ECS MID-ATLANTIC, LLC
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October 13, 2017

W.R. Phillips
Aerocolours
205 Redoubt Road
Yorktown, Virginia 23693

ECS Project No. 07:13947

Reference: Subsurface Exploration and Geotechnical Engineering Analysis
Aerocolours Collision Center
7700 and 7716 George Washington Memorial Highway
York County, Virginia

Dear Mr. Phillips,

ECS Mid-Atlantic, LLC has completed a subsurface exploration and engineering evaluation of the above referenced project. This report presents the results of the subsurface exploration and engineering analyses for the proposed building, pavement, and infiltration areas.

Introduction

The project site is located at 7700 and 7716 George Washington Memorial Highway in York County, Virginia. The project consists of a new building that will be roughly 12,500 SF in plan area. Parking areas and a stormwater management facility are also planned. It was assumed that final grade will be at or near existing elevations (within 1- to 2-feet of the existing site elevations). We have not been provided with structural load information. Therefore, the column and wall loads are not expected to exceed 80 kips and 3 kips per linear foot.

The project site currently consists of two adjacent lots. The lot located at 7700 George Washington Memorial Highway is comprised of a utility easement. The lot located at 7716 George Washington Memorial Highway is comprised of a densely wooded parcel that is roughly 5-feet lower in elevation than the existing roadway. George Washington Memorial Highway borders the site to the west, commercial development borders the site to the south, and low lying areas border the site to the north and east. Ponding water was observed in some areas of the site particularly on the edges of the utility easement and wooded areas. An existing ditch line was observed bordering the west side of the wooded parcel. Elevations are relatively level across the sites, with the exception of the area of the utility easement. Elevations undulate across the utility easement due to the presence of ponding water and previous construction activities in this area.

The purpose of this exploration was to explore the soil and groundwater conditions at the site and to develop soils-related engineering recommendations to guide design and construction of the planned building and parking area. Our exploration included seven (7) 15- to 40-foot deep Standard Penetration Test (SPT) borings to explore the subsurface soil and groundwater conditions, performing a site reconnaissance to observe general topography, and analyzing field data to develop appropriate geotechnical engineering recommendations regarding the planned construction. A Boring Location Plan is included in Appendix I.

Field Exploration Procedures

A total of seven (7) SPT borings were completed to depths ranging from 15- to 40-feet below the existing site elevations at the proposed site. Specifically, one (1) 25-foot and one (1) 40-foot deep borings (designated as B-1 and B-2) were performed within the proposed building footprint. Boring B-1 was extended to a depth of 40-feet due to encountering soft soils. Three (3) 15-foot borings (designated as P-1 through P-3) were performed within the proposed pavement areas. In addition, one (1) bulk soil sample (designated as CBR-1) was collected for laboratory testing and pavement design analysis. Two (2) 15-foot deep borings (designated as BMP-1 and BMP-2) were performed within the proposed stormwater management area. An infiltration test was completed at stormwater management area at boring BMP-1 within the most granular soils encountered above the groundwater table.

The soil borings were advanced with an ATV-mounted auger drill rig which utilized split spoon drilling techniques to advance the boreholes. Drilling services were provided by Fishburne Drilling Services, Inc. of Chesapeake, Virginia.

Representative samples were obtained from the soil borings by means of the split-barrel sampling procedure in accordance with ASTM Specification D 1586-99, (Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils). Soil samples were collected at 2 foot intervals to a depth of 10 feet bgs and at 5 foot intervals thereafter. In this procedure, a 2 inch O.D., split barrel sampler is driven into a soil a distance of 24 inches by a 140-pound hammer falling 30 inches, using a manual hammer. The first 6-inch depth increment is considered the seating interval. The number of blows required to drive the sampler through the next two 6-inch intervals is designated the Standard Penetration Test (SPT) N-value and is indicated for each sample on the boring logs. Individual Soil Boring Logs can be found in Appendix II, of this report. A copy of the Unified Soil Classification System (USCS) and Reference Notes for Boring Logs are included in Appendix III of this report.

After recovery, representative portions of each sample were removed from the sampler, visually classified and placed in sealed glass jars. A field log of the soils encountered in the soil test borings was maintained by ECS personnel and the drill crew. The samples were taken to our laboratory for classification in accordance with ASTM D 2488-00

(Standard Practice for Description and Identification of Soil (Visual-Manual Procedure) and laboratory testing.

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

One (1) infiltration test (designated as INF-1) was performed at the stormwater management area boring location BMP-1. In-situ saturated hydraulic conductivity (K_{sat}) testing was completed within the designated infiltration test area. An infiltration test was not performed at location BMP-2 due to a shallow groundwater table depth. Our infiltration testing was performed using a Johnson Precision Permeameter™ and the manufacturer's testing guidelines and procedures. The permeameter establishes a constant head of water at a predetermined depth in a borehole by use of a precision valve and float assembly. The rate of water flow into the borehole required to maintain the constant head is then determined at selected intervals. The permeameter can effectively measure saturated hydraulic conductivity at any desired depth in the vadose zone ranging from 0.5 feet to 98 feet and can measure K_{sat} in a range of 10^{-2} to 10^{-7} cm/sec. The use of the Precision Permeameter is a generally accepted method for measuring saturated hydraulic conductivity of in-situ soils.

Laboratory Analysis Program

A geologist from our office visually classified each soil sample from the test borings on the basis of texture and plasticity in accordance with the Unified Soil Classification System (USCS) and ASTM D 2488-00 (Description and Identification of Soils-Visual/Manual Procedures). The engineer grouped the various soil types into the major zones noted on the boring logs. The stratification lines designating the interfaces between earth materials on the boring logs are approximate; in situ, the transitions may be gradual. The group symbols for each soil type are indicated in parentheses following the soil descriptions on the boring logs.

Representative soil samples from the SPT borings were selected and subjected to classification testing consisting of natural moisture content, gradation (including #200 wash), and Atterberg Limits testing and analysis. One (1) bulk soil sample (designated as CBR-1) was obtained and tested in our laboratory for pavement design purposes. The Laboratory Testing Summary is included in Appendix IV of this report.

Subsurface Conditions

Experienced personnel from our office classified each soil sample in accordance with the Unified Soil Classification System (USCS). The group symbols for each soil type are indicated in parentheses following the soil descriptions on the boring logs. The geotechnical engineer grouped the various soil types into the major zones noted on the boring logs. The stratification lines designating the interfaces between earth materials on the boring logs are approximate; in situ, the transitions may be gradual.

Up to 12-inches of topsoil materials were encountered at the boring locations. Underlying the surficial materials, the natural subsurface soils were generally comprised of CLAY (CL) underlain by SAND (SC) to the boring termination depths of 15, 25, and 40-feet below the existing site elevations. The SPT, N-Values, for the granular materials ranged from Weight-of-Hammer (WOH) to 21 blows per foot (BPF), indicating a very loose to medium dense relative density. The SPT, N-values for the cohesive soils ranged from 1 to 20 BPF, indicating a very soft to very stiff consistency. Boring logs describing soil conditions encountered are included in Appendix II of this report.

Groundwater was encountered at the boring locations ranging in depth from 2.5- to 5-feet below the existing site elevations. Therefore, groundwater might impact foundation and shallow utility construction. Please note that groundwater levels are influenced by seasonal conditions and by periods of significant precipitation or prolonged drought. Deeper utilities will require groundwater control. If groundwater is encountered, we expect that dewatering in shallow trenches could be accomplished by pumping from sumps adjacent to the construction excavations. However, deeper utilities (if deeper than 5 feet) will likely require well pointing.

Subgrade Preparation and Earthwork Operations

We recommend stripping of organic matter, unstable soils, or unsuitable FILL material (if encountered). Up to 12-inches of topsoil materials were encountered at the boring locations. Heavily wooded areas often require additional cuts of up to 12-inches to remove root mat. The stripping depth should be evaluated at the time of construction by representatives of the Geotechnical Engineer.

If additional stripping becomes necessary below that determined by contract, suitable methods should be employed to determine additional stripping depths beyond the contract depth (such as elevations determined before and after additional stripping, etc.). Cut and fill operations should extend a minimum of 5 feet beyond the building limits.

After stripping or cutting to the desired grade, and prior to structural fill placement, subgrades should be observed by the Geotechnical Engineer. In an effort to densify the surficial subgrade soils, the stripped area should be proofrolled with a 10-ton smooth drum roller with a minimum of two passes in two perpendicular directions, provided in-situ moisture contents are within ±3% of optimum in order to facilitate compaction.

Proofrolling of the subgrade should be accomplished using a loaded tandem axle dump truck having a weight of at least 20 tons to aid in identifying localized soft or unsuitable material. Any loose or unsuitable materials encountered during proofrolling should be removed and replaced with Engineered Fill or scarified, moisture conditioned, and recompacted to the minimum specifications given in this report.

Existing subgrades within the expanded building and pavement limits to a depth of at least 12 inches and subsequent lifts of Engineered Fill should be compacted to at least 95 percent of maximum dry density as determined per ASTM D698-07 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)). Loose lifts should not exceed 8 inches. Compaction should be accomplished with a large sheepsfoot roller for predominately clayey soil materials and/or a heavy vibratory drum roller for granular soil materials (or equivalent compacting equipment). The Fill should extend at least 10 feet beyond the building limits and 2 feet beyond the edges of the pavements before being sloped to match existing grades. Fill and cut slopes should not be constructed steeper than 3H:1V.

Soft, loose, or unsuitable materials encountered, which cannot be stabilized by reworking the soil, should be removed and replaced with an approved structural fill. Undercut volumes should be determined by cross-sectioning the area before and after undercut. We have found that calculating undercut volumes by truck counts is less accurate and generally results in additional expense to the owner. In order to minimize undercutting and issues during earthwork activities, we recommend earthwork operations be performed during the drier times of the year.

Generally, it appears that the near surface on-site native sandy soils can be re-used as structural fill. Only some of the near surface Clayey soils will be suitable for reuse and should meet the requirements of on-site borrow engineered fill. The materials must be moisture conditioned to within +/-3% of the soils optimum moisture. However, this requires time and favorable weather and the contractor must have appropriate equipment to aerate, scarify, and re-compact clayey and sandy soil materials to be successful. All proposed select fill soils should be submitted to the geotechnical engineer for approval prior to their use on the project. We recommend imported engineered fill (select) material consisting of approved inorganic material classified as SM, SM-SP, SP, SC or better containing less than about 50% by weight Silt or Clay and free of debris. This material should be placed in horizontal lifts not exceeding 8 inches in loose thickness, moisture conditioned to within +/- 3% of the optimum moisture content, and compacted to a minimum of 95% of the maximum dry density obtained in accordance with ASTM D-698, Standard Proctor method. Select fill slopes should be no greater than 3 horizontal to 1 vertical and structural fill material placed on slopes should be properly benched in.

The following is an assessment of the fill materials considered suitable for use on this project:

On-Site Borrow Engineered Fill: Soil material classified as Sand (SM, SC, SP, SW or better) and generally free of organics, and other unsuitable material. Soils obtained on-site classified as Clay (CL) having a maximum Liquid limit of 40 and maximum Plasticity

Index of 20 may also be used as Engineered Fill, if permitted in the final design documents. The natural soils encountered on the site generally appear to meet these requirements.

Imported Engineered Fill: Granular soil material classified as Sand (SM, SM-SP, SC, SP, SW or better) containing a maximum 40% by weight passing the No. 200 Sieve (Silt or Clay). Imported Engineered Fill should be generally free of organics, debris, rubble, and other unsuitable material.

Porous Fill: Well graded, clean granular material having a maximum aggregate size of 1.5 inches and no more than 15% passing the #200 Sieve (GW, GP, SW, SP). VDOT Size No. 57 Stone or ASTM C-33 washed concrete Sand are considered acceptable Porous Fill.

Foundation Undercut Backfill: Flowable Fill with a minimum compressive strength of 200 psi at 28 days may be utilized for backfill beneath foundations. Footing undercut backfill should be placed under the observation of the Geotechnical Engineer.

Soils intended to be used as Engineered Fill should be thoroughly evaluated by the Geotechnical Engineer prior to placement. The evaluation should be performed per ASTM D2487-06 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).

The ease with which suitable on-site soils can be used as Engineered Fill will depend upon their natural moisture contents at the time of construction. Scarifying and drying of the on-site soils may be required before recommended compaction can be achieved.

Drying and compaction of wet soils is typically difficult during the cold, winter months. Accordingly, earthwork should be performed during the warmer, drier times of the year, if practicable. Proper drainage should be maintained during earthwork phases of construction to prevent ponding water which has a tendency to degrade soil subgrades.

Building Foundations

Based on the results of our exploration and analysis, it is our opinion that the proposed building can be supported by shallow spread footings bearing in stable, original undisturbed subgrade or compacted engineered fill materials. For footings or turn downs placed on compacted engineered fill or approved native soil material, we recommend that a net allowable soil bearing pressure of 2,000 psf be utilized for wall and column footings.

In order to attain these allowable capacities, a minimum wall footing width of 24 inches and a minimum column footing width of 36 inches should be maintained for all footings. The minimum width dimension will help reduce the potential of foundation soil bearing failure and/or excessive settlement due to local shear or “punching” action in potentially soft surficial soils. Minimum footing depths should be 24 inches for frost and shrink swell concerns. It is anticipated that foundation bearing soils will have a moderate shrink swell potential.

Isolated areas of soft, unsuitable, or otherwise deleterious material exposed in the footing excavations should be undercut and removed from below the footings. The footing can be lowered or footing grades can be restored by backfilling with Flowable Fill having a minimum 28-day compressive strength of 200 psi. The bearing capacity at the final footing elevation should be verified in the field by the Geotechnical Engineer or their qualified representative to assure that the in-situ bearing capacity at the bottom of each footing excavation is adequate for the design loads recommended in this study.

Provided our recommendations outlined herein are followed, total foundation settlement is expected to be less than 1 inch. Differential settlement between similarly loaded footings is not expected to exceed ½ inch. This evaluation is based on our engineering experience of the soil conditions and the anticipated structural loading and is to guide the structural engineer with their design.

The footings should be constructed as structurally independent of floor slabs-on-grade as differential settlement between the slabs and foundations could occur. Where this is not possible, the footings should be thickened and reinforced as necessary. New footings should be positioned so as to avoid bearing above or in close proximity to any deep utilities or storm drains.

Building Floor Slab Design

The floor slabs may be supported on suitable natural soils or new Engineered Fill. Soils containing organics will need to be completely removed regardless of their stability. Slab subgrades should be re-worked to a depth of 8 inches and be re-compacted to 95% of the Standard Proctor maximum dry density (ASTM D 698). Slab subgrades should be proofrolled by the Geotechnical Engineer or their qualified representative, remediated as required, and approved prior to Engineered Fill placement. In the event that large areas of unstable and unsuitable subgrade are encountered, stabilization utilizing geotextile, geogrid, moderate undercutting or a combination of these remedial type measures could be considered under the advisement of the Geotechnical Engineer.

The building slab-on-grade should be directly supported by a minimum of 4 inches of Porous Fill. Porous Fill should consist of a well graded, clean granular material having a maximum aggregate size of 1.5 inches and no more than 15% passing the #200 Sieve (GW, GP, SW, SP). VDOT Size No. 57 Stone or ASTM C-33 washed concrete Sand are considered acceptable Porous Fill. As an alternate, a 6-inch layer of Aggregate Base Material, VDOT Type I, Size 21A can be employed beneath the slabs. This densely graded aggregate will help shed water and protect sensitive, underlying soils during wetter, winter weather. The Porous Fill layer will facilitate the fine grading of the subgrade, provide more uniform bearing conditions, and help minimize the rise of water to the bottom of the slab (capillary action). A vapor barrier consisting of at least a 6 mil polyethylene sheet should be placed on top of the Porous Fill in heated areas prior to the placement of concrete and lapped at least 6 inches. Floor slab subgrades should be recompacted immediately before placing the porous fill to repair any disturbance that may have occurred due to construction operations.

Provided the placement of Engineered Fill and Porous Fill is per the recommendations discussed herein, the slabs may be designed assuming a Modulus of Subgrade Reaction, K_S, of 150 psi per inch.

Thickened slab sections which support relatively lightly loaded walls need not contain the underslab Porous Fill layer provided soils exposed in the excavation bottoms are suitable and stable. However, their excavations should be prepared and, if necessary, undercut in the same manner as the footings.

We recommend that the floor slab be isolated from the foundation footings so differential settlement of the structure will not induce shear stresses in the floor slab. Where this is not possible, the footings should be thickened and reinforced as necessary. Also, in order to minimize the crack width of any shrinkage cracks that may develop near the surface of the slab, we recommend mesh reinforcement be included in the design of the floor slab. The mesh should be within the top half of the slab to be effective.

Seismic Design

The 2012 Edition of the International Building Code (IBC) requires that a seismic Site Class be assigned for new structures. The Seismic Site Class may be determined by calculating a weighted average of the N-values of subsurface materials encountered through a depth of 100 feet or to a depth of consistent values as determined by Standard Penetration Test methods. Alternatively, engineering judgment based on local experience may be applied.

We have evaluated the seismic site coefficient in accordance with the IBC. Based on our experience with seismic testing in this geologic environment, we estimate the subsurface profile of this site to have Site-Class E.

Pavement Design

Private Parking Lots and Access: For the construction of new pavements, we recommend that any soft, unstable and/or unsuitable materials be removed from within the 2-foot expanded pavement limits. The exposed surface should be proofrolled and carefully observed at the time of construction in order to aid in identifying any localized soft or unsuitable materials. This material where encountered, should be closely evaluated during construction and should be removed from below the pavement as required and/or considered necessary by the Geotechnical Engineer. In the event that large areas of unstable and unsuitable subgrade are encountered, stabilization utilizing geotextile, geogrid, moderate undercutting or a combination of these remedial type measures could be considered under the advisement of the Geotechnical Engineer.

Based on the results of our soil test borings and laboratory testing, it appears the natural soils that will be exposed as pavement subgrades will consist mainly of CLAY (CL) and SAND (SC). The soaked CBR test result was 2.3. The soaked CBR value was multiplied by a safety factory value of 2/3, yielding a design CBR value of 1.5. Therefore, a design CBR value of 1.5 should be utilized for the proposed pavement sections.

For the parking lot, the following typical pavement sections are recommended. These sections assume a maximum ADT of 300 Vehicles Per Day (VPD) for the parking areas and main entrances. The Heavy Duty Pavement contains an allowance for up to 15 trucks per day (5%).

STANDARD DUTY PAVEMENT
(Automobile Parking)

Asphalt Surface:	2.0 inches Asphalt Surface Material Type SM-12.5A
Aggregate Base:	8.0 inches Aggregate Base Material Type I, Size 21B
Subgrade:	Stable and compacted to a dry density of at least 95% of the soil’s Standard Proctor maximum dry density (ASTM D698) to a depth of 8.0 inches below subgrade elevation.

HEAVY DUTY PAVEMENT
(Drive Lanes/Entrances)

Asphalt Surface:	2.0 inches Asphalt Surface Material Type SM-12.5A
Asphalt Base:	4.0 inches Asphalt Base Material Type BM-25.0
Aggregate Base:	8.0 inches Aggregate Base Material Type I Size 21B
Subgrade:	Stable and compacted to a dry density of at least 95% of the soil’s Standard Proctor maximum dry density (ASTM D698) to a depth of 8.0 inches below subgrade elevation.

The pavement sections provided above should be considered the minimum recommended section for the anticipated traffic classification. Revised and/or modified pavement sections may be required in areas of concentrated and heavy traffic. The Civil Engineer should review actual traffic patterns to assure they are compatible with the minimum recommended sections.

We recommend that dumpster pads (including the area the collection truck will be on while emptying the dumpster) and loading dock pavements be rigid (concrete) pavement sections. We recommend that concrete pavements be comprised of a minimum of 6 inches of Portland cement concrete having a minimum 28-day compressive strength of 4,000 psi. The concrete should be air entrained and should be reinforced with welded wire mesh-type reinforcement. Construction joints or sawcut joints should be provided at a maximum spacing of 12 feet. Four inches of untreated aggregate base material, Type I - Size 21A, is recommended beneath exterior concrete pavements.

An important consideration with regard to the design and construction of pavements is surface and subsurface drainage. Where standing water develops, either on the pavement surface or within the base course layer, softening of the subgrade and other problems related to the deterioration of the pavement can be expected. Furthermore, good drainage should minimize the possibility of the subgrade materials becoming saturated over a long period of time. Based upon the results of the soil test borings, the groundwater table should not significantly affect the performance of pavements; however, surface runoff water that is trapped during construction on the exposed subgrade soils could create localized deterioration of the soil's bearing capacity. Standing water that may develop on the surface of the pavement may be controlled by adequate design (surface graded to control runoff to desired locations - catch basins, drain inlets, gutters, etc.), adequate compaction of each lift of pavement section component material (to reduce localized settlements that result in ponding) and accurate grading of each lift of pavement section component material (to achieve the desired design grades). Standing water that may develop within the base course layer may be removed by installing temporary weep holes in drainage structures, construction of drainage swales and diversion ditches, and proper backfill and grading behind curbs to minimize water intrusion from behind the curbs.

Pavement subdrains or drainage ditches should be provided behind curbs in cut areas where the grades slope toward the pavements. The invert elevation of swales should be at least 1 foot below the pavement subgrade level. Pavement subdrains should be extended to an appropriate discharge point.

Infiltration Area Discussion

Infiltration Test Results

One (1) field infiltration test was completed utilizing the Johnson Meter at depths ranging from 2- to 3-feet below the existing site elevations, in the most porous material encountered above the water table (if applicable) at the stormwater management area location. Infiltration tests were not performed at boring location BMP-2 due to the presence a shallow groundwater table. Utilizing the Johnson Meter, we recorded the following in-situ infiltration value illustrated on the next page:

Table 1: Measured Infiltration Rate

Test Location	Infiltration Test No.	Ksat Test Depth (Feet)	Ksat Rate (in/hour)	USDA Soil Classification
BMP-1	INF-1	2-3	0.001	CL

The groundwater table was encountered ranging in depth from 2.5- to 4-feet below the existing site elevations at borings BMP-1 and BMP-2. The soils encountered within the BMP facility predominantly consisted of CLAY (CL) and SAND (SC). The tested soils would fall into Hydrologic Soil Grouping D. Typically, soils with the Hydrologic Soil Group designations of A and B are considered suitable for infiltration purposes. Some soils designated as C type soils are considered suitable for infiltration practices, but these soils would need to be evaluated on a case specific basis. Soils with group designations of D are generally not considered suitable.

Construction Considerations

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

In a dry and undisturbed state, the soil at the site will provide good subgrade support for fill placement and construction operations; however, when wet, this soil will degrade quickly with disturbance from contractor operations. Good site drainage should be maintained during earthwork operations which would help maintain the integrity of the soil.

Proper compaction control of fill is an important aspect of this project. Therefore, we recommend that all fill operations be observed full-time by a qualified soil technician to determine if minimum compaction requirements are being met.

Groundwater was encountered at the boring locations ranging in depth from 2.5- to 5-feet below the existing site elevations. Therefore, groundwater might impact foundation and shallow utility construction. Deeper utilities may require groundwater control. If groundwater is encountered, we expect that dewatering in shallow trenches could be accomplished by pumping from sumps adjacent to the construction excavations. Deeper utilities (if deeper than 5 feet) will likely require well pointing.

General Comments

This report has been prepared in order to aid in the evaluation of this site and to assist Aerocolours in the design and planning of the project. The report scope is limited to the specific project and location described, and the project description represents our understanding of the significant aspects relevant to soil and foundation characteristics.

We have appreciated being of service to you during the design phase of this project and look forward to its successful construction. If you should have any questions regarding the information and recommendations contained in this report or if we can be of any further assistance, please contact our office.

Respectfully,

ECS MID-ATLANTIC, LLC

W. LLOYD WARD
Lic. No. 034612

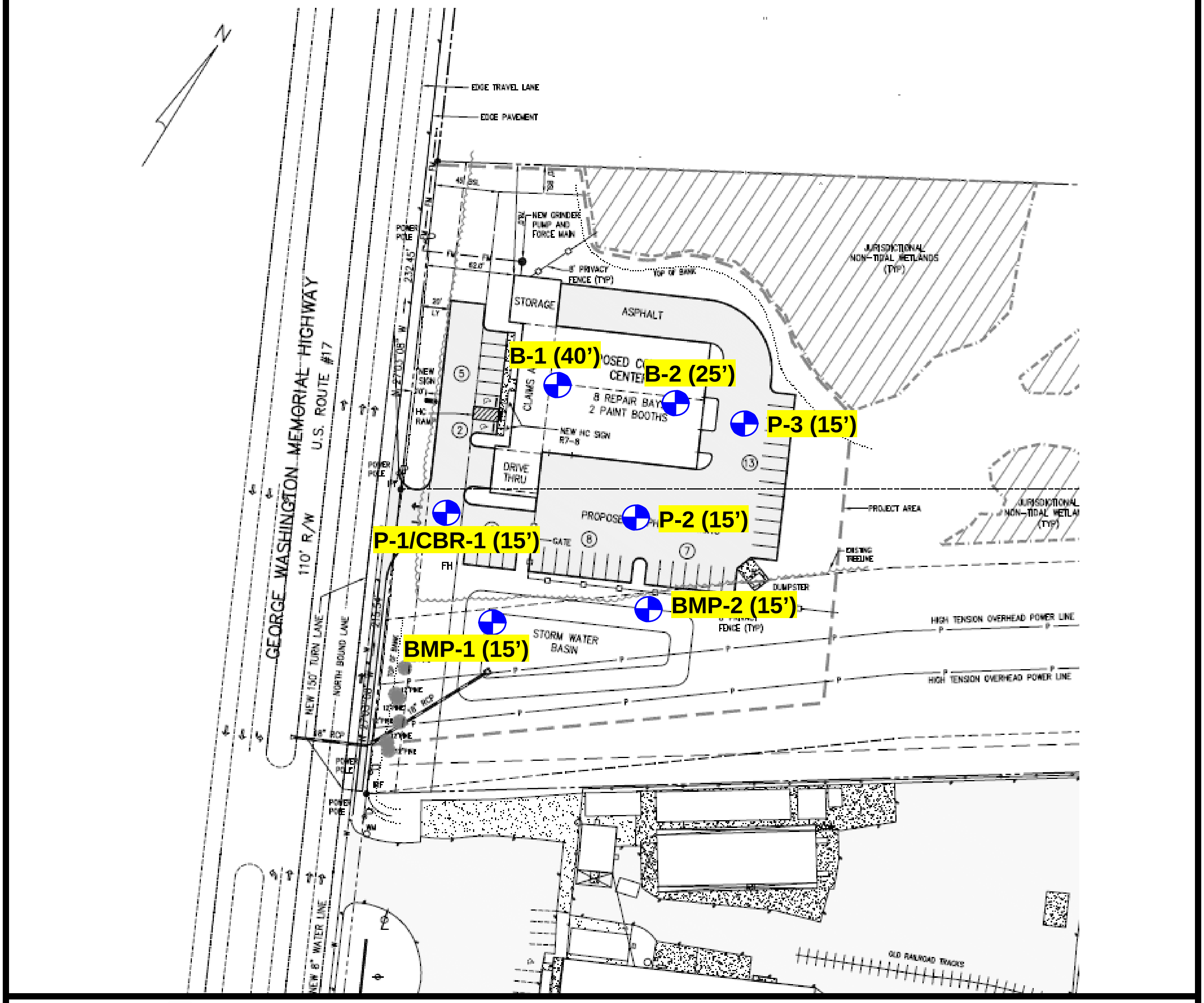
Sara B. Phillips
Sara B. Phillips
Senior Project Geologist

W. Lloyd Ward, P.E.
VP/Williamsburg Branch Manager

Appendix: I. Boring Location Plan
II. Boring Logs
III. Unified Classification System and Reference Notes for Boring Logs
IV. Laboratory Testing Summary

APPENDIX I

Boring Location Plan



LEGEND

● - Approximate Boring Location

SCALE

NTS

SOURCE

Campbell Land Surveying, Inc.

Dated: 4/21/2016

FIGURE 1
BORING LOCATION PLAN
Aerocolours Collision Center Exploration
7700 & 7716 George Washington Memorial Highway
York County, Virginia

ECS PROJECT NO. 07:13947

APPENDIX II

Boring Logs

CLIENT	Job #:	BORING #	SHEET
Aerocolours	07:13947	B-1	1 OF 2

PROJECT NAME: Aerocolours Collision Center

ARCHITECT-ENGINEER:

SITE LOCATION: 7700 and 7716 George Washington Memorial Highway, York County, VA

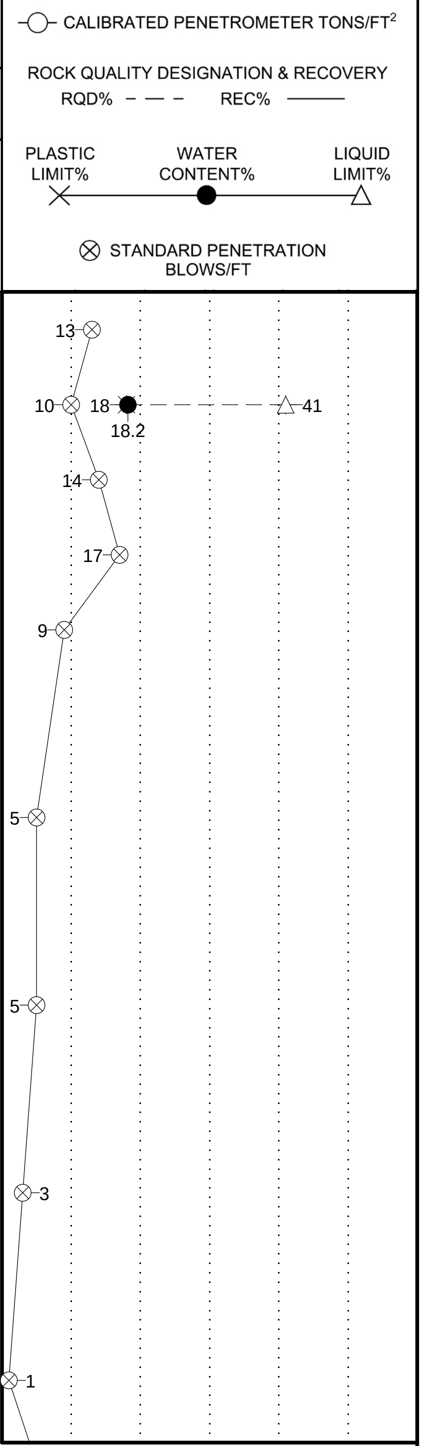
NORTHING	EASTING	STATION

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING ➤ LOSS OF CIRCULATION

SURFACE ELEVATION

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [10.00"]			
	S-1	SS	24	18	(CL) SANDY LEAN CLAY, grayish brown to gray-brown-red, moist to wet, stiff to firm			4 6 7 5
	S-2	SS	24	16				4 5 5 6
5	S-3	SS	24	18		▽		6 7 7 8
	S-4	SS	24	16				7 8 9 9
	S-5	SS	24	20				6 4 5 5
10								
	S-6	SS	24	18				3 2 3 3
15								
	S-7	SS	24	24	(SM) SILTY FINE TO MEDIUM SAND, trace clay, orangish gray, wet, loose to very loose			3 2 3 4
20								
	S-8	SS	24	16				2 1 2 1
25								
	S-9	SS	24	24	(CL) SANDY LEAN CLAY, tan, wet, very soft			WOH 1 WOH 1
30								



CONTINUED ON NEXT PAGE.

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

▽ WL 5 WS ☐ WD ☒	BORING STARTED 09/11/17	CAVE IN DEPTH
▼ WL(SHW) ▼ WL(ACR)	BORING COMPLETED 09/11/17	HAMMER TYPE Auto
▽ WL	RIG ATV FOREMAN Fishburne	DRILLING METHOD Rotary Wash "Mud" Drilling

CLIENT	Job #:	BORING #	SHEET
Aerocolours	07:13947	B-1	2 OF 2

PROJECT NAME: Aerocolours Collision Center

ARCHITECT-ENGINEER:

SITE LOCATION: 7700 and 7716 George Washington Memorial Highway, York County, VA

NORTHING:

EASTING:

STATION:

CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY

RQD% – — – REC% ———

PLASTIC LIMIT% — WATER CONTENT% — LIQUID LIMIT%

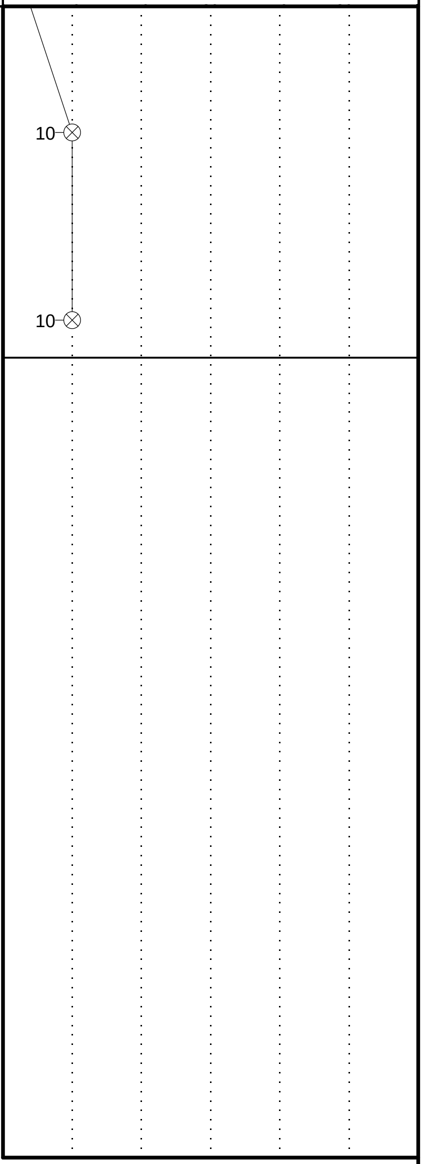
⊗ STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION

SURFACE ELEVATION

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"	STANDARD PENETRATION BLOWS/FT
					(CL) SANDY LEAN CLAY, tan, wet, very soft				
	S-10	SS	24	12	(SM) SILTY FINE SAND, trace clay, greenish gray, wet, loose, contains significant marine shell fragments			5 4 6 7	10
35									
	S-11	SS	24	18				4 5 5 7	10
40					END OF BORING @ 40'				
45									
50									
55									
60									



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

WL 5 WS ☐ WD ☒	BORING STARTED 09/11/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 09/11/17	HAMMER TYPE Auto
WL	RIG ATV FOREMAN Fishburne	DRILLING METHOD Rotary Wash "Mud" Drilling

CLIENT
Aerocolours

Job #:
07:13947

BORING #
B-2

SHEET
1 OF 1

PROJECT NAME
Aerocolours Collision Center

ARCHITECT-ENGINEER

SITE LOCATION
7700 and 7716 George Washington Memorial Highway, York County, VA

NORTHING

EASTING

STATION

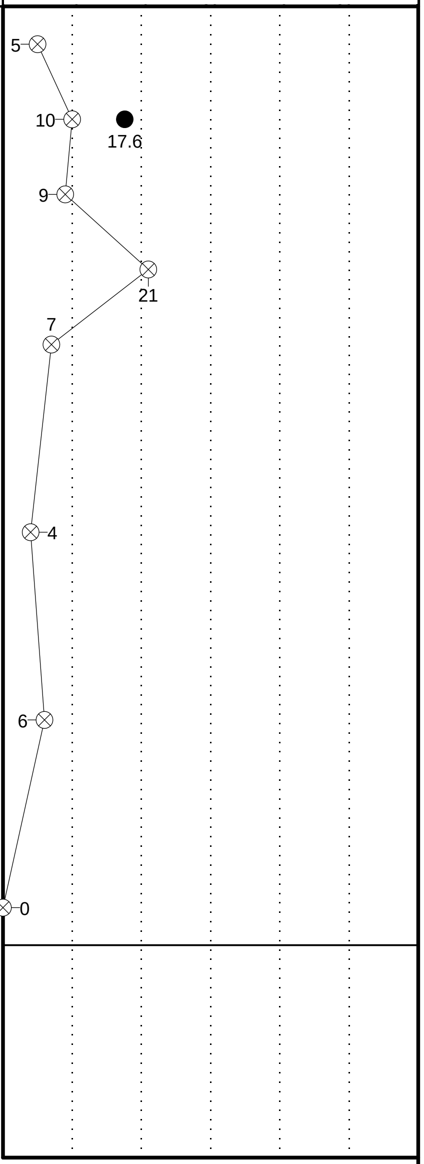
-○- CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — –   REC% ———

PLASTIC LIMIT% ✕   WATER CONTENT% ●   LIQUID LIMIT% △

⊗ STANDARD PENETRATION BLOWS/FT

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL BOTTOM OF CASING ➤ SURFACE ELEVATION	ENGLISH UNITS LOSS OF CIRCULATION	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	20	Topsoil Depth [6.00"] (SC) CLAYEY FINE TO MEDIUM SAND, brownish tan, moist, loose				3 2 3 7
	S-2	SS	24	16	(CL) SANDY LEAN CLAY, brownish gray-orange, moist to wet, stiff				5 5 5 5
5	S-3	SS	24	14			▽		3 4 5 6
	S-4	SS	24	18	(SC) CLAYEY FINE TO MEDIUM SAND, tan, wet, medium dense to very loose				10 11 10 11
	S-5	SS	24	18					3 4 3 5
10									
	S-6	SS	24	18					2 2 2 3
15									
	S-7	SS	24	14	(SM) SILTY FINE TO MEDIUM SAND, grayish tan, wet, loose to very loose				3 3 3 4
20									
	S-8	SS	24	24					WOH WOH WOH 1
25					END OF BORING @ 25'				
30									



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

▽ WL 5   WS ☐   WD ☒

BORING STARTED 09/11/17

CAVE IN DEPTH

▽ WL(SHW)   ▼ WL(ACR)

BORING COMPLETED 09/11/17

HAMMER TYPE Auto

▽ WL

RIG ATV   FOREMAN Fishburne

DRILLING METHOD Rotary Wash "Mud" Drilling

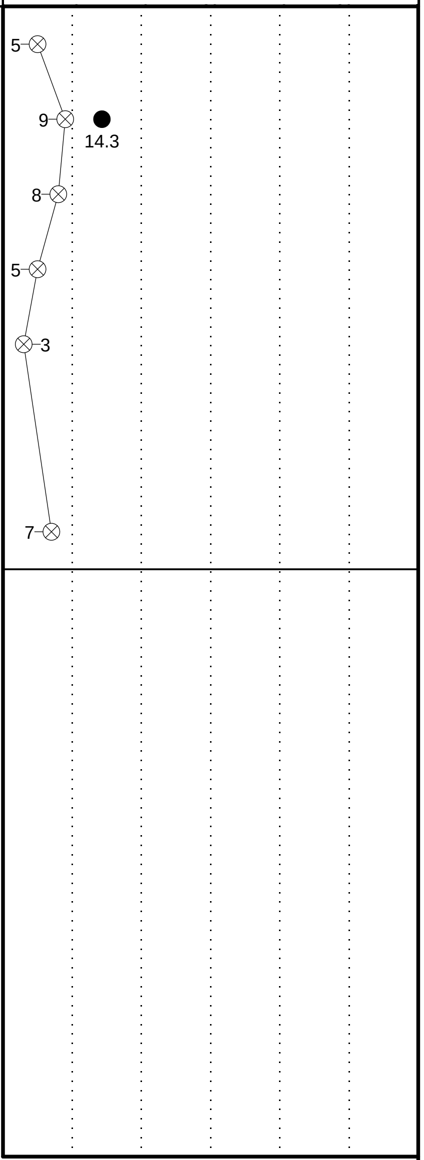
CLIENT	Job #:	BORING #	SHEET
Aerocolours	07:13947	BMP-1	1 OF 1

PROJECT NAME: Aerocolours Collision Center
ARCHITECT-ENGINEER:
SITE LOCATION: 7700 and 7716 George Washington Memorial Highway, York County, VA
NORTHING:
EASTING:
STATION:

DESCRIPTION OF MATERIAL — ENGLISH UNITS
BOTTOM OF CASING ➤ LOSS OF CIRCULATION 100%
SURFACE ELEVATION

-○- CALIBRATED PENETROMETER TONS/FT^2
ROCK QUALITY DESIGNATION & RECOVERY
RQD% – – – REC% ———
PLASTIC LIMIT% ✕ WATER CONTENT% ● LIQUID LIMIT% △
⊗ STANDARD PENETRATION BLOWS/FT

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	18	Topsoil Depth [6.00"] (CL) LEAN CLAY, grayish brown, moist to wet, firm to stiff, with varying amounts of sand, contains organics at a depth of 8 to 10 feet below the existing site elevations			2 2 3 4
	S-2	SS	24	18		▽		4 4 5 5
5	S-3	SS	24	16				5 4 4 4
	S-4	SS	24	20				3 3 2 3
	S-5	SS	24	24				1 2 1 2
10								
	S-6	SS	24	24				3 3 4 5
15					END OF BORING @ 15'			
20								
25								
30								



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

▽ WL 4 WS ☐ WD ☒	BORING STARTED 09/11/17	CAVE IN DEPTH
▽ WL(SHW) ▼ WL(ACR)	BORING COMPLETED 09/11/17	HAMMER TYPE Auto
▽ WL	RIG ATV FOREMAN Fishburne	DRILLING METHOD Rotary Wash "Mud" Drilling

CLIENT	Job #:	BORING #	SHEET
Aerocolours	07:13947	BMP-2	1 OF 1

PROJECT NAME: Aerocolours Collision Center

ARCHITECT-ENGINEER:

SITE LOCATION: 7700 and 7716 George Washington Memorial Highway, York County, VA

NORTHING: | EASTING: | STATION:

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING ➤ LOSS OF CIRCULATION 100%

SURFACE ELEVATION

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [6.00"]			
	S-1	SS	24	24	(CL) LEAN CLAY, grayish tan, moist to wet, very soft to very stiff, contains varying amounts of Sand			1 1 1 1
	S-2	SS	24	18		▽		2 3 3 3
5	S-3	SS	24	18				4 7 6 7
	S-4	SS	24	24				8 9 11 10
	S-5	SS	24	18				5 6 6 8
10								
	S-6	SS	24	20				2 2 2 3
15					END OF BORING @ 15'			
20								
25								
30								

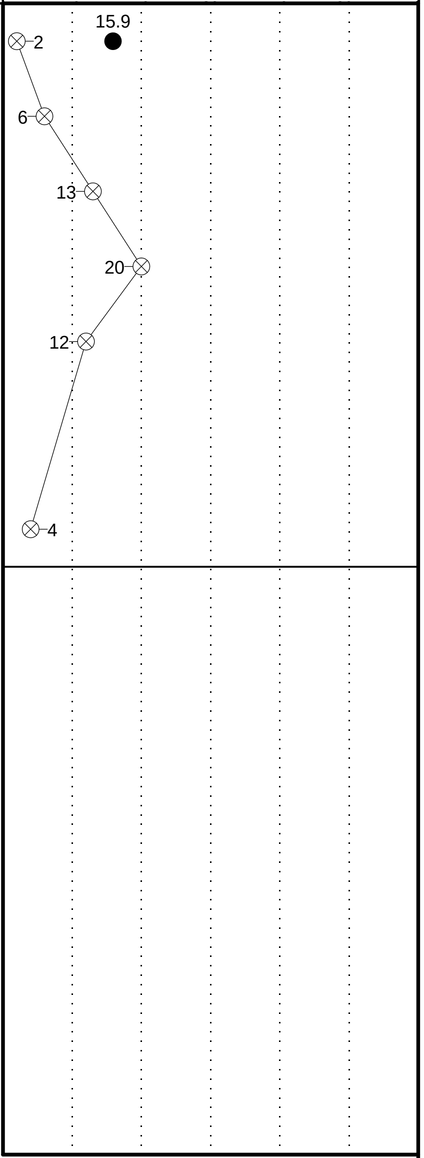
-○- CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY

RQD% – – –   REC% ———

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

⊗ STANDARD PENETRATION BLOWS/FT



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

▽ WL 2.5 WS ☐ WD ☒	BORING STARTED 09/11/17	CAVE IN DEPTH
▽ WL(SHW) ▼ WL(ACR)	BORING COMPLETED 09/11/17	HAMMER TYPE Auto
▽ WL	RIG ATV FOREMAN Fishburne	DRILLING METHOD Rotary Wash "Mud" Drilling

CLIENT
Aerocolours

Job #: 07:13947

BORING # P-1

SHEET 1 OF 1

PROJECT NAME
Aerocolours Collision Center

ARCHITECT-ENGINEER

SITE LOCATION
7700 and 7716 George Washington Memorial Highway, York County, VA

NORTHING

EASTING

STATION

-○- CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% ✕ WATER CONTENT% ● LIQUID LIMIT% △

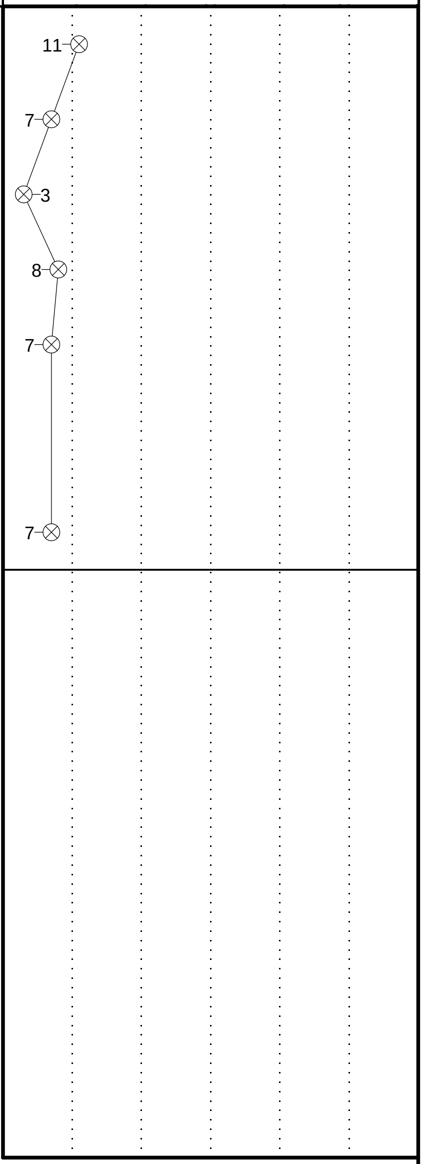
⊗ STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING ➤ LOSS OF CIRCULATION

SURFACE ELEVATION

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [8.00"]			
	S-1	SS	24	18	(CL) SANDY LEAN CLAY, gray and orangish brown, wet, stiff to firm			3 5 6 8
	S-2	SS	24	20		▽		4 4 3 2
5	S-3	SS	24	16				1 2 1 2
	S-4	SS	24	16				3 4 4 5
	S-5	SS	24	18				2 3 4 6
10								
	S-6	SS	24	24				2 3 4 5
15					END OF BORING @ 15'			
20								
25								
30								



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

▽ WL 3.5 WS ☐ WD ☒	BORING STARTED 09/11/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 09/11/17	HAMMER TYPE Auto
WL	RIG ATV FOREMAN Fishburne	DRILLING METHOD Rotary Wash "Mud" Drilling

CLIENT	Job #:	BORING #	SHEET
Aerocolours	07:13947	P-2	1 OF 1

PROJECT NAME
Aerocolours Collision Center

ARCHITECT-ENGINEER

SITE LOCATION
7700 and 7716 George Washington Memorial Highway, York County, VA

NORTHING
EASTING
STATION

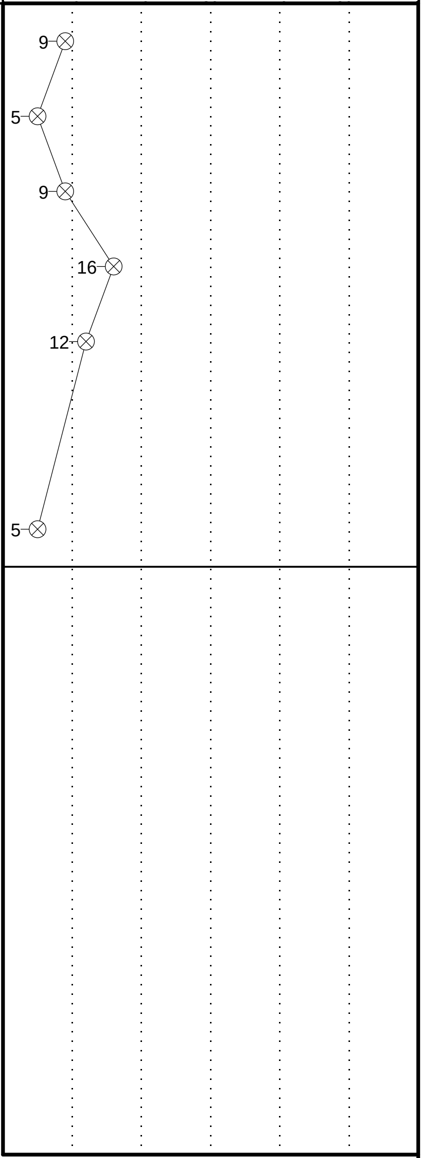
-○- CALIBRATED PENETROMETER TONS/FT^2

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

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

⊗ STANDARD PENETRATION BLOWS/FT

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL ENGLISH UNITS BOTTOM OF CASING ➤ LOSS OF CIRCULATION 100% SURFACE ELEVATION	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [5.00"]			
	S-1	SS	24	20	(SC) CLAYEY FINE TO MEDIUM SAND, grayish brown, moist, loose			4 5 4 4
	S-2	SS	24	20	(CL) SANDY LEAN CLAY, grayish brown to gray- tan, moist to wet, very stiff to firm	▽		3 3 2 3
5	S-3	SS	24	20				3 4 5 7
	S-4	SS	24	24				5 7 9 11
	S-5	SS	24	24				5 6 6 9
10								
	S-6	SS	24	16				2 3 2 3
15					END OF BORING @ 15'			
20								
25								
30								



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

▽ WL 4 WS ☐ WD ☒	BORING STARTED 09/11/17	CAVE IN DEPTH
▽ WL(SHW) ▼ WL(ACR)	BORING COMPLETED 09/11/17	HAMMER TYPE Auto
▽ WL	RIG ATV FOREMAN Fishburne	DRILLING METHOD Rotary Wash "Mud" Drilling

CLIENT	Job #:	BORING #	SHEET
Aerocolours	07:13947	P-3	1 OF 1

PROJECT NAME

Aerocolours Collision Center

ARCHITECT-ENGINEER

SITE LOCATION

7700 and 7716 George Washington Memorial Highway, York County, VA

NORTHING	EASTING	STATION

—○— CALIBRATED PENETROMETER TONS/FT^2

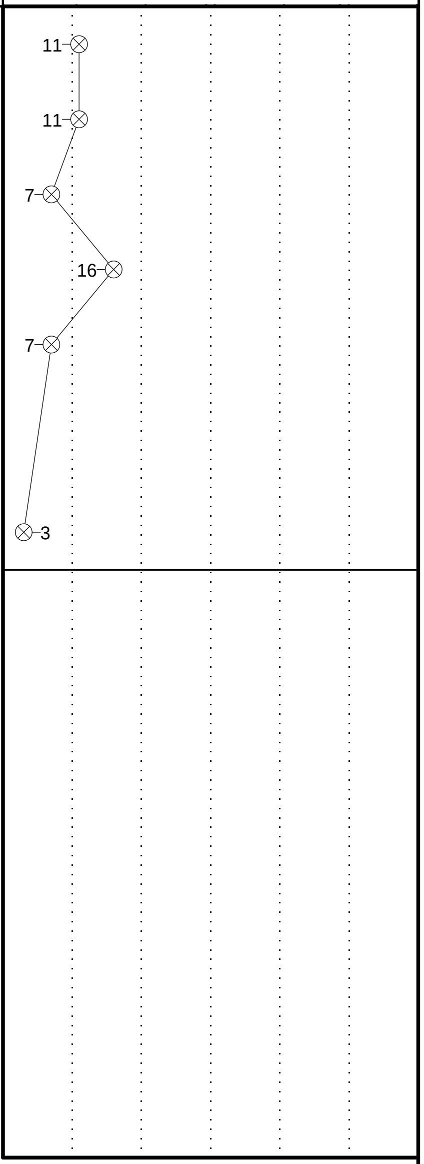
ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — –   REC% ———

PLASTIC LIMIT% ✕   WATER CONTENT% ●   LIQUID LIMIT% △

⊗ STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS
BOTTOM OF CASING ➤   LOSS OF CIRCULATION 100%
SURFACE ELEVATION

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	18	Topsoil Depth [12.00"] (SC) CLAYEY FINE TO MEDIUM SAND, grayish brown, moist, medium dense			2 5 6 6
	S-2	SS	24	18	(CL) SANDY LEAN CLAY, gray-tan, moist to wet, firm to stiff	▽		4 5 6 8
5	S-3	SS	24	14				2 3 4 5
	S-4	SS	24	14				6 7 9 10
	S-5	SS	24	20	(SC) CLAYEY MEDIUM TO COARSE SAND, gray and orangish brown, wet, loose to very loose			3 3 4 4
10								
	S-6	SS	24	24				2 1 2 3
15					END OF BORING @ 15'			
20								
25								
30								



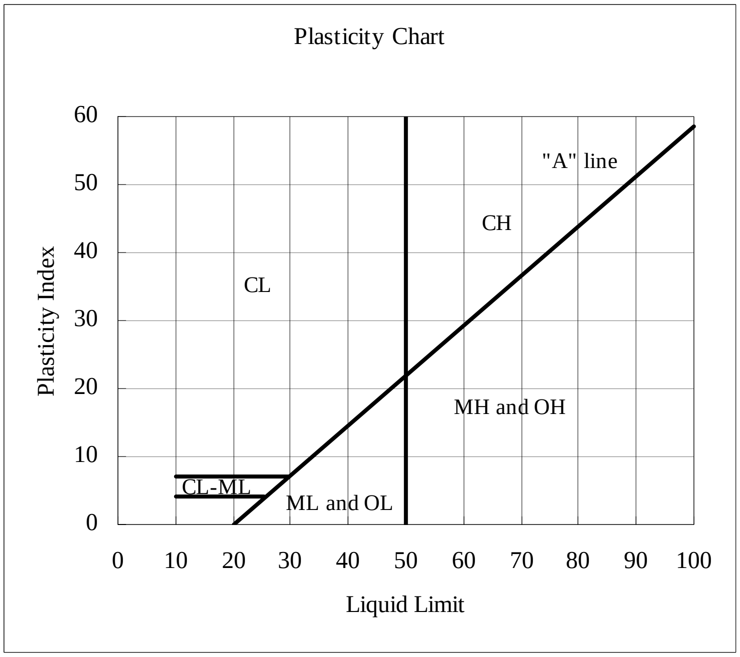
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

▽ WL 4 WS ☐ WD ☒	BORING STARTED 09/11/17	CAVE IN DEPTH
▽ WL(SHW) ▼ WL(ACR)	BORING COMPLETED 09/11/17	HAMMER TYPE Auto
▽ WL	RIG ATV FOREMAN Fishburne	DRILLING METHOD Rotary Wash "Mud" Drilling

APPENDIX III

Unified Classification System and Reference Notes for Boring Logs

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487)

Major Divisions			Group Symbols		Typical Names	Laboratory Classification Criteria		
Coarse-grained soils (More than half of material is larger than No. 200 Sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW		Well-graded gravels, gravel-sand mixtures, little or no fines	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]	$C_u = D_{60}/D_{10}$ greater than 4 $C_c = (D_{30})^2/(D_{10}xD_{60})$ between 1 and 3	
			GP		Poorly graded gravels, gravel-sand mixtures, little or no fines		Not meeting all gradation requirements for GW	
		Gravels with fines (Appreciable amount of fines)	GM[a]	d	Silty gravels, gravel-sand 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 below “A” line or P.I. less than 7	
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW		Well-graded sands, gravelly sands, little or no fines		$C_u = D_{60}/D_{10}$ greater than 6 $C_c = (D_{30})^2/(D_{10}xD_{60})$ between 1 and 3	
			SP		Poorly graded sands, gravelly sands, little or no fines		Not meeting all gradation requirements for SW	
		Sands with fines (Appreciable amount of fines)	SM[a]	d	Silty sands, sand-silt mixtures		Atterberg limits above “A” line or P.I. less than 4	Limits plotting in CL-ML zone with P.I. between 4 and 7 are borderline 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			

---

[a] Division of GM and SM groups into subdivisions of d and u are for roads and airfields only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 28 or less and the P.I. is 6 or less; the suffix u used when L.L. is greater than 28.

[b] Borderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC,well-graded gravel-sand mixture with clay binder. (From Table 2.16 - Winterkorn and Fang, 1975)

REFERENCE NOTES FOR BORING LOGS

I. Drilling Sampling Symbols

SS	Split Spoon Sampler	ST	Shelby Tube Sampler
RC	Rock Core, NX, BX, AX	PM	Pressuremeter
DC	Dutch Cone Penetrometer	RD	Rock Bit Drilling
BS	Bulk Sample of Cuttings	PA	Power Auger (no sample)
HSA	Hollow Stem Auger	WS	Wash sample
REC	Rock Sample Recovery %	RQD	Rock Quality Designation %

II. Correlation of Penetration Resistances to Soil Properties

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

A. Non-Cohesive Soils (Silt, Sand, Gravel and Combinations)

Density		*Relative Properties*	
Under 4 blows/ft	Very Loose	Adjective Form	12% to 49%
5 to 10 blows/ft	Loose	With	5% to 12%
11 to 30 blows/ft	Medium Dense		
31 to 50 blows/ft	Dense		
Over 51 blows/ft	Very Dense		

Particle Size Identification		
Boulders		8 inches or larger
Cobbles		3 to 8 inches
Gravel	Coarse	1 to 3 inches
	Medium	½ to 1 inch
	Fine	¼ to ½ inch
Sand	Coarse	2.00 mm to ¼ inch (dia. of lead pencil)
	Medium	0.42 to 2.00 mm (dia. of broom straw)
	Fine	0.074 to 0.42 mm (dia. of human hair)
Silt and Clay		0.0 to 0.074 mm (particles cannot be seen)

B. Cohesive Soils (Clay, Silt, and Combinations)

Blows/ft	*Consistency*	*Unconfined Comp. Strength Q_p (tsf)*	*Degree of Plasticity*	*Plasticity Index*
Under 2	Very Soft	Under 0.25	None to slight	0 – 4
3 to 4	Soft	0.25-0.49	Slight	5 – 7
5 to 8	Medium Stiff	0.50-0.99	Medium	8 – 22
9 to 15	Stiff	1.00-1.99	High to Very High	Over 22
16 to 30	Very Stiff	2.00-3.00		
31 to 50	Hard	4.00–8.00		
Over 51	Very Hard	Over 8.00		

III. Water Level Measurement Symbols

WL	Water Level	BCR	Before Casing Removal	DCI	Dry Cave-In
WS	While Sampling	ACR	After Casing Removal	WCI	Wet Cave-In
WD	While Drilling	▽	Est. Groundwater Level	▼	Est. Seasonal High GWT

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

APPENDIX IV

Laboratory Testing Summary

Laboratory Testing Summary

Page 1 of 1

Boring Number	Sample Number	Depth (feet)	MC[1] (%)	Soil Type[2]	Atterberg Limits[3]			Percent Passing No. 200 Sieve[4]	Moisture - Density (Corr.)[5]		CBR Value[6]	Other
					LL	PL	PI		Maximum Density (pcf)	Optimum Moisture (%)		
B-1												
	S-2	**2.00 - 4.00**	**18.2**	**CL**	**41**	**18**	**23**	**56.2**				
B-2												
	S-2	**2.00 - 4.00**	**17.6**	**CL**				**59.4**				
BMP-1												
	S-2	**2.00 - 4.00**	**14.3**	**CL**				**72.0**				
BMP-2												
	S-1	**0.00 - 2.00**	**15.9**	**CL**				**52.3**				
CBR-1												
	P-1	**0.50 - 0.50**	**12.9**	**CL**	**26**	**13**	**13**	**59.3**	**112.4**	**14.9**	**2.3**	

Notes: 1. ASTM D 2216, 2. ASTM D 2487, 3. ASTM D 4318, 4. ASTM D 1140, 5. See test reports for test method, 6. See test reports for test method

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content (ASTM D 2974)

Project No.	**07:13947**
Project Name:	**Aerocolours Collision Center**
Client:	**Aerocolours**
Printed On:	**Thursday, October 12, 2017**

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