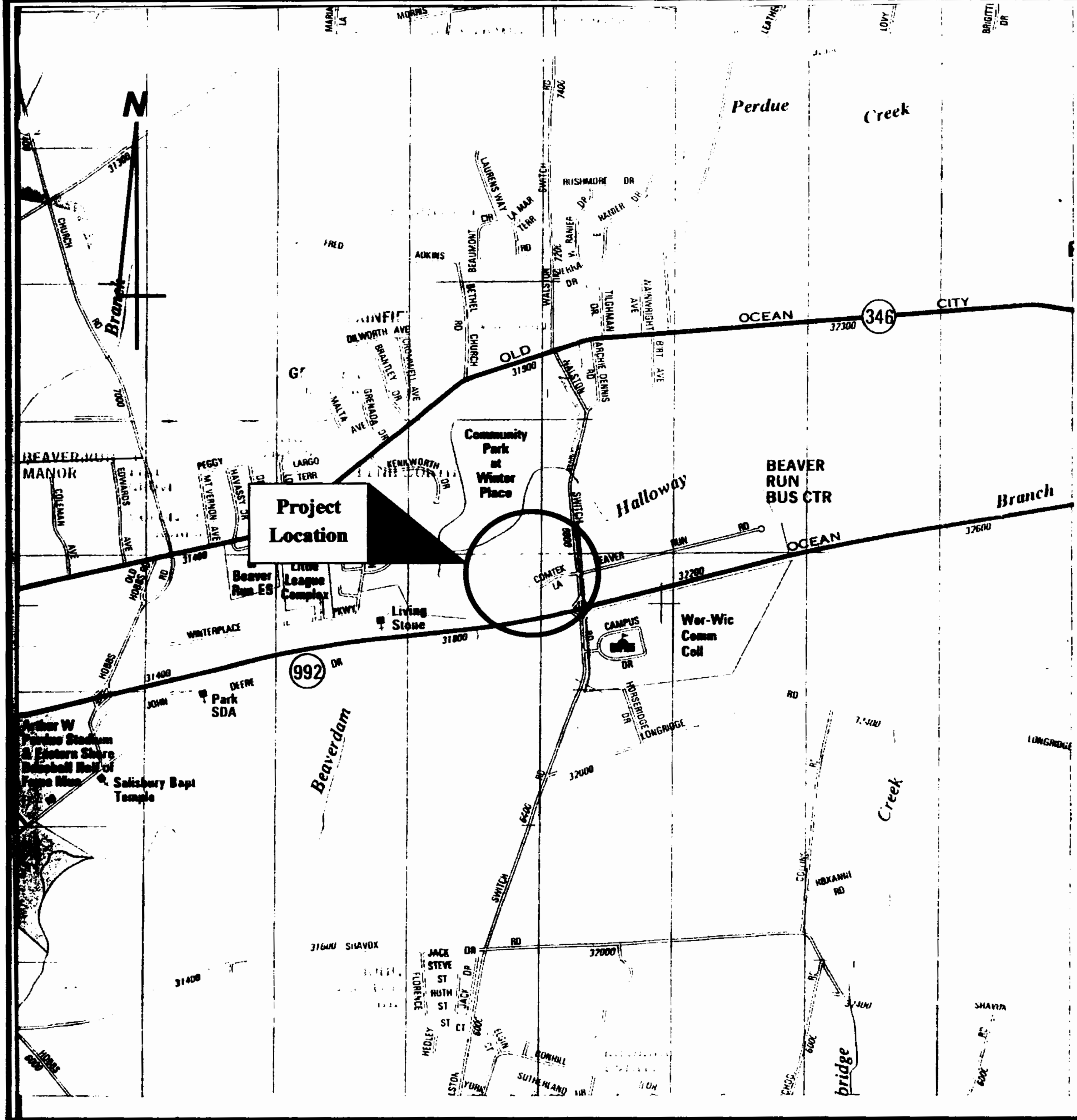
Bulk samples were obtained from the pavement area test borings. A Modified Proctor compaction test (ASTM D 1557) was performed on this soil to determine its compaction characteristics, including its maximum dry density and optimum moisture content.

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.



JOHN D. HYNES & ASSOCIATES, INC.

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

Date: May 24, 2010

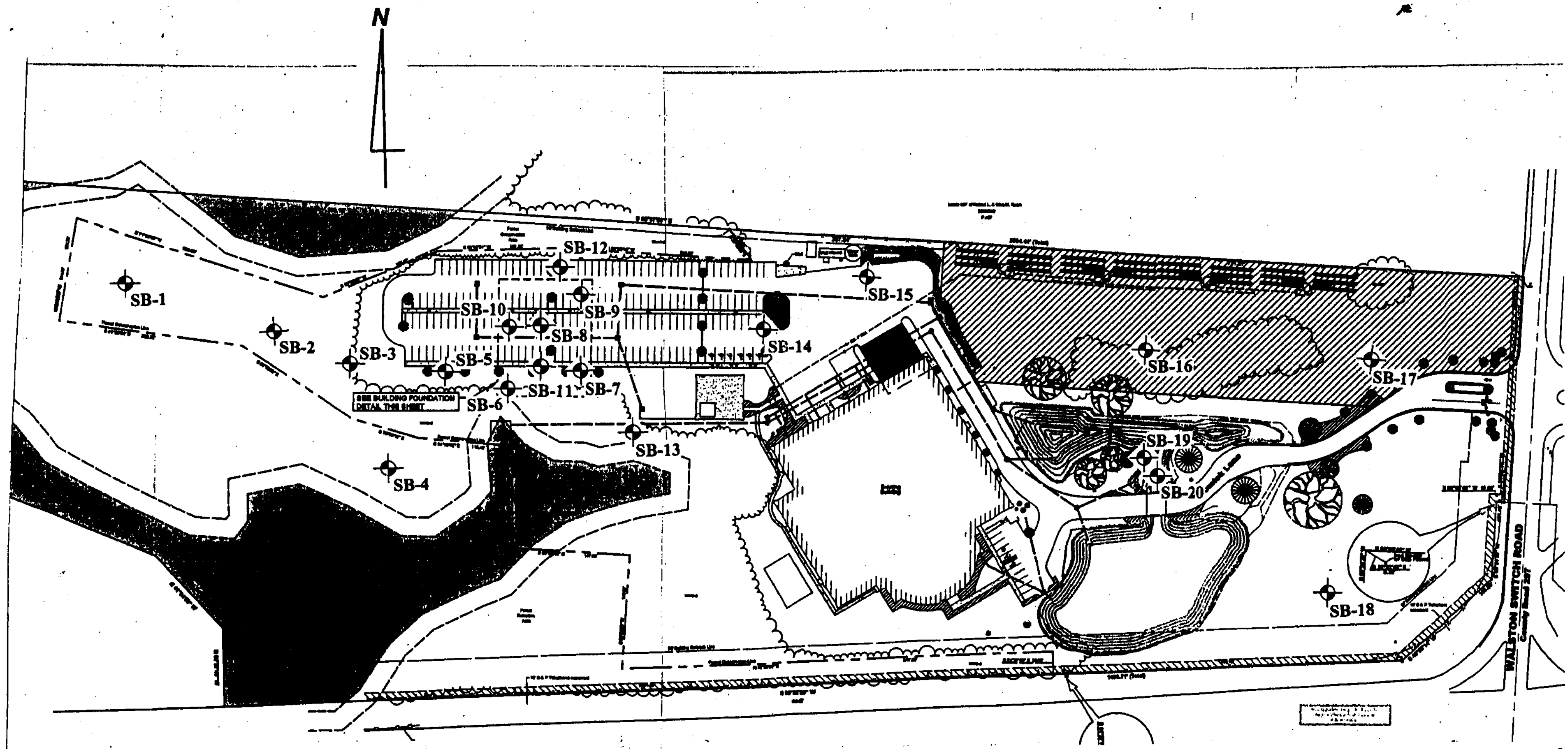
Scale: 1"=2000'

Drawn: ADC

Project Location Map
Tri-County Council/Shore Transit/Transit Bus Service and Maintenance Facility
Salisbury, Maryland

Drawing Number:

JDH-10/10/211-A



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410-546-6462 / Fax: 410-548-5346

Boring Location Plan
Tri-County Council/Shore Transit/Transit Bus Service and Maintenance Facility
Salisbury, Maryland

Date: May 25, 2010
Scale: As Indicaed
Drawn: BMG
Drawing Number:
JDH-10/10/211-B

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LOG OF BORING SB-1

(Page 1 of 1)

Becker Morgan Group
Port Exchange
312 West Main Street, Suite 300
Salisbury, Maryland 21801

Project Name:. : Tri-County Council/Shore Transit/ Transit Bus Service and Maintenance Facility
Project Number: : JDH-10/10/211
Start Date: : 05/18/10
End Date: : 05/18/10
Logged By: : M. Melito
Driller: : M. Hynes
Drilling Method: : Hand Auger
Total Depth: : 10 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	REMARKS
0	Light brown, wet, fine to medium SAND, with some silt, trace clay	░	SM	1	Scale 1" ~ 6.2 feet Approximately 8 inches of organic bearing soil was encountered at the ground surface. Groundwater was not encountered during augering operations. Laboratory Test Results Sample No. 6 From 9.5 to 10 feet Natural Moisture = 22.1 %
2	Brown and gray (mottled), wet, silty CLAY, with trace sand	▨	CH	2 3	
6	Light brown, wet, clayey, fine to medium SAND, with little silt	▨	SC	4	
8	Light brown, wet, fine to coarse SAND, with some silt, trace clay	░	SM	5	
10	Light brown, wet, silty CLAY, with little sand		CL	6	
	Boring terminated at 10 feet.				
12					
14					
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42					

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LOG OF BORING SB-2

(Page 1 of 1)

Becker Morgan Group
Port Exchange
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Salisbury, Maryland 21801

Project Name:.	: Tri-County Council/Shore Transit/ : Transit Bus Service and : Maintenance Facility	End Date: Logged By: Driller:	: 05/18/10 : M. Melito : M. Hynes
Project Number:	: JDH-10/10/211	Drilling Method:	: Hand Auger
Start Date:	: 05/18/10	Total Depth:	: 10 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	REMARKS
0 2	Brown, wet, sandy SILT, with trace clay, trace organic silt		ML/SM	1	Scale 1" ~ 6.2 feet Approximately 8 inches of organic bearing soil was encountered at the ground surface. Groundwater was encountered at 8 feet during augering operations. Laboratory Test Results Sample No. 4 From 6 to 8 feet Natural Moisture = 12.2 %
	Brown and gray (mottled), wet, silty CLAY, with trace sand		CH	2	
4	Light brown, wet, fine to medium SAND, with little silt, trace clay		SM	3	
6 8	Light brown, wet to saturated, fine to medium SAND, with little silt, little clay		SM	4 5	
10 12	Boring terminated at 10 feet.				
14 16 18 20 22 24 26 28 30 32 34 36 38 40 42					

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LOG OF BORING SB-3

(Page 1 of 1)

Becker Morgan Group
Port Exchange
312 West Main Street, Suite 300
Salisbury, Maryland 21801

Project Name:.	: Tri-County Council/Shore Transit/ : Transit Bus Service and : Maintenance Facility	End Date:	: 05/18/10
		Logged By:	: M. Melito
		Driller:	: M. Hynes
Project Number:	: JDH-10/10/211	Drilling Method:	: Hand Auger
Start Date:	: 05/18/10	Total Depth:	: 10 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	REMARKS
0	Brown and gray (mottled), wet, silty CLAY, with trace sand, trace organic silt	▨	CL	1 2 3	Scale 1" ~ 6.2 feet Approximately 12 inches of organic bearing soil was encountered at the ground surface. Groundwater was encountered at 8.5 feet during augering operations. Laboratory Test Results Sample No. 5 From 7.5 to 8.5 feet Natural Moisture = 24.9 %
2					
4					
6					
	Light brown, wet, silty, fine to coarse SAND, with trace to little clay	░	SM	4	
8	Light brown, wet, silty CLAY, with trace sand	▨	CL	5	
	Light brown, saturated, fine to coarse SAND, with little silt, trace clay	░	SM	6	
10	Boring terminated at 10 feet.				
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42					

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LOG OF BORING SB-4

(Page 1 of 1)

Becker Morgan Group
Port Exchange
312 West Main Street, Suite 300
Salisbury, Maryland 21801

Project Name:.	: Tri-County Council/Shore Transit/ : Transit Bus Service and : Maintenance Facility	End Date:	: 05/18/10
		Logged By:	: M. Melito
		Driller:	: M. Hynes
Project Number:	: JDH-10/10/211	Drilling Method:	: Hand Auger
Start Date:	: 05/18/10	Total Depth:	: 10 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	REMARKS
0 2	Brown, wet, silty CLAY, with little sand (Silty clay)	▨	CH	1 2	Scale 1" ~ 6.2 feet Approximately 6 inches of organic bearing soil was encountered at the ground surface. Groundwater was not encountered during augering operations. Laboratory Test Results Sample No. 6 From 9 to 10 feet Natural Moisture = 35.6 %
4	Light brown, wet, silty CLAY, with little sand (Silty clay)	▨	CL	3	
6	Light brown, wet, fine to coarse SAND, with little silt, trace to little clay (Sandy loam)	░	SM	4	
8	Light brown, wet, silty CLAY, with trace sand (Silty clay)	▨	CL	5 6	
10 12	Boring terminated at 10 feet.				

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LOG OF BORING SB-5

(Page 1 of 1)

Becker Morgan Group
Port Exchange
312 West Main Street, Suite 300
Salisbury, Maryland 21801

Project Name:. : Tri-County Council/Shore Transit/ : Transit Bus Service and : Maintenance Facility
Project Number: : JDH-10/10/211
Start Date: : 05/18/10
End Date: : 05/18/10
Logged By: : M. Melito
Driller: : J. Thomas
Drilling Method: : HSA (Mobile B-47 HD)
Total Depth: : 10.5 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches	REMARKS
0 2	Light brown, wet, medium stiff, silty CLAY, with little sand	▨	CL	1	3-6-5-4	Scale 1" ~ 6.2 feet Approximately 20 inches of organic bearing soil was encountered at the ground surface. Groundwater was not encountered during drilling operations. Laboratory Test Results Sample No. 3 From 6 to 7.5 feet Natural Moisture = 13.7 %
4	Light brown, wet, stiff, silty CLAY, with trace sand	▨	CH	2	4-6-8	
6 8	Light brown, wet, medium dense, fine to coarse SAND, with little clay, little silt	▨	SC	3	6-8-9	
10	Light brown, wet, medium dense, silty, fine to coarse SAND, with trace clay	▨	SM	4	7-8-6	
12	Boring terminated at 10.5 feet.					
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LOG OF BORING SB-6

(Page 1 of 1)

Becker Morgan Group
Port Exchange
312 West Main Street, Suite 300
Salisbury, Maryland 21801

Project Name:. : Tri-County Council/Shore Transit/ : Transit Bus Service and : Maintenance Facility
Project Number: : JDH-10/10/211
Start Date: : 05/18/10
End Date: : 05/18/10
Logged By: : M. Melito
Driller: : J. Thomas
Drilling Method: : HSA (Mobile B-47 HD)
Total Depth: : 35.5 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches	REMARKS
0 2	Brown, wet, stiff, clayey SILT, with some sand		ML	1	3-5-7-6	Scale 1" ~ 6.2 feet Approximately 12 inches of organic bearing soil was encountered at the ground surface. Groundwater was encountered at 19 feet during drilling operations. At completion water was at 10 feet; boring caved in at 16 feet. Laboratory Test Results Sample No. 4 From 9 to 10.5 feet Atterberg Limits Liquid Limit = 54 Plasticity Index = 22 Natural Moisture = 33.5 %
4	Gray, wet, medium stiff, sandy CLAY, with little silt		CL	2	4-4-6	
6 8	Gray and orange brown, wet, very stiff, silty CLAY, with little to some sand, trace gravel		CL	3	8-8-11	
10 12	Light brown, wet, medium stiff, clayey SILT, with trace sand		MH	4	4-4-6	
14 16 18 20 22	Light brown, wet to saturated, loose to medium dense, silty SAND, with trace clay		SM	5 6	4-4-4 4-4-7	
24 26	Light brown, saturated, medium dense, fine to coarse SAND, with little to some silt, trace to little clay, trace gravel		SM	7	4-6-7	
28 30 32 34	Light brown, saturated, medium dense, fine to coarse SAND, with trace silt, trace clay		SP	8 9	3-5-8 6-7-7	
36 38 40 42	Boring terminated at 35.5 feet.					

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LOG OF BORING SB-7

(Page 1 of 1)

Becker Morgan Group
Port Exchange
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Salisbury, Maryland 21801

Project Name:.	: Tri-County Council/Shore Transit/ Transit Bus Service and Maintenance Facility	End Date:	: 05/17/10
		Logged By:	: M. Melito
		Driller:	: J. Thomas
Project Number:	: JDH-10/10/211	Drilling Method:	: HSA (Mobile B-47 HD)
Start Date:	: 05/17/10	Total Depth:	: 35.5 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches	REMARKS
0 2	Light brown, wet, stiff, sandy CLAY, with some silt, trace organic silt	▨	CL	1	6-6-7	Scale 1" ~ 6.2 feet Approximately 4 inches of asphalt and 8 inches of gravel were encountered at the ground surface. Groundwater was encountered at 19 feet during drilling operations. At completion water was at 14 feet; boring caved in at 15 feet.
4	Gray and orange brown, wet, very stiff, silty CLAY, with little sand	▨	CL/CH	2	5-10-10	
6 8 10 12	Light brown, wet, medium dense, fine to coarse SAND, with little clay, little silt	▨	SC	3 4	4-8-7 3-5-6	
14 16	Light brown, wet, loose, silty, fine to medium SAND, with trace clay	░	SM	5	4-4-6	
18 20 22	Light brown, wet to saturated, loose, fine to medium SAND, with some silt, trace gravel	░	SM	6	3-5-5	
24 26	Light brown, saturated, medium dense, fine to coarse SAND, with tracle silt, trace gravel	░	SP	7	7-8-10	
28 30 32 34	Light brown, saturated, medium dense, fine to coarse SAND, with trace silt, trace clay	░	SP	8 9	7-7-10 6-8-9	
36 38 40 42	Boring terminated at 35.5 feet.					

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LOG OF BORING SB-8

(Page 1 of 1)

Becker Morgan Group
Port Exchange
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Salisbury, Maryland 21801

Project Name:.	: Tri-County Council/Shore Transit/ : Transit Bus Service and : Maintenance Facility	End Date: Logged By: Driller:	: 05/17/10 : M. Melito : J. Thomas
Project Number:	: JDH-10/10/211	Drilling Method:	: HSA (Mobile B-47 HD)
Start Date:	: 05/17/10	Total Depth:	: 35.5 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches	REMARKS
0 2	Brown, wet, medium stiff, sandy SILT, with trace clay, trace organic silt		ML	1	3-3-5	Scale 1" ~ 6.2 feet Approximately 3 inches of asphalt and 4.5 inches of gravel were encountered at the ground surface. Groundwater was encountered at 9.5 feet during drilling operations.
4	Gray to orange brown (mottled), wet, stiff, silty CLAY, with trace sand		CH	2	4-4-7	
6 8	Light brown, wet, medium stiff, clayey SAND, with little silt		SC	3	3-3-4	
10 12	Light brown, wet to saturated, loose, silty, fine to coarse SAND, with trace clay		SM	4	3-4-5	
14 16	Light brown, saturated, loose, fine SAND and SILT		SM/ML	5	2-4-4	
18 20 22	Light brown, saturated, medium dense, fine to coarse SAND, with little silt, trace clay		SM	6	3-5-6	
24 26 28 30 32	Light brown, saturated, loose to medium dense, fine to coarse SAND, with trace silt, trace clay, trace gravel		SP/SM	7 8	5-4-6 5-8-8	
34	Light brown, saturated, medium dense, fine to coarse SAND, with trace silt, trace clay		SP	9	10-8-6	
36 38 40 42	Boring terminated at 35.5 feet.					

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LOG OF BORING SB-9

(Page 1 of 1)

Becker Morgan Group
Port Exchange
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Salisbury, Maryland 21801

Project Name:.	: Tri-County Council/Shore Transit/ : Transit Bus Service and : Maintenance Facility	End Date:	: 05/17/10
		Logged By:	: M. Melito
		Driller:	: J. Thomas
Project Number:	: JDH-10/10/211	Drilling Method:	: HSA (Mobile B-47 HD)
Start Date:	: 05/17/10	Total Depth:	: 35.5 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches	REMARKS
0 2	Brown and gray (mottled), wet, stiff, silty CLAY, with little sand, trace gravel	▨	CH	1	4-5-8	Scale 1" ~ 6.2 feet Approximately 4 inches of asphalt and 8 inches of gravel were encountered at the ground surface. Groundwater was encountered at 19 feet during drilling operations. At completion water was at 16 feet.
4	Brown and gray (mottled), wet, stiff, silty CLAY, with trace sand	▨	CH	2	4-8-5	
6 8	Light brown, wet, medium dense, clayey, fine to coarse SAND, with little silt	▨	SC	3	4-4-8	
10 12	Light brown and gray (mottled), wet, medium stiff, silty CLAY, with trace sand	▨	CH	4	4-4-8	
14 16	Light brown, wet, medium stiff, clayey SILT, with little sand	▥	ML	5	3-3-4	
18 20 22	Light brown, wet to saturated, medium dense, fine to coarse SAND, with little silt, trace clay, trace gravel	░	SM	6	3-4-9	
24 26	Light brown, saturated, medium dense, fine to coarse SAND, with little to some silt, trace to little clay, trace gravel	░	SP/SM	7	7-8-12	
28 30 32 34	Light brown, saturated, medium dense, fine to coarse SAND, with trace silt, trace clay	░	SP	8 9	3-7-9 6-9-11	
36 38 40 42	Boring terminated at 35.5 feet.					

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LOG OF BORING SB-10

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Becker Morgan Group
Port Exchange
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Project Name:. : Tri-County Council/Shore Transit/ : Transit Bus Service and : Maintenance Facility
Project Number: : JDH-10/10/211
Start Date: : 05/17/10
End Date: : 05/17/10
Logged By: : M. Melito
Driller: : J. Thomas
Drilling Method: : HSA (Mobile B-47 HD)
Total Depth: : 35.5 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches	REMARKS
0 2	Gray and brown, wet, soft, silty CLAY, with some sand		CH	1	3-2-2	Scale 1" ~ 6.2 feet Approximately 3 inches of asphalt and 5 inches of gravel were encountered at the ground surface. Groundwater was encountered at 14 feet during drilling operations. At completion water was at 14 feet; boring caved in at 17 feet. Laboratory Test Results Sample No. 2 From 3 to 4.5 feet Atterberg Limits Liquid Limit = 31 Plasticity Index = 14 Natural Moisture = 24.5 %
4	Dark brown, wet, soft, silty CLAY, with little organic silt, trace sand		CL	2	2-2-2	
6 8	Light gray, wet, loose, silty, fine to coarse SAND, with trace clay		SM	3	2-3-4	
10 12	Light brown and orange brown (mottled), wet, medium stiff, silty CLAY, with little to some sand		CL	4	4-4-4	
14 16 18 20 22	Light brown, wet to saturated, medium dense, fine to medium SAND, with little silt, little clay		SM	5 6	4-5-9 5-6-6	
24 26	Light brown, saturated, medium dense, fine to coarse SAND, with trace silt, trace clay, trace gravel		SP/SM	7	3-5-7	
28 30 32 34	Light brown, saturated, medium dense, fine to coarse SAND, with trace silt, trace clay, trace gravel		SP	8 9	5-7-9 6-7-6	
36 38 40 42	Boring terminated at 35.5 feet.					

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LOG OF BORING SB-11

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Becker Morgan Group
Port Exchange
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Salisbury, Maryland 21801

Project Name:. : Tri-County Council/Shore Transit/ : Transit Bus Service and : Maintenance Facility
Project Number: : JDH-10/10/211
Start Date: : 05/17/10
End Date: : 05/17/10
Logged By: : M. Melito
Driller: : J. Thomas
Drilling Method: : HSA (Mobile B-47 HD)
Total Depth: : 35.5 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches	REMARKS
0 2	Brown, wet, loose, sandy CLAY, with little silt		CL	1	5-6-4-4	Scale 1" ~ 6.2 feet Approximately 6 inches of organic bearing soil was encountered at the ground surface. Groundwater was encountered at 20 feet during drilling operations. At completion water was at 14 feet; boring caved in at 14 feet. Laboratory Test Results Sample No. 2 From 3 to 4.5 feet Atterberg Limits Liquid Limit = 28 Plasticity Index = 10 Natural Moisture = 18.4 % Sample No. 3 From 6 to 7.5 feet Atterberg Limits Liquid Limit = 30 Plasticity Index = 11 Natural Moisture = 21.9 %
4	Light brown, wet, soft, silty CLAY, with little sand, trace organics (roots), trace gravel		CL	2	2-2-2	
6 8	Light brown, wet, stiff, silty CLAY, with little sand, trace gravel		CL	3	5-5-8	
10 12	Light brown and orange brown (mottled), wet, stiff, clayey SAND, with little silt		SM	4	4-5-7	
14 16	Light brown, wet to saturated, medium stiff to stiff, clayey SILT, with some fine sand		ML/MH	5	3-3-4	
18 20 22				6	3-3-7	
24 26				7	5-7-8	
28 30 32	Light brown, saturated, medium dense, fine to coarse SAND, with little silt, trace to little clay		SM	8	7-9-9	
34	Light brown, saturated, medium dense, fine to coarse SAND, with little silt, trace clay, trace gravel		SM	9	9-8-10	
36 38 40 42	Boring terminated at 35.5 feet.					

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LOG OF BORING SB-12

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Becker Morgan Group
Port Exchange
312 West Main Street, Suite 300
Salisbury, Maryland 21801

Project Name:. : Tri-County Council/Shore Transit/ : Transit Bus Service and : Maintenance Facility
Project Number: : JDH-10/10/211
Start Date: : 05/18/10
End Date: : 05/18/10
Logged By: : M. Melito
Driller: : J. Thomas
Drilling Method: : HSA (Mobile B-47 HD)
Total Depth: : 10.5 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches	REMARKS
0	Brown, wet, loose, silty, fine to coarse SAND, with trace clay	░	SM	1	6-6-5-4	Scale 1" ~ 6.2 feet Approximately 6 inches of organic bearing soil was encountered at the ground surface. Groundwater was not encountered during drilling operations. Laboratory Test Results Sample No. 2 From 3 to 4.5 feet Atterberg Limits Liquid Limit = 24 Plasticity Index = 8 Natural Moisture = 10.1 %
2 4	Brown and gray (mottled), wet, soft, silty CLAY, with some sand	▨	CL-ML	2	2-2-2	
6 8	Light brown, wet, medium stiff, silty CLAY, with trace sand	▨	CL	3	3-3-6	
10	Orange to brown, wet, medium dense, fine to coarse SAND, with some silt, trace clay	░	SM	4	3-5-8	
12 14 16	Boring terminated at 10.5 feet.					
18 20 22 24 26 28 30 32 34 36 38 40 42						

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LOG OF BORING SB-13

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Becker Morgan Group
Port Exchange
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Salisbury, Maryland 21801

Project Name:.	: Tri-County Council/Shore Transit/ : Transit Bus Service and : Maintenance Facility	End Date:	: 05/18/10
		Logged By:	: M. Melito
		Driller:	: M. Hynes
Project Number:	: JDH-10/10/211	Drilling Method:	: Hand Auger
Start Date:	: 05/18/10	Total Depth:	: 10 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	REMARKS
0	Light brown and gray (mottled), wet, silty CLAY, with trace sand (Silty clay)	▨	CH	1 2	Scale 1" ~ 6.2 feet Approximately 9 inches of organic bearing soil was encountered at the ground surface. Groundwater was not encountered during augering operations.
4	Brown, wet, fine to medium SAND, with little to some silt, trace to little clay (Sandy loam)	░	SM	3	
6	Light brown, wet, sandy SILT, with little clay (Silt loam)	▥	ML	4	
8	Light brown, wet, clayey, fine to coarse SAND, with trace silt (Sandy clay)	▨	SC	5	
10	Boring terminated at 10 feet.				

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LOG OF BORING SB-14

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Becker Morgan Group
Port Exchange
312 West Main Street, Suite 300
Salisbury, Maryland 21801

Project Name:.	: Tri-County Council/Shore Transit/ Transit Bus Service and Maintenance Facility	End Date:	: 05/18/10
		Logged By:	: M. Melito
		Driller:	: J. Thomas
Project Number:	: JDH-10/10/211	Drilling Method:	: HSA (Mobile B-47 HD)
Start Date:	: 05/18/10	Total Depth:	: 10.5 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blow Count	REMARKS
0 2	Brown, wet, stiff, silty CLAY, with some sand, trace gravel (Silty clay)	▨	CH	1	4-5-6	Scale 1" ~ 6.2 feet Approximately 12 inches of gravel was encountered at the ground surface. Groundwater was not encountered during drilling operations.
4	Light brown and gray (mottled), wet, stiff, silty CLAY, with trace sand (Silty clay)	▨	CH	2	6-7-8	
6 8	Light brown, wet, medium dense, silty, fine to coarse SAND, with trace clay (Sandy loam)	░	SM	3	6-6-9	
10	Light brown, wet, loose, fine to coarse SAND, with little silt, trace clay, trace gravel (Sandy loam)	░	SM	4	3-5-5	

Boring terminated at 10.5 feet.

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42

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HYNES & ASSOCIATES

LOG OF BORING SB-15

(Page 1 of 1)

Becker Morgan Group
Port Exchange
312 West Main Street, Suite 300
Salisbury, Maryland 21801

Project Name:.	: Tri-County Council/Shore Transit/ : Transit Bus Service and : Maintenance Facility	End Date: Logged By: Driller:	: 05/18/10 : M. Melito : J. Thomas
Project Number:	: JDH-10/10/211	Drilling Method:	: Hand Auger
Start Date:	: 05/18/10	Total Depth:	: 10 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	REMARKS
0	Brown and gray (mottled), wet, silty CLAY, with trace sand (Clay)	▨	CH	1 2	Scale 1" ~ 6.2 feet Approximately 4.5 inches of asphalt and 16 inches of gravel were encountered at the ground surface. Groundwater was not encountered during augering operations.
6	Light brown, wet, silty CLAY, with little sand (Clay)	▨	CL	3	
8	Light brown, wet, clayey, fine to coarse SAND, with trace silt (Sandy clay loam)	░	SC	4	
10	Light brown, wet, fine to coarse SAND, with little silt, trace clay (Sandy loam)	░	SM	5	
	Boring terminated at 10 feet.				

Depth in Feet: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42

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HYNES
&
ASSOCIATES

LOG OF BORING SB-16

(Page 1 of 1)

Becker Morgan Group
Port Exchange
312 West Main Street, Suite 300
Salisbury, Maryland 21801

Project Name:. : Tri-County Council/Shore Transit/ : Transit Bus Service and : Maintenance Facility
Project Number: : JDH-10/10/211
Start Date: : 05/18/10
End Date: : 05/18/10
Logged By: : M. Melito
Driller: : M. Hynes
Drilling Method: : Hand Auger
Total Depth: : 10 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	REMARKS
0 2	Light brown, wet, fine to medium SAND, with little silt, trace clay	▒	SM	1	Scale 1" ~ 6.2 feet Approximately 12 inches of organic bearing soil was encountered at the ground surface. Groundwater was encountered at 9 feet during augering operations.
4 6	Orange-brown and gray (mottled), wet, silty CLAY, with little sand	▨	CH	2 3	
8	Light brown, wet, silty, fine SAND, with trace clay	▒	SM	4	
10	Light brown, saturated, fine to coarse SAND, with little silt, trace clay, trace gravel	▒	SM	5	
12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42	Boring terminated at 10 feet.				

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HYNES
&
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LOG OF BORING SB-17

(Page 1 of 1)

Becker Morgan Group
Port Exchange
312 West Main Street, Suite 300
Salisbury, Maryland 21801

Project Name:.	: Tri-County Council/Shore Transit/ : Transit Bus Service and : Maintenance Facility	End Date:	: 05/18/10
		Logged By:	: M. Melito
		Driller:	: M. Hynes
Project Number:	: JDH-10/10/211	Drilling Method:	: Hand Auger
Start Date:	: 05/18/10	Total Depth:	: 10 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	REMARKS
0 2	Light brown, wet, fine to medium SAND, with trace to little silt, trace clay	░	SM	1	Scale 1" ~ 6.2 feet Approximately 8 inches of organic bearing soil was encountered at the ground surface. Groundwater was encountered at 9 feet during augering operations.
4	Brown and gray (mottled), wet, silty CLAY, with trace sand	▨	CH	2	
6	Brown, wet, silty CLAY, with trace to little sand	▨	CL	3	
8	Light brown, wet, sandy SILT, with trace clay	▥	ML	4	
10	Light brown, saturated, fine to coarse SAND, with little silt, trace clay, trace gravel	░	SM	5	
12	Boring terminated at 10 feet.				
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HYNES
&
ASSOCIATES

LOG OF BORING SB-18

(Page 1 of 1)

Becker Morgan Group
Port Exchange
312 West Main Street, Suite 300
Salisbury, Maryland 21801

Project Name:. : Tri-County Council/Shore Transit/ : Transit Bus Service and : Maintenance Facility
Project Number: : JDH-10/10/211
Start Date: : 05/18/10
End Date: : 05/18/10
Logged By: : M. Melito
Driller: : M. Hynes
Drilling Method: : Hand Auger
Total Depth: : 10 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	REMARKS
0 2	Brown, wet, fine to coarse SAND, with trace to little silt, trace clay, trace gravel (Loamy sand)	░	SM	1	Scale 1" ~ 6.2 feet Approximately 14 inches of organic bearing soil was encountered at the ground surface. Groundwater was encountered at 9 feet during augering operations.
4	Brown, wet, silty CLAY, with trace to little sand (Clay)	▨	CL	2	
6	Brown (mottled), wet, silty CLAY, with little sand (Clay)	▨	CL	3	
8	Brown (mottled), wet, clayey SILT, with trace sand (Silty clay loam)	▥	ML	4	
10	Brown, saturated, fine to coarse SAND, with little clay, little silt, trace gravel (Sandy loam)	▨	SC	5	
	Boring terminated at 10 feet.				
12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42					

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HYNES & ASSOCIATES

LOG OF BORING SB-19

(Page 1 of 1)

Becker Morgan Group
Port Exchange
312 West Main Street, Suite 300
Salisbury, Maryland 21801

Project Name:.	: Tri-County Council/Shore Transit/ : Transit Bus Service and : Maintenance Facility	End Date:	: 05/18/10
		Logged By:	: M. Melito
		Driller:	: M. Hynes
Project Number:	: JDH-10/10/211	Drilling Method:	: Hand Auger
Start Date:	: 05/18/10	Total Depth:	: 10 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	REMARKS
0 2	Light brown, wet, fine to coarse SAND, with trace to little silt, trace clay (Sandy loam)	▨	SM	1	Scale 1" ~ 6.2 feet Approximately 8 inches of organic bearing soil was encountered at the ground surface. Groundwater was not encountered during augering operations.
	Light brown, wet, sandy SILT, with trace clay (Silt loam)		ML	2	
4	Light brown, wet, fine to medium SAND, with little silt, little clay (Sandy loam)	▨	SM	3	
6	Light brown, wet, fine to coarse SAND, with trace to little silt, trace clay (Sandy loam)	▨	SM	4	
8	Light brown, wet, fine to coarse SAND, with little silt, trace clay (Sandy loam)	▨	SM	5	
10	Boring terminated at 10 feet.				
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HYNES
&
ASSOCIATES

LOG OF BORING SB-20

(Page 1 of 1)

Becker Morgan Group
Port Exchange
312 West Main Street, Suite 300
Salisbury, Maryland 21801

Project Name:.	: Tri-County Council/Shore Transit/ : Transit Bus Service and : Maintenance Facility	End Date:	: 05/18/10
		Logged By:	: M. Melito
		Driller:	: M. Hynes
Project Number:	: JDH-10/10/211	Drilling Method:	: Hand Auger
Start Date:	: 05/18/10	Total Depth:	: 5 feet

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	REMARKS
0	Light brown, saturated, sandy SILT, with little clay, trace organic silt, trace organics (roots) (Sandy clay) sediments	▨	CL	1	Scale 1" ~ 6.2 feet 1 foot of water was encountered at the ground surface.
2	Light brown, saturated, silty, fine to coarse SAND, with trace clay, trace organic silt, trace gravel (Loam)	░	SM	2	
4	Light brown, saturated, fine to coarse SAND, with trace to little silt, trace clay, trace gravel (Sandy loam)	░	SM	3	
6	Light brown, saturated, fine to coarse SAND, with little silt, trace clay, trace organics (roots), trace gravel (Sandy loam)	░	SM	4	
8	Boring terminated at 5 feet.				
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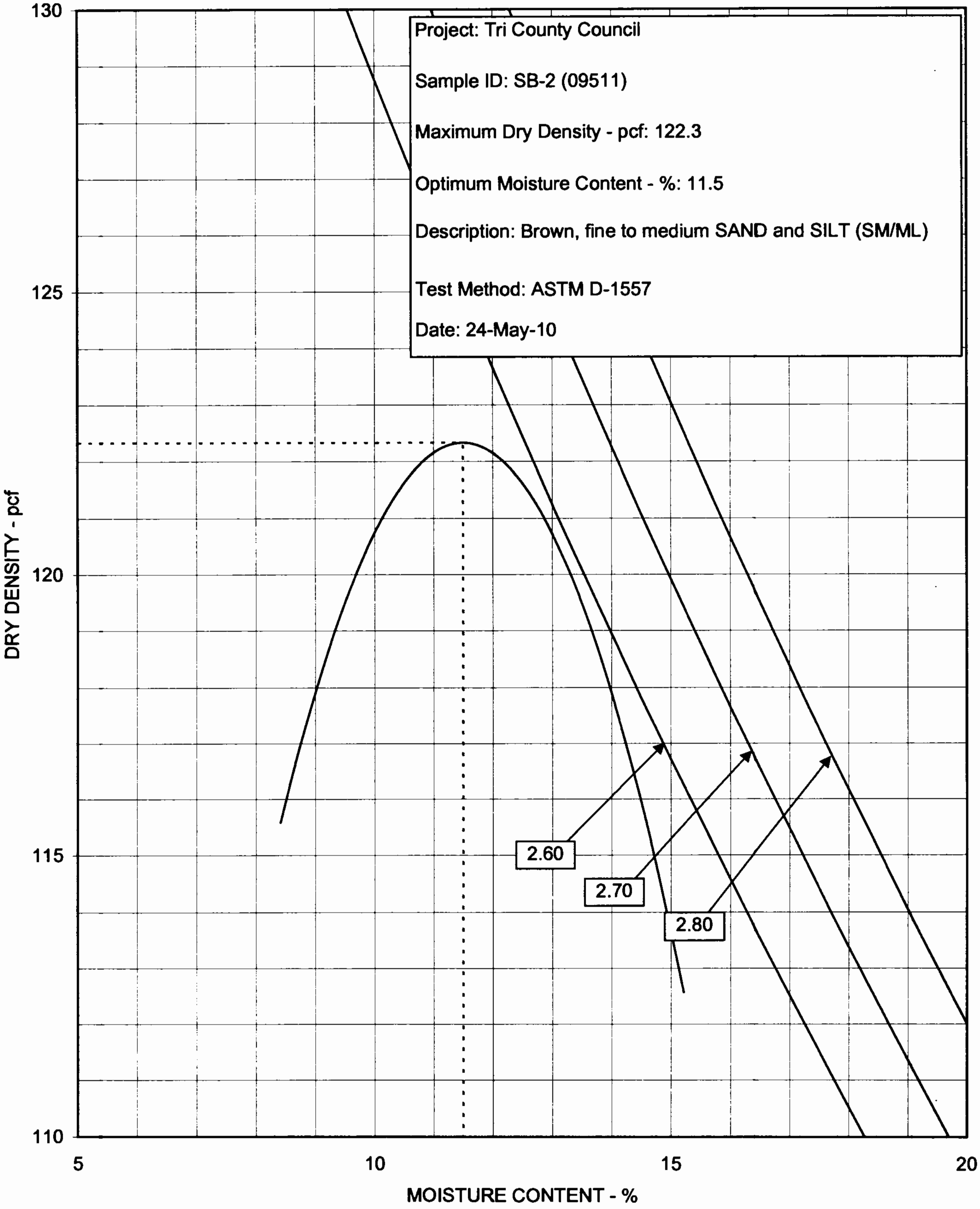


Project: Tri County Council

Sample ID: SB-2 (09511)

Maximum Dry Density - pcf: 122.3

Optimum Moisture Content - %: 11.5

Description: Brown, fine to medium SAND and SILT (SM/ML)

Test Method: ASTM D-1557

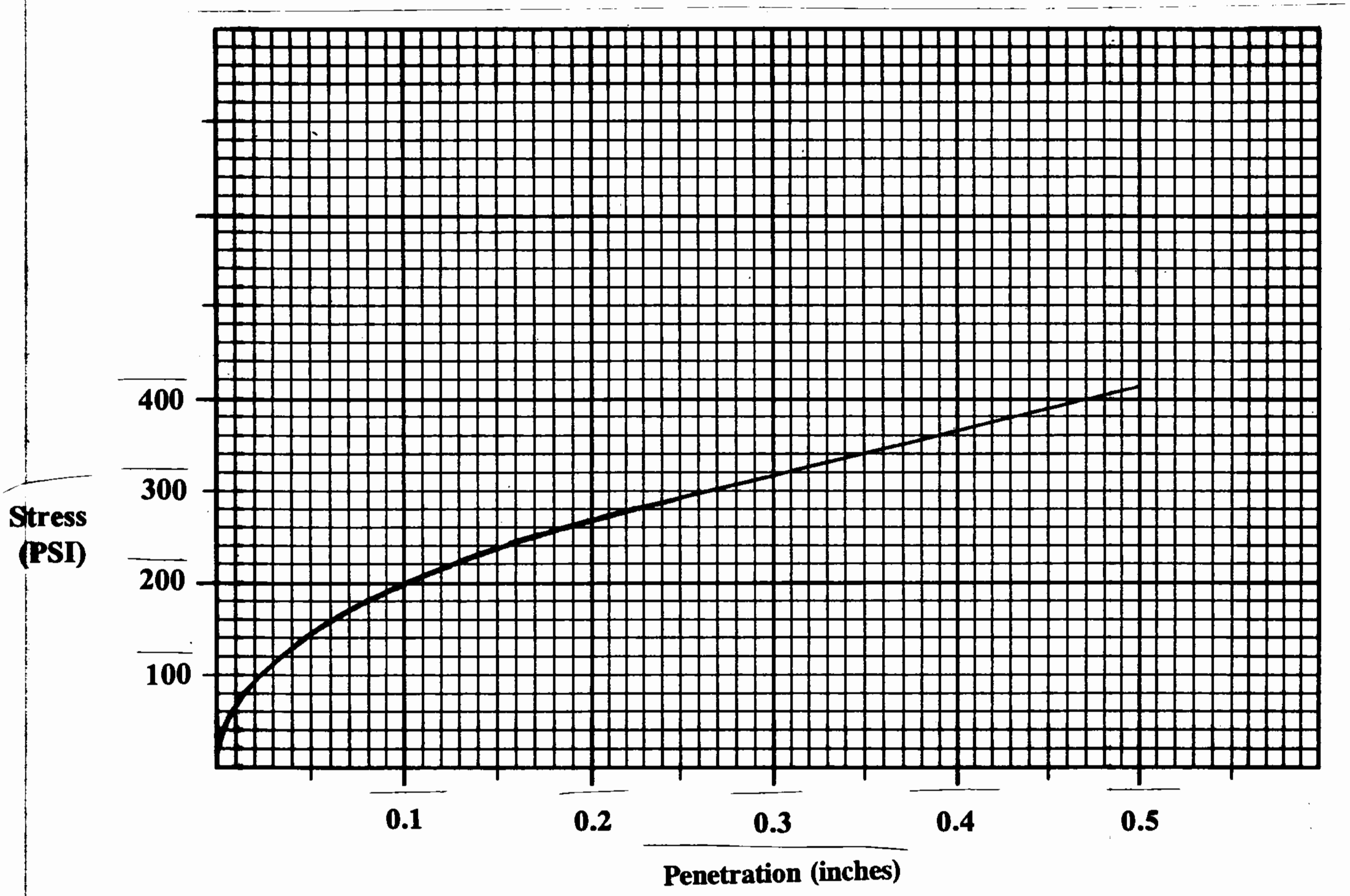
Date: 24-May-10

JOHN D. HYNES & ASSOCIATES, INC.

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

Record No.: 09511
Made For: Becker Morgan Group
Project: Tri-County Council/Shore Transit/Transit Bus Service and Maintenance Facility
Location: SB-2

Type of Test: California Bearing Ratio
Date Tested: May 24, 2010
Method of Testing: ASTM D-1883

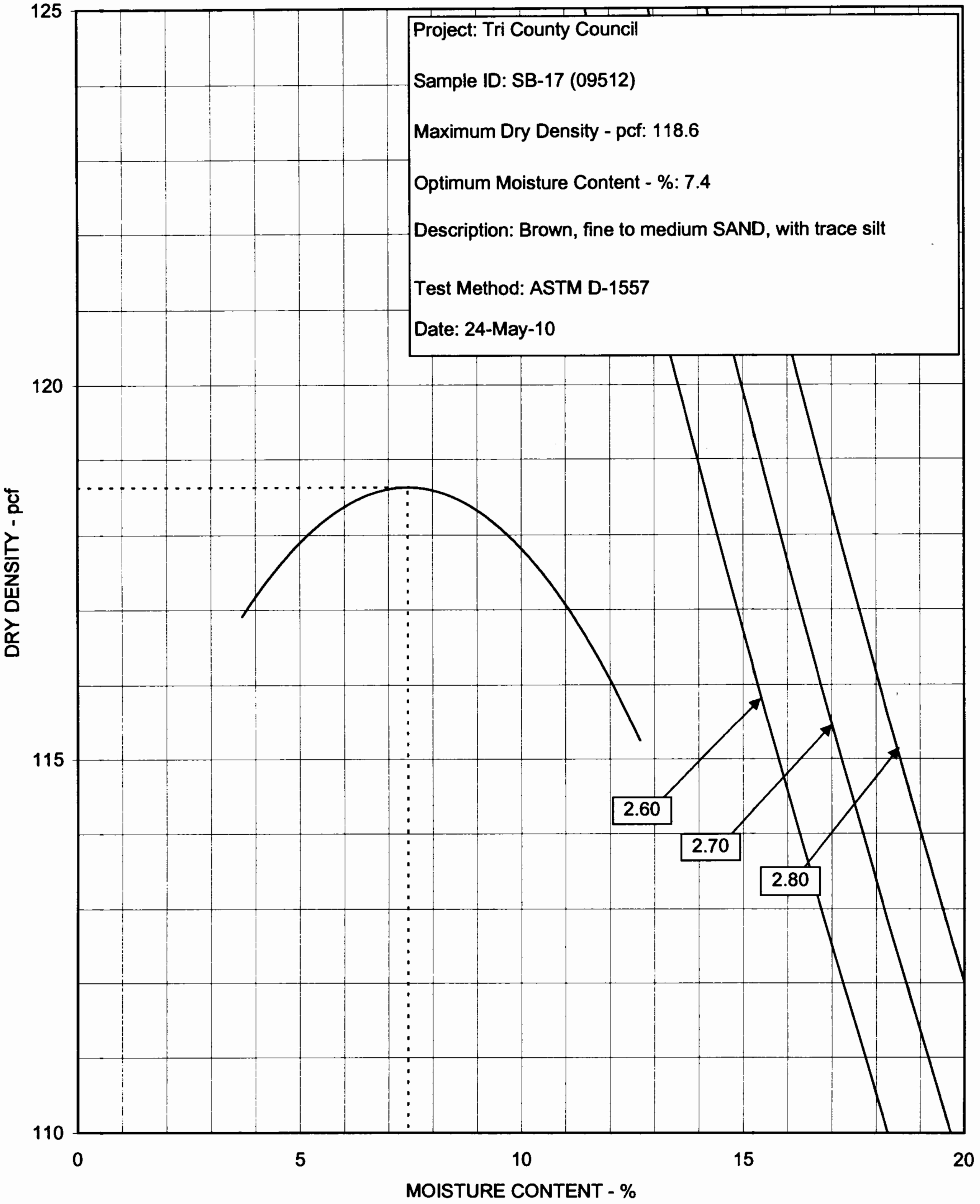


Data: Preparation Method: D-1557 Soaked Dry Density=108.1 pcf
Maximum Dry Density=122.3 pcf Water Content as Compacted: 13.9%
Water Content after Soaking: 18.1% Optimum Water Content: 11.5%
Swell: -0.15% CBR: 20 Surcharge: 20 lbs.
Brown, fine to medium SAND and SILT (SM/ML)

John D. Hynes & Associates, Inc.

By:

John D. Hynes & Associates


Project: Tri County Council

Sample ID: SB-17 (09512)

Maximum Dry Density - pcf: 118.6

Optimum Moisture Content - %: 7.4

Description: Brown, fine to medium SAND, with trace silt

Test Method: ASTM D-1557

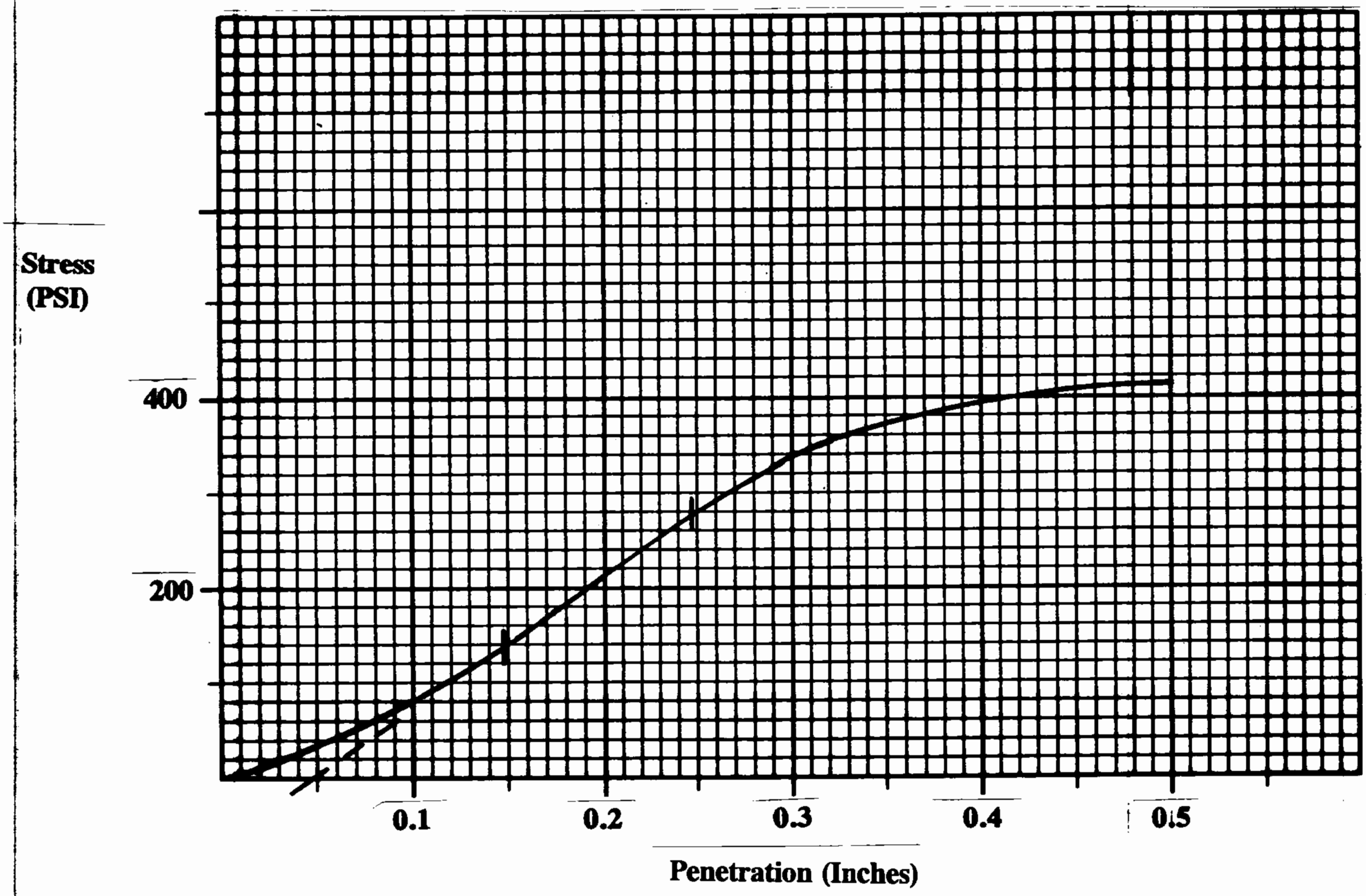
Date: 24-May-10

JOHN D. HYNES & ASSOCIATES, INC.

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

Record No.: 09512
Made For: Becker Morgan Group
Project: Tri-County Council/Shore Transit/Transit Bus Service and Maintenance Facility
Location: SB-17

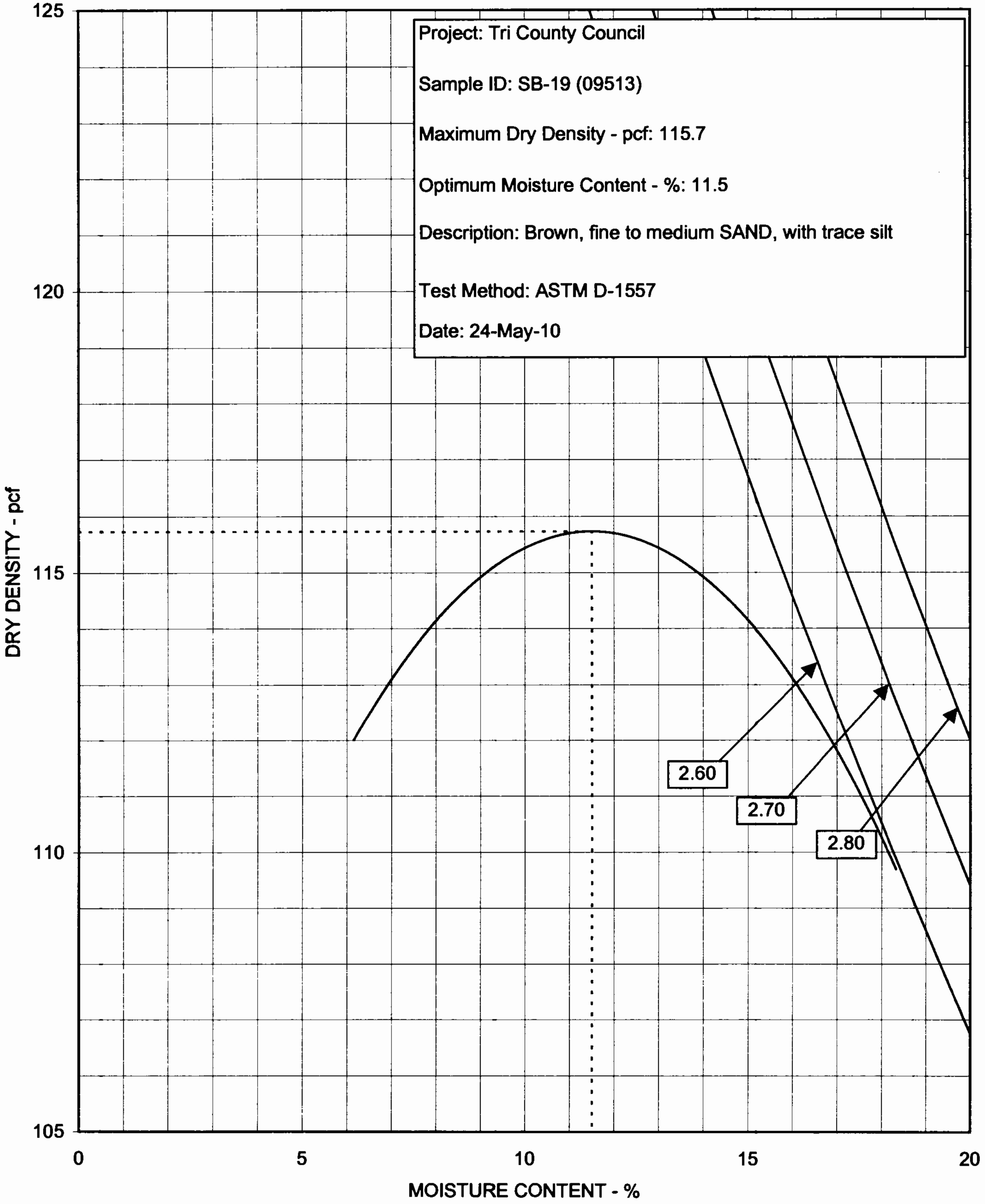
Type of Test: California Bearing Ratio
Date Tested: May 27, 2010
Method of Testing: ASTM D-1883



Data: Preparation Method: D-1557 **Soaked** **Dry Density=112.7 pcf**
Maximum Dry Density=118.6 pcf **Water Content as Compacted: 12.9%**
Water Content after Soaking: 12.0% **Optimum Water Content: 7.4%**
Swell: -.13% **CBR: 18** **Surcharge: 20 lbs.**
Brown, fine to medium SAND, with trace silt

John D. Hynes & Associates, Inc.

By:



Project: Tri County Council

Sample ID: SB-19 (09513)

Maximum Dry Density - pcf: 115.7

Optimum Moisture Content - %: 11.5

Description: Brown, fine to medium SAND, with trace silt

Test Method: ASTM D-1557

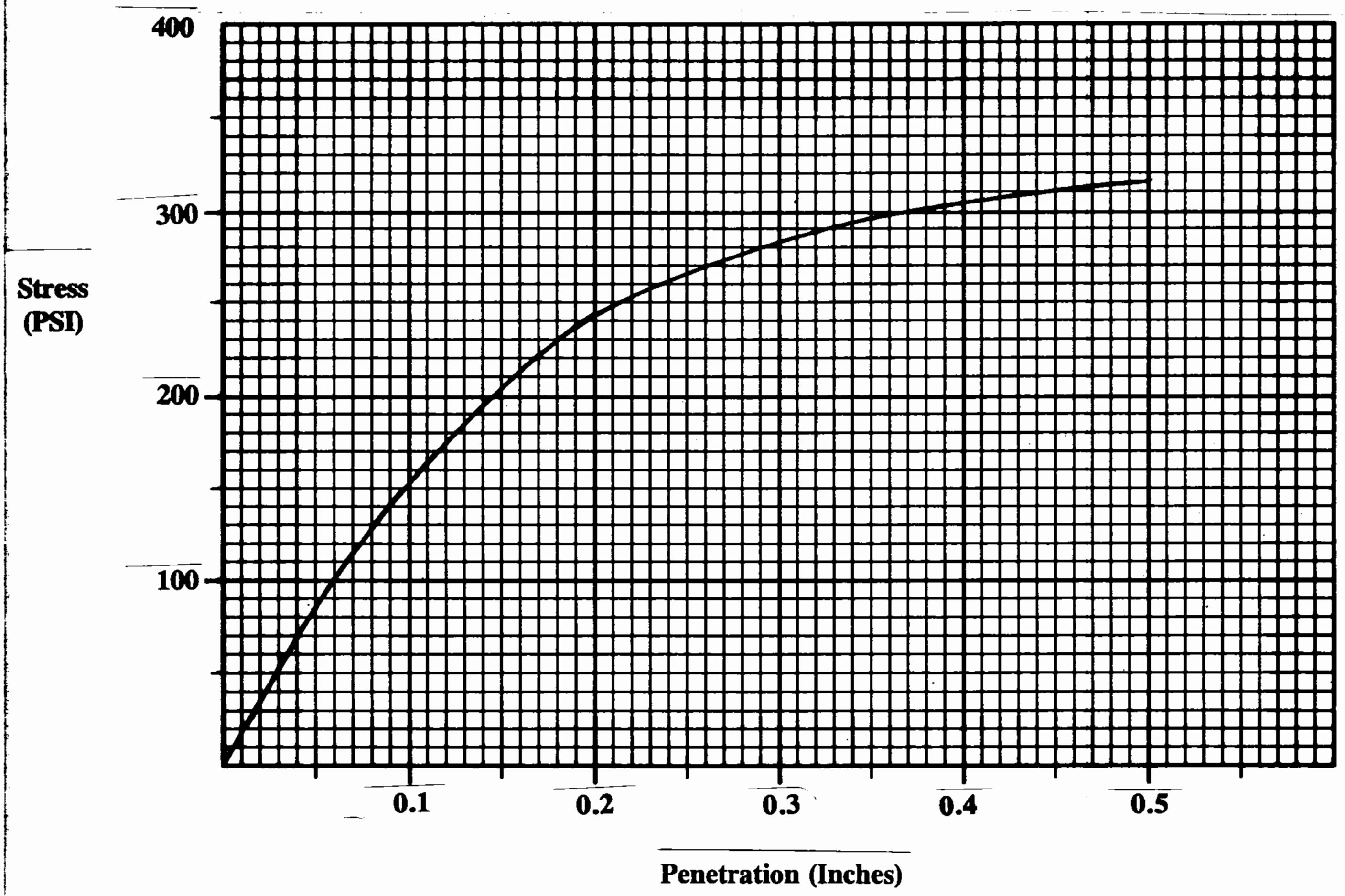
Date: 24-May-10

JOHN D. HYNES & ASSOCIATES, INC.

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

Record No.: 09513
Made For: Becker Morgan Group
Project: Tri-County Council/Shore Transit/Transit Bus Service and Maintenance Facility
Location: SB-19

Type of Test: California Bearing Ratio
Date Tested: May 27, 2010
Method of Testing: ASTM D-1883



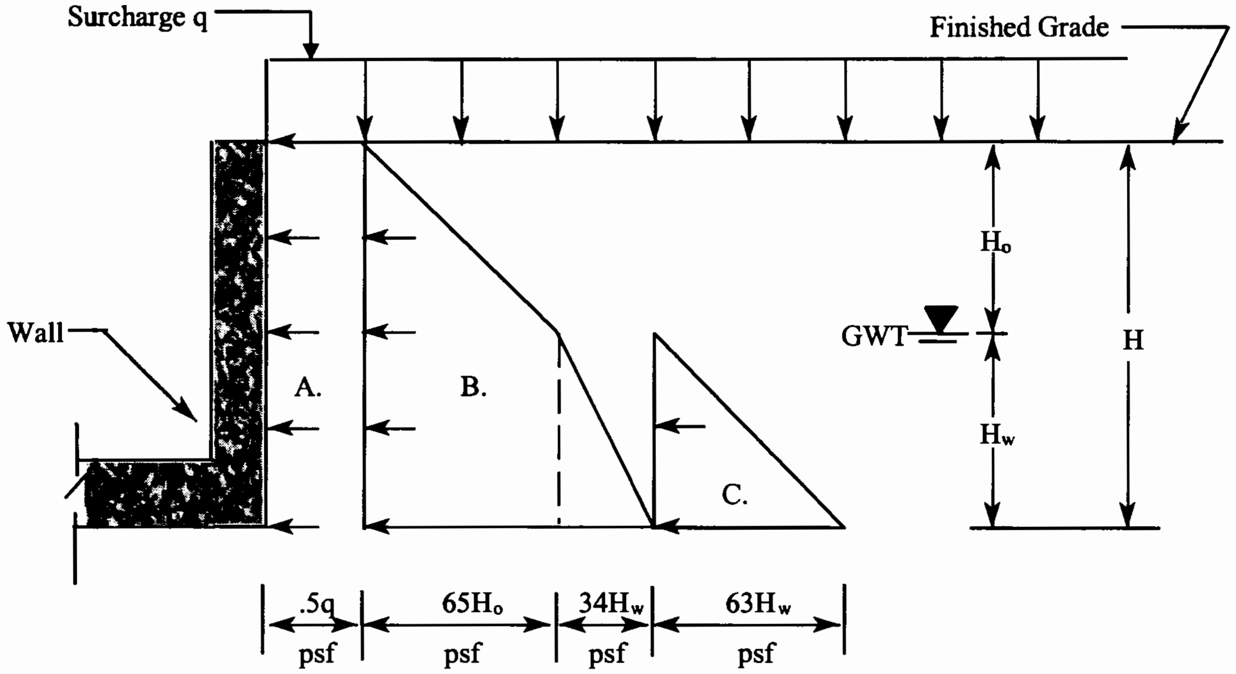
Data: Preparation Method: D-1557 Soaked Dry Density=110.3 pcf
Maximum Dry Density=115.7 pcf Water Content as Compacted: 5.4%
Water Content after Soaking: 14.1% Optimum Moisture: 11.5%
Swell: -.327% CBR: 16 Surcharge: 20 lbs.
Brown, fine to medium SAND, with trace silt

John D. Hynes & Associates, Inc.

By:

John D. Hynes & Associates, Inc.
32185 Beaver Run Drive, Salisbury, Maryland 21804
Phone: (410) 546-6462 — Fax: (410) 548-5346
www.johndhynesandassociatesinc.com
E-mail: jdhynes@aol.com

EARTH PRESSURE REQUIREMENTS
FOR
BELOW GRADE WALLS (UNDRAINED)



A. Lateral Surcharge
B. Lateral Soil Pressure
C. Hydrostatic Pressure

1. Pressure diagram assumes undrained soil conditions.
2. Pressure diagram assumes at rest soil pressures on cantilevered walls or walls with one support level.
3. For backfill, use non-plastic SP or better quality material (ASTM D-2487).
4. Compact backfill in maximum 8-inch loose lifts to 92 to 95 percent maximum dry density (ASTM D-1557).
5. Use only light-duty hand operated compaction equipment within 10 feet of walls.
6. For surcharge q, consider the greater of the maximum expected construction equipment live loads or permanent structure dead and live loads.
7. For temporary retaining walls used for excavation support, use 2/3 of the above values for lateral surcharge and soil pressures. This reflects the active soil pressure condition.

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

Date: June 7, 2010
Scale: Not to Scale
DRAWN: TE

Earth Pressure Requirements for Below Grade Walls (Undrained)
Tri-County Council/Shore Transit/Transit Bus Service and Maintenance Facility
Wicomico County, Maryland

DWG. No.
JDH-10/10/211-C

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.

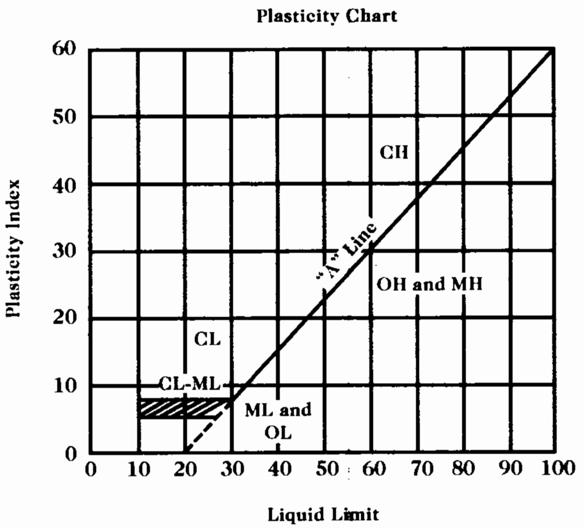
Groundwater - Observations were made at the times indicated. Porosity of soil strata, weather conditions, site topography, etc. may cause changes in the water levels indicated on the logs.

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

JOHN D. HYNES & ASSOCIATES, INC.

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

UNIFIED SOIL CLASSIFICATION SYSTEM

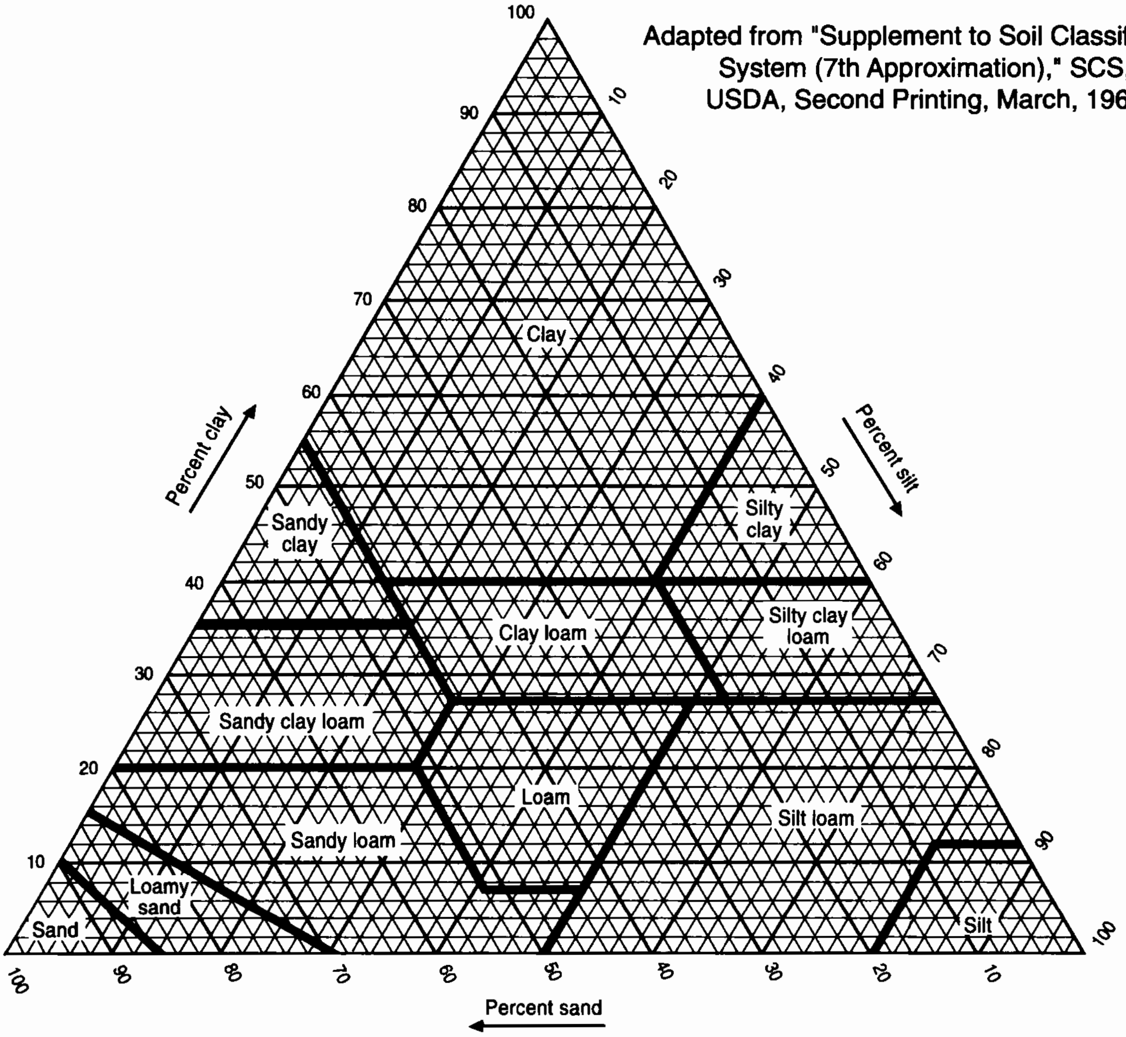
Major Divisions			*Group Symbols*		*Typical Names*	*Laboratory Classification Criteria*			
Coarse-grained soils (More than half of material is larger than No 200 sieve size)	Gravels (More than half of coarse fraction is larger than No 4 sieve size)	Clean gravels (Little or no fines)	GW		Well-graded gravels, 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 More than 12 percent 5 to 12 percent	GW, GP, SW, SP GM, GC, SM, SC *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	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
				u					
			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	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 *border-line* cases requiring use of dual symbols.
				u					
			SC		Clayey sands, sand-clay mixtures			Atterberg limits above “A” line with P.I. greater than 7	
Fine-grained soils (More than half material is smaller than No 200 sieve)	Silts and clays (Liquid limit less than 50)		ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity				
			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				

☐ ***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

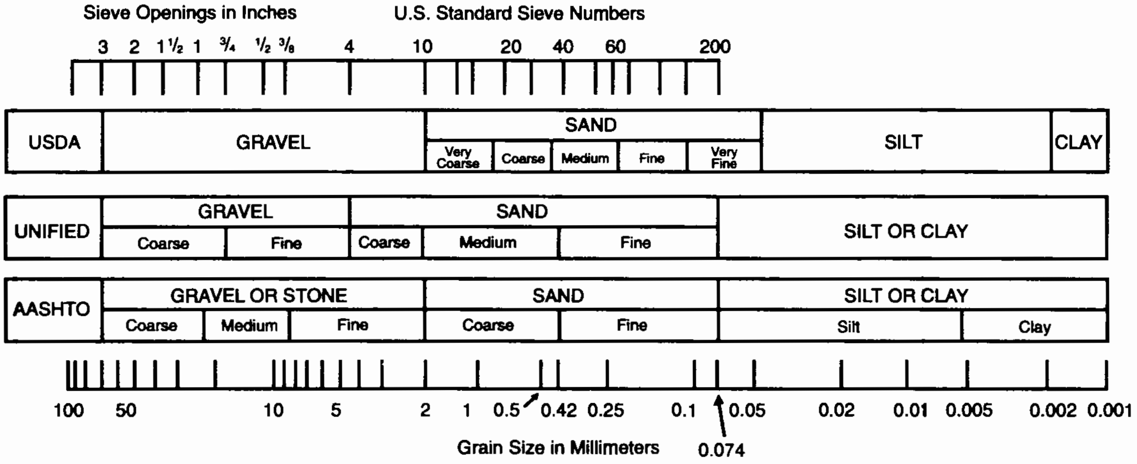
HYNES

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.

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