Stantec

ADDENDUM NO. 1

LaGrange Skate Plaza
City of LaGrange

June 6, 2018

Item No. 1 Questions

1. Does the Prime submitting GC or the specialty sub-contractor need to hold a Georgia Utility Contractor licence to oversee all of the specialty work? **No - Majority of the skate park work could be done under a GC license. The prime can hold a GC license and any of their subs hold the needed license for their work.**

2. Can a Utility Contractor specifically be retained to do the tie in only? **Yes – any sub will be required to hold the license for their identified work.**

3. Has a geotechnical study been done for the site? **Yes – the study has been uploaded to the website detailing site findings.**

4. Can a list of specialty contractors be supplied that focus on Skate parks? **Yes – a list of contractors has been uploaded to the web site. Please note, this is not an exclusive list and they are not to be considered as prequalified for the project.**

5. What permit fees are associated with this project? **There is no permit fee because this project disturbs less than an acre of land.**

Item No. 2 Plans

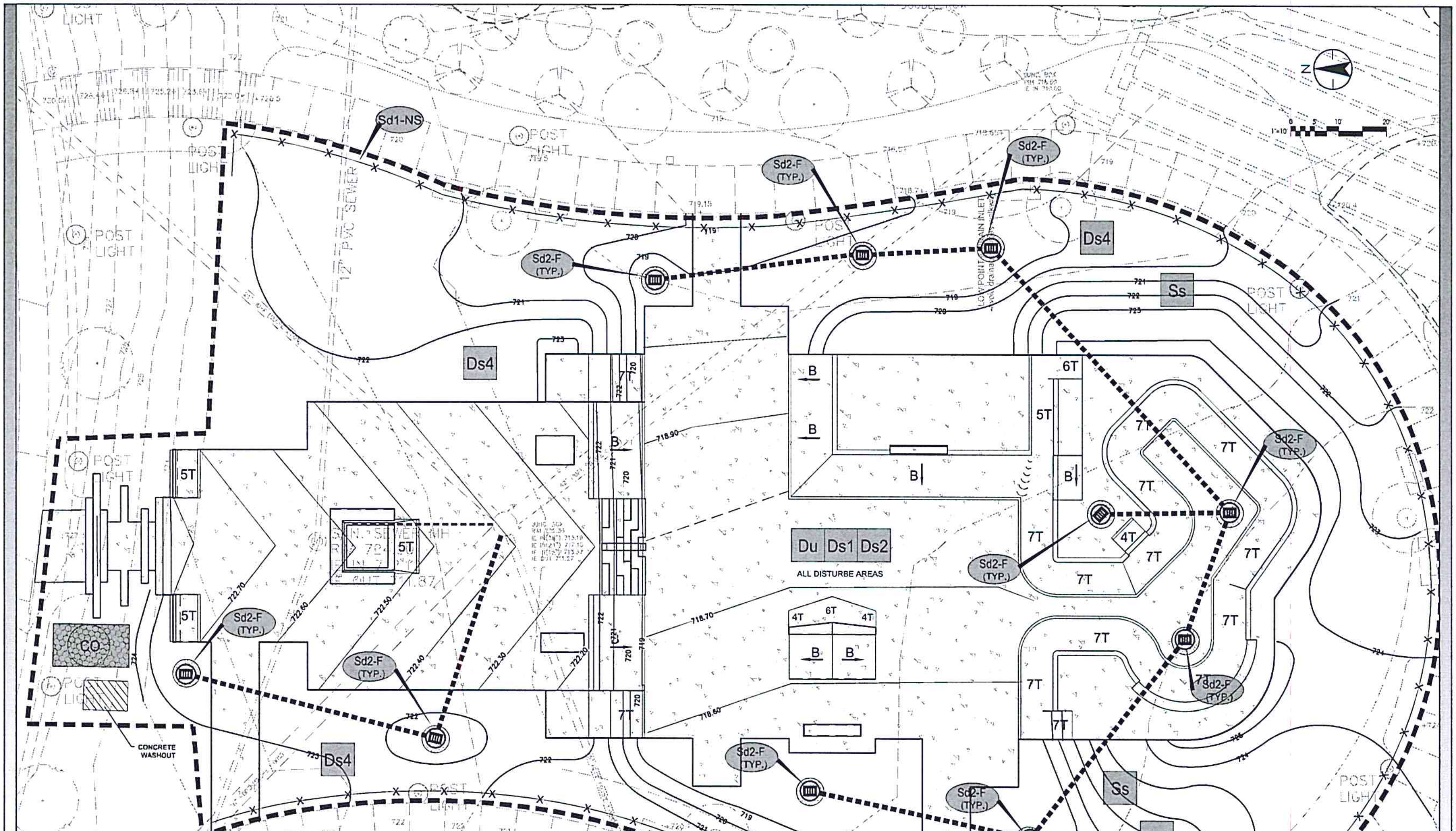
1. **Sheet C3.1, 4.1** - note added. Existing utility manholes (Storm and Sewer) tops will be adjusted to match proposed final grade. Minor spot grade adjustments at bowl.

2. **Sheet C3.1, 4.1** – Zurn drain added to upper deck in the bowl area.

Item No. 3 Contract Documents and Technical Specifications

1. Project schedule has been extended to give an additional 2 weeks. **(104 days)**

2. The **Prime Submitting General Contractor OR Specialty Sub-Contractor Skate Park Construction Qualification Statement** is required to be submitted with the bid package. This form can be found prior to the technical specifications.



EXISTING USE NARRATIVE:
The existing site is a park with dog park, play ground and play field etc.

PROPOSED USE NARRATIVE:
This project involves the grading and installing storm drain system, and concrete pavement for new skate plaza as well as erosion control etc.

TOTAL SITE AREA : ±0.8 ac
TOTAL DISTURBED AREA : 0.8 ac

AMENDMENTS/REVISIONS TO THE ES&PC PLANS WHICH HAVE SIGNIFICANT EFFECT ON BMP'S WITH A HYDRAULIC COMPONENT MUST BE CERTIFIED BY THE DESIGN PROFESSIONAL.

NOTES:

1. EROSION CONTROL MEASURES SHALL BE MAINTAINED AT ALL TIMES. IF FULL IMPLEMENTATION OF THE APPROVED PLAN DOES NOT PROVIDE FOR EFFECTIVE EROSION CONTROL, ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IMPLEMENTED TO CONTROL OR TREAT THE SEDIMENT SOURCE.
2. THE ESCAPE OF SEDIMENT FROM THE SITE SHALL BE PREVENTED BY THE INSTALLATION OF EROSION AND SEDIMENT CONTROL MEASURES AND PRACTICES PRIOR TO LAND-DISTURBING ACTIVITIES.
3. ANY DISTURBED AREAS LEFT EXPOSED FOR A PERIOD GREATER THAN 14 DAYS SHALL BE STABILIZED WITH MULCH OR TEMPORARY SEEDING.
4. ALL EROSION CONTROL MEASURES SHALL BE COMPLETELY REMOVED UPON FINAL STABILIZATION.
5. NON EXEMPT ACTIVITIES SHALL NOT BE CONDUCTED WITHIN THE 25 OR 50-FOOT UNDISTURBED STREAM BUFFERS AS MEASURED FROM THE POINT OF WRESTED VEGETATION WITHOUT FIRST ACQUIRING THE NECESSARY VARIANCES AND PERMITS.
6. WASTE MATERIALS SHALL NOT BE CHARGED TO WATERS OF STATE EXCEPT AS AUTHORIZED BY A SECTION 404 PERMIT.
7. THERE IS NOT A STATE WATER LOCATED ON OR WITHIN 200 FT. OF THE PROJECT SITE.
8. THERE IS NOT A WETLAND WITHIN 200' OF THE PROJECT SITE.

Stantec
9665 Granite Ridge Drive
Suite 220
San Diego, CA 92123
Tel. 858.633.4233
www.stantec.com

LICENSE:

PROJECT:
LAGRANGE SKATE PLAZA
CITY OF LAGRANGE, GA

SHEET TITLE:
EROSION CONTROL PLAN

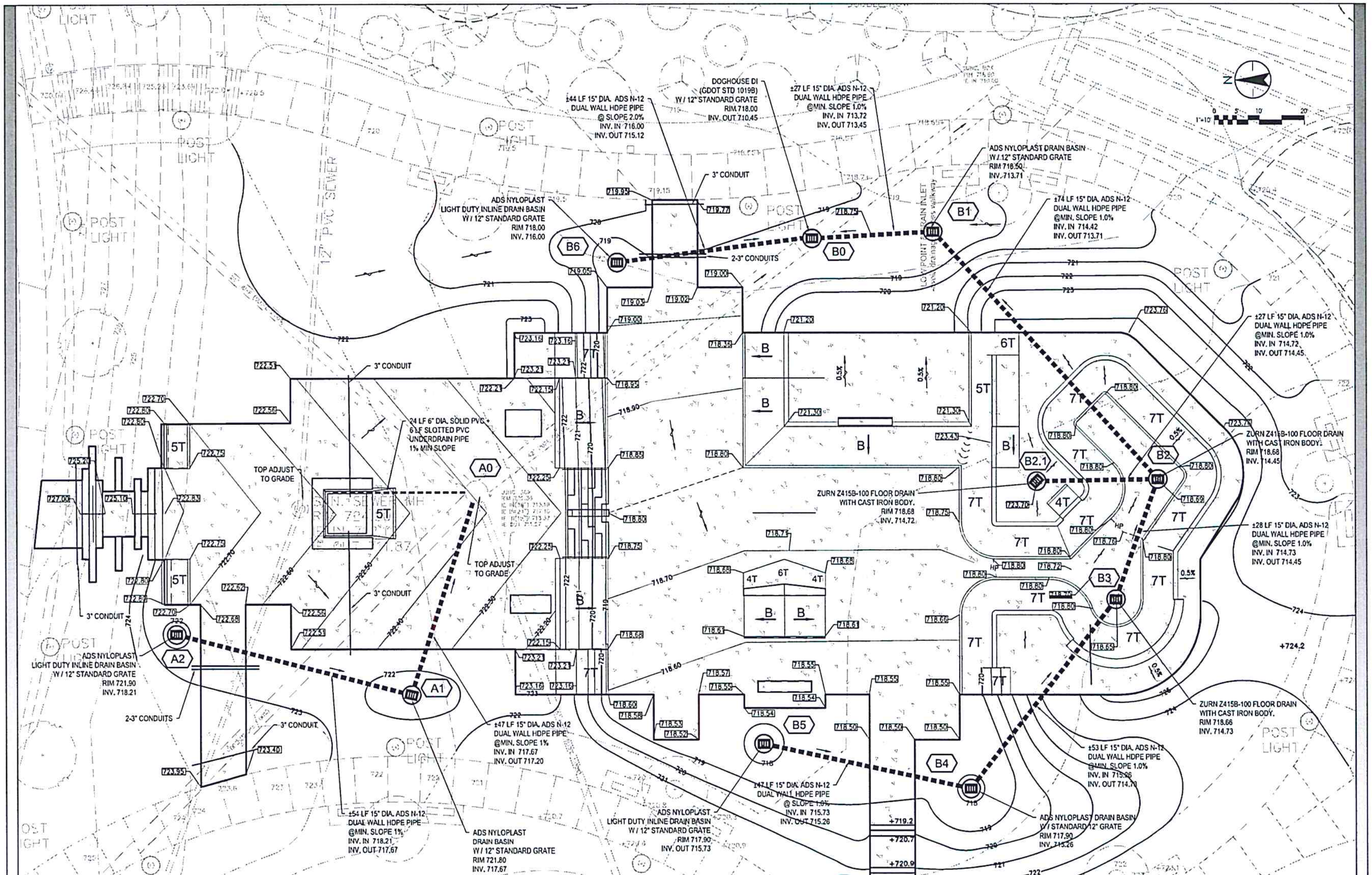
ISSUE DATE: 03-2018

DRAWN BY: CC / MS / TB

CHECKED BY: KR

REVISIONS:
△
△
△

SHEET NUMBER: C4.1



PIPE CHART

STRUCTURE NAME	TYPE	DRAINAGE AREA(AC)	RUNOFF COEFFICIENT (C)	Q10 (cfs)
A1	DI	0.12	0.58	0.66
A2	DI	0.10	0.58	0.55
B0	DOGHOUSE DI	0.11	0.79	0.82
B1	DI	0.09	0.53	0.45
B2	DI	0.02	0.93	0.18
B2.1	DI	0.02	0.93	0.18
B3	DI	0.03	0.89	0.25
B4	DI	0.20	0.54	1.02
B5	DI	0.17	0.73	1.18
B6	DI	0.16	0.49	0.74

PIPE NAME	PIPE SIZE	PIPE LENGTH(LF)	PIPE SLOPE	PIPE TYPE	Q10 (cfs)	V10 (ft/sec)
A2-A1	15"	54	1.00%	HDPE	0.55	0.45
A1-A0	15"	47	1.00%	HDPE	1.21	0.99
B5-B4	15"	47	1.00%	HDPE	1.18	0.96
B4-B3	15"	53	1.00%	HDPE	1.27	1.04
B2.1-B2	15"	27	1.00%	HDPE	0.18	0.15
B3-B2	15"	28	1.00%	HDPE	2.16	1.76
B2-B1	15"	74	1.00%	HDPE	4.02	3.28
B1-B0	15"	27	1.00%	HDPE	4.55	3.71
B6-B0	15"	44	2.00%	HDPE	0.74	0.60

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LICENSE:

PROJECT:
LAGRANGE SKATE PLAZA
CITY OF LAGRANGE, GA

SHEET TITLE:
GRADING AND DRAINAGE PLAN

ISSUE DATE: 03-2018

DRAWN BY: CC / MS / TB

CHECKED BY: KR

REVISIONS:

SHEET NUMBER: C3.1

RE: Specialty Contractor List

- **SPA Skateparks**
  2310 Rogge Ln. Austin, TX 78723
  Contact: Jamie Curtis
  Phone: 512.736.5008/ 512.736.5008
  website: www.SPAskateparks.com
  info@spaskateparks.com

- **Grindline**
  4619 14th Avenue SW
  Seattle, WA 98106
  Contact: Matt Fluegge
  Office: 206.932.6414
  Cell: 206.612.3401
  matt@grindline.com

- **California Skateparks/ California Landscape & Design**
  273 N. Benson Av
  Upland, CA 91768
  Contact: Misty Ruiz/ Roger Lovingood
  (909) 949-1601/
  misty@californiaskateparks.com
  roger.lovingood@callandscape.com

- **DREAMLAND SKATEPARKS**
  960 SE Hwy 101
  PMB384
  Lincoln City, OR 97367-2622
  503-577-9277
  danyel@fastmail.fm

- **Wally Hollyday Skateparks**
  Contact: Wally Hollyday, Principal
  Phone: 949-510-1515
  Fax: 949-448-8208
  Email: wally@skatedesign.com
  www.skatedesign.com

- **Tony Misiano**
  Newline Skateparks
  Phone: 386-785-3204
  Email: tony@newlineskateparks.com

- **Team Pain**
  890 Northern Way / Suite D-1
  Winter Springs, FL 32708
  Contact: Tim Payne
  (407) 366-9221
  info@teampain.com

- **SPOHN RANCH SKATEPARKS**
  15131 Clark Avenue
  City of Industry, CA 91745
  877-489-3539
  info@skateboardparks.com

- **ARTISAN SKATEPARKS**
  Andy Duck
  4600 Tamarack Drive,
  Kitty Hawk, NC 27949
  252-202-1333
  andy@artisanskateparks.com

SUBSURFACE EXPLORATION AND
GEOTECHNICAL ENGINEERING EVALUATION

PROPOSED SKATE PLAZA AT SOUTHBEND PARK
LAGRANGE, GEORGIA
GEC JOB NO. 180102.310

PREPARED FOR

MR. JEFFREY A. RICE, P.E.
STANTEC

VIA EMAIL: JEFF.RICE@STANTEC.COM

PREPARED BY

GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS, INC.
5031 MILGEN COURT
COLUMBUS, GEORGIA 31907

MARCH 16, 2018

GEC

GEC
GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS, INC

March 16, 2018

Mr. Jeffrey A. Rice, P.E.
Stantec

Via Email: jeff.rice@stantec.com

SUBJECT: Subsurface Exploration and Geotechnical Engineering Evaluation
Proposed Skate Plaza at Southbend Park
Lagrange, Georgia
GEC Project No. 180102.310

Dear Mr. Rice:

Geotechnical & Environmental Consultants, Inc. (GEC) is pleased to present this report of our subsurface exploration and geotechnical engineering evaluation for the above site. The purpose of the exploration was to obtain data to evaluate the site and subsurface conditions in order to provide recommendations relative to the geotechnical aspects of the project.

We greatly appreciate the opportunity to provide these services to you. If you have any questions, or if we can be of further assistance, please do not hesitate to call.

Sincerely,

GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS, INC.

Bianca M. Wilson

Bianca M. Wilson, E.I.T
Project Engineer

GEORGIA REGISTERED No. 16617 PROFESSIONAL ENGINEER RICHARD L. CURTIS

Digitally signed by Richard L. Curtis
Date: 2018.03.16 16:42:16 -04'00'

Richard L. Curtis, P.E., D.GE
Chief Geotechnical Engineer
Ga. Reg. #16617 AL Reg. #17948

514 Hillcrest Industrial Boulevard, Macon, GA 31204 • Phone: (478) 757-1606 • Fax: (478) 757-1608
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PROPOSED SKATE PLAZA AT SOUTHBEND PARK
LAGRANGE, GEORGIA
GEC JOB NO. 180102.310

APPENDIX

1.0 EXECUTIVE SUMMARY

The following summary highlights our pertinent findings and recommendations concerning this project.

- Site preparation will include the removal of any debris, topsoil, trees and vegetation, and any soft/loose near-surface soils in the planned construction areas. All stripped materials and debris should be disposed off-site or in non-structural areas.

- In general, the on-site materials appear to be suitable for use as structural fill, except for the organic-laden fill material encountered at borings B-1 and B-5.

- Refusal to the auger process was encountered within the depths evaluated at borings B-2 and B-4 at a depth of 6 feet and 2 feet, respectively. Since auger refusal was encountered within fill material, we assume that refusal was caused by gravel/rock fragments or debris within the fill.

- Groundwater was not encountered at depths evaluated at the time of boring. Groundwater is not expected to be a concern in the structural areas of the site.

- Relatively loose/soft soils were encountered near the surface in borings B-2 and B-4. Also, organic-laden fill was encountered in boring B-1. In general, if loose/soft or organic-laden soils are encountered in structural areas, the soils may need to be reworked or undercut to a point 10 feet outside the perimeter of the structural areas.

- We recommend using conventional shallow foundations for support of the proposed structures. An allowable soil bearing pressure of 1,500 psf may be used for design of shallow foundations bearing on competent existing soils or engineered fill.

- The concrete slab-on-grade for the proposed structures may be designed using a modulus of subgrade reaction of 100 pci for the soil types encountered at the site.

This executive summary has been prepared solely to provide a general overview of the report. The executive summary should not be relied upon for any purpose except for a general overview. Please rely on the full report for information concerning the findings, recommendations and other concerns at the site.

2.0 PROJECT INFORMATION

It is our understanding that the proposed construction will consist of a skate plaza at Southbend Park in LaGrange, Georgia. Various concrete hardscape structures are planned in the skate plaza including walls, ramps and a bowl structure. We understand that some fill material was likely placed in the area during recent nearby grading activities; however, no documentation is available.

3.0 METHOD OF EXPLORATION

3.1 Site Reconnaissance and Boring Layout

GEC performed a general review of the proposed project site and surrounding areas prior to the performance of our subsurface exploration activities. The review was performed to evaluate surface conditions that could impact our exploration techniques or the proposed construction.

The locations and depths of the borings were selected by GEC based on the site plans provided. Borings were field-located using a hand-held GPS device and coordinates established by overlaying the provided site plan onto internet-based aerial photography. Boring elevations were determined using the topographic information provided. Since the borings were not located by survey, the locations and boring elevations should be considered approximate.

3.2 Soil Test Borings

A total of five (5) soil test borings were performed at the project site. Borings designated B-1 through B-5 were performed in the proposed skate plaza area and were extended to a depths ranging from 6 to 10 feet below the existing ground surface. The approximate locations of the borings are presented on the *Boring Location Plan* located in the Appendix.

All borings were backfilled with the auger cuttings prior to site demobilization. The split-spoon samples were returned to our laboratory and were manually and visually examined and classified. The samples were classified according to the Unified Soil Classification System (USCS). Detailed records of the soil test borings, indicating the N-values (blow counts) obtained from the Standard Penetration Testing (SPT) and a more detailed description of the drilling and sampling processes, are presented in the Appendix.

4.0 SITE AND SUBSURFACE CONDITIONS

4.1 Site Description

At the time of drilling, the site was cleared free of trees, with planted landscape. Bull Street is completed and bounds the project site to the north. Pierce Street bounds the site to the west and a wood line is adjacent to the property on the east border. Additionally, a sanitary sewer line was observed to bisect the site, running northeast-to-southwest, entering the site at Bull Street. Two sewer manholes were noted along the alignment of the sanitary sewer during drilling operations. The ground surface generally slopes moderately down from hilltops located north of the property.

4.2 Local Geology

The site is located in the Piedmont Physiographic Province of Georgia. The Piedmont is composed of igneous and metamorphic rocks, most commonly granites, granitic gneiss, and schists. These rocks have undergone extensive alterations, folding and faulting during the mountain building episodes, which produced the Appalachian Mountains and have since experienced a long period of stability. Chemical and physical weathering, have produced the present topography. The depth of weathering can vary greatly. The general Piedmont subsurface profile consists of clayey soils near the surface, which grade into silty sands and sandy silts with depth. Soils beneath the upper clayey zones often retain and exhibit the relic structure (banding, foliation) of the parent rock and are termed saprolite. A zone of weathered rock often separates saprolite from hard relatively un-weathered bedrock. The various rock types resist weathering in different degrees depending on their chemical composition, fracturing, jointing, and bedding, so the depth to bedrock is often quite erratic and can vary over a short distance. Also, it is not unusual to find lenses of partially weathered rock and hard rock boulders within the saprolite. Alluvial, or water deposited, soils are present in association with rivers and streams. These soils consist of interlayered sands, silts and clays with varying amounts of organic materials.

Naturally occurring soils can be covered by fill that resulted from man's activities during construction, farming, waste disposal, or other ground disturbing activities. Fill materials can be highly variable and can contain debris. The engineering properties of fill depend primarily on composition, moisture content, and density. No density test reports or quality assurance reports were provided for any previous construction at the site. Where density tests or other construction-related testing reports are not provided, fill materials are designated as undocumented.

4.3 Subsurface Conditions

Details of the subsurface conditions encountered by the soil test borings are shown on the *Soil Boring Records* in the Appendix of this report. These records represent an estimate of the subsurface conditions based on our interpretation of the boring data using normally accepted engineering judgment. Stratification lines on the *Soil Boring Records* represent approximate boundaries between soil types. However, the in-situ transition is typically more gradual. Although individual test borings are representative of the subsurface conditions at the boring locations on the dates shown, they are not necessarily indicative of the subsurface conditions at other locations or at other times. The general soil conditions and their pertinent characteristics are discussed in the following paragraphs.

General Stratigraphy

The general subsurface stratigraphy of the site consisted of planted landscape underlain by fill or Piedmont residual materials extending to the maximum depths explored. Auger refusal materials were encountered at both boring locations.

Fill/Possible Fill Soils

The fill soils generally consisted of soft to hard sandy silts (ML) and medium dense silty sands (SM) with various amounts of gravel, mica and organic contents. The standard penetration test (SPT) N-values in these soils ranged from 4 to 36 blows per foot (bpf).

Residual Soils

The residual soils encountered in the borings generally consisted of firm to stiff sandy silts (ML) with various clay and mica contents. The standard penetration test (SPT) N-values in these soils ranged from 8 to 12 blows per foot (bpf).

Auger Refusal

Refusal to the auger process was encountered in boring B-2 (6') and B-4 (2'). We recommend the auger refusal be assumed to indicate gravel/rock fragments or debris within the fill for evaluation of excavation conditions.

Groundwater

Groundwater was not encountered at depths evaluated at the time of boring. Groundwater levels may be expected to fluctuate with changes in temperature, rainfall and other seasonal factors, and may at other times differ from those reported herein.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Site and Subgrade Preparation

The initial step in site preparation should consist of the removal of any debris, topsoil, trees, vegetation and root systems, and any soft/loose near-surface soils in the planned construction areas. Any utility lines in the project area should be removed and relocated. Excavations or holes resulting from the removal of trees or utilities should be backfilled with structural fill to the compaction requirements presented in Section 5.2, *Earthwork.* All topsoil should be stripped from construction areas.

Care should be taken with near-surface soils containing fine-grained particles (silts and clays) during grading. When exposed to moisture, the workability and strength of these near-surface soils deteriorates significantly, and the need for undercutting and other construction delays may result. We recommend that construction grades be maintained throughout this project in such a manner so to establish positive drainage away from working surfaces and subgrades.

Following site stripping, we recommend that all proposed fill areas or areas at-grade be proofrolled in the presence of a geotechnical engineer or his representative to evaluate subgrade stability. Proofrolling should be performed with a fully loaded tri-axle dump truck, 20-ton roller, or similar equipment in an overlapping pattern to detect any soft or loose areas. Any areas that pump or rut excessively and cannot be densified by continued rolling should be undercut to a depth to be determined in the field by the geotechnical engineer, and be replaced with structural fill.

The fine grained sandy silt (ML) and silty sand (SM) soils encountered in the borings will be sensitive to disturbance from construction activity and water seepage. If precipitation occurs prior to or during construction, the near-surface soils could increase in moisture content and become more susceptible to disturbance. Construction activity should be monitored, and should be curtailed if the construction activity is causing subgrade disturbance. A geotechnical engineering representative can help with monitoring and developing recommendations to aid in limiting subgrade disturbance.

Relatively loose/soft soils were encountered near the surface in borings B-2 and B-4. Also, organic-laden fill was encountered in boring B-1. In general, if loose/soft or organic-laden soils are encountered in structural areas, the soils may need to be reworked or undercut to a point 10 feet outside the perimeter of the structural areas. The extent of the reworking necessary will depend on the final grading plans and the climatic conditions at the time of construction. All undercut areas should be backfilled with structural fill as described in Section 5.2, *Earthwork*, of this report.

Prior to fill placement, the subgrade should be scarified, moisture-conditioned to slightly above the optimum moisture content, and compacted to at least 95 percent of the standard Proctor maximum dry density (ASTM D698) in all structural or paved areas. All at-grade areas and cut surfaces should be scarified, moisture conditioned to slightly above the optimum moisture content, and compacted to at least 98 percent of the same criteria.

5.2 Earthwork

The soil test borings indicate the near-surface soils at the site can be graded with conventional earthmoving equipment such as self-loading or pusher-assisted pans and tracked dozers. The near-surface soils appear to be suitable for use as fill material, with the exception of the organic-laden fill material encountered at borings B-1 and B-5. Wetting or drying of the soils at the site may be necessary to achieve the required compaction criteria. The contractor should be required to have equipment available on site for both wetting and drying of the soils.

In general, all fill placed at the site, including on-site soils, should not contain rocks or lumps larger than four (4) inches in greatest dimension and contain no more than 15 percent larger than 2.5 inches. Structural fill soils should have a liquid limit less than 50, plastic index less than 30 and a standard Proctor maximum dry density (ASTM D698) greater than 90 pcf. Generally, soils classified as SP, SM, SC, ML or CL according to the Unified Soil Classification System are considered suitable for fill providing they meet the above criteria.

Structural fill should be moisture-conditioned to slightly above the optimum moisture content, spread in relatively thin lifts (8-inch maximum loose lifts) and methodically compacted with heavy compaction equipment to at least 95 percent of the standard Proctor maximum dry density (ASTM D698). The upper one-foot of fill material should be compacted to a 98 percent compaction criterion. Additionally, the upper one-foot of material in areas at-grade or cut surfaces should be scarified and compacted to the 98 percent criteria. Structural fill criteria should be utilized beneath proposed and future structural areas. Due to the silty nature of the on-site soils, we recommend that the moisture content of the fill soils be maintained within 3% of the optimum moisture content during compaction. Specifically, moisture levels should be maintained low enough to allow for satisfactory compaction to be achieved without pumping when proofrolled.

Upon completion of filling and grading, care should be taken to maintain the subgrade moisture content prior to construction of slabs and pavements. Construction traffic over the completed subgrade should be avoided to the extent practical. The site should also be graded to prevent ponding of surface water on the prepared structure and pavement subgrades or in excavations. Any accumulated surface water should be removed as promptly as possible. If the subgrade should become frozen, desiccated, saturated, or disturbed, the affected material should be removed or these materials should be scarified, moisture conditioned, and recompacted prior to slab and pavement construction. As noted previously some of the fine-grained soils at this site will be susceptible to degradation from weather and construction activities. Therefore, some remediation of exposed subgrade should be expected.

Structural fill should extend horizontally beyond the outer edge of the foundations at least ten feet or a distance equal to the height of the fill to be placed, whichever is greater. In paved areas, fill slopes should extend horizontally at least five feet beyond the edge of pavement prior to sloping.

Utility trenches should be backfilled with materials satisfying the criteria described above for general fill, placed in lifts of approximately eight (8) inches in uncompacted thickness.

5.3 Foundations

The proposed structure can be constructed on conventional shallow foundations bearing on the in-place soils, reworked soils, or structural fill meeting the compaction requirements of Section 5.2, *Earthwork*. Based on the soils encountered during our exploration, we recommend a uniform net allowable soil bearing pressure of 1,500 psf be used for shallow foundation design of the proposed structure foundations. Exterior foundations should bear at a minimum of 18 inches below external grades to preclude damage due to frost penetration.

Using assumed structural loads, we estimate that total post-construction settlement of up to one (1) inch will occur. Differential settlement should be approximately 50% of the total settlement over a distance of 30 feet. Individual spread footings should have a minimum dimension of 24 inches and strip footings should have a minimum lateral dimension of 20 inches.

A Geotechnical Engineer or his representative should examine footing subgrades immediately prior to rebar placement to confirm that the foundation conditions are as anticipated and the design bearing pressure is available. Auger and hand-held dynamic cone penetrometer testing, augmented by hand probing, should be used to determine whether conditions within these areas are consistent with those encountered by the borings.

5.4 Slab Recommendations

A concrete slab-on-grade system bearing on the in-place soils or structural fill may be utilized for the building. Assuming that the upper 12 inches of subgrade consist of properly compacted and proofrolled existing soil or newly installed fill material compacted to a minimum of 98% of standard Proctor maximum dry density, a modulus of subgrade reaction of 100 pci may be used for design of concrete slab-on-grade subject to minor interior loads.

Grade supported slabs should be jointed around columns and along footing supported walls to minimize cracking due to differential movement. Provided surface grades direct water away from the building, a below-slab drainage system is not required. However, we recommend that ground slabs be underlain by an effective vapor barrier to reduce moisture vapor transmission and a layer of at least 4 inches of crushed stone to protect the subgrade prior concrete placement and provide a capillary break to limit moisture migration. Note that a vapor barrier may create differences in curing conditions so that measures to reduce potential slab curl should be specified.

5.5 Slopes

Based on our experience with soils similar to those encountered during our exploration, we recommend excavated slopes less than 10 feet high be laid back at least to a 2H:1V (Horizontal to Vertical) slope. Permanent fill slopes up to 10 feet high that are placed on suitable subgrade may be constructed at 2.5:1 or flatter. All fill slopes should be adequately compacted as recommended in this report. Permanent slopes of 3:1 or flatter may be used to facilitate mowing. All sloped surfaces should be protected from erosion by grassing or other means. Buildings should be set back at least 10 feet from the crest of slopes or as required by regulatory authorities. Pavements should be set back at least 5 feet from the crest edge. All temporary slopes and confined excavations should conform to the latest OSHA Regulations.

5.6 Drainage Considerations

It is not anticipated that special groundwater control measures will be required during construction. However, fluctuation of groundwater levels should be anticipated. We recommend that the Contractor determine the actual groundwater levels at the time of construction to determine groundwater impact on the construction procedures.

Water should not be allowed to collect in the foundation excavations, on the slab areas, or on prepared subgrade of the construction area either during or after construction. The subgrade beneath structures should be sloped to a low point to facilitate removal of any collected rainwater, groundwater, or surface runoff. Positive site drainage (i.e. sloping grade) should be provided to reduce infiltration of surface water around the perimeter of the structure and beneath the area of the proposed structure.

5.7 Lateral Earth Pressures

Due to the topographic relief at the site, below grade structures and retaining walls are anticipated at the site. Lateral load resistance for site structures can be developed by friction between the foundation bottom and the supporting subgrade. As an alternative, passive resistance acting against the vertical face of the foundations could be used. If the foundations are poured neat against the soil, the friction and passive resistance can be used in combination, providing the strain compatibility in simultaneous development of all lateral soil resistance components are considered.

Based on the results of our exploration performed for the subject project and the testing of similar soils on other projects, the following earth pressure coefficients are recommended for using the soils encountered in our borings as compacted structural fill.

Active Earth Pressure (K_A)	At-Rest Earth Pressure (K_O)	Passive Earth Pressure (K_P)	Frictional Sliding Resistance (f_S)
0.36	0.53	2.77	0.35

The above passive earth pressure coefficients are based on our experience with similar projects with similar soil conditions. These coefficients were estimated based on an assumed angle of internal friction of approximately 28°. Triaxial shear testing, which was beyond the scope of this exploration, would be required to determine the actual strength properties of the soils at this site. A moist unit weight of 110 pounds per cubic foot should be used for design calculations.

Our recommendations assume that the ground surface above any walls is level and that soils similar to those found in our borings will be used for wall backfill.

The recommended values assume that constantly functioning drainage systems are installed to prevent the accidental backup of hydrostatic pressures behind the wall system. Tractors and other heavy equipment should not operate within five feet of below grade walls to prevent lateral pressures in excess of those cited above.

These recommendations should not be correlated with soil parameters for use in any Mechanically Stabilized Earth (MSE) wall design. We recommend that soil parameters for any MSE retaining wall design be established through appropriate laboratory testing initiated by the wall designer.

5.8 Geotechnical Controls

1. The Geotechnical Engineer should be provided the opportunity for a general review of the final design documents in order to assess proper interpretation of the earthwork and foundation recommendations.

2. The Geotechnical Engineer, or his qualified representative, should observe undercutting and proofrolling operations.

3. A qualified engineering technician, under the supervision of the Geotechnical Engineer, should observe fill operations and perform a minimum of one field density test per 2,500 square feet of area for each one-foot thickness of fill.

4. The Geotechnical Engineer, or his qualified representative, should check each foundation excavation utilizing hand probing and auger and dynamic cone penetrometer testing. This will reduce the risk of unsuitable or soft materials directly underlying the footings, which may be detrimental to the integrity of the structures.

5.9 Limitations

This report is for the exclusive use of Stantec, the engineers, owners, and subcontractors for the project described herein, and may only be applied to this specific project. The analyses, conclusions and recommendations presented in this report are based on the preceding project information, and the results of this evaluation. Conditions may vary from those observed in the borings.

If it becomes apparent during construction that soil conditions differing from those discussed in this report are encountered, Geotechnical and Environmental Consultants, Inc. should be notified at once so that the effects may be determined and any remedial measures necessary may be prescribed.

This report has been prepared in accordance with generally accepted standards of geotechnical engineering practice in the State of Georgia. No other warranty is expressed or implied. Our firm is not responsible for conclusions, opinions or recommendations of others.

The right to rely upon this report and the data within may not be assigned without the written permission of Geotechnical and Environmental Consultants, Inc. If the design or location of the structure is changed, the recommendations contained herein must be considered invalid, unless our firm reviews changes and our recommendations are either verified or modified in writing. When design is complete, we should be given the opportunity to review the foundation plans, grading plans and applicable portions of the specifications to determine if they are consistent with the intent of our recommendations.

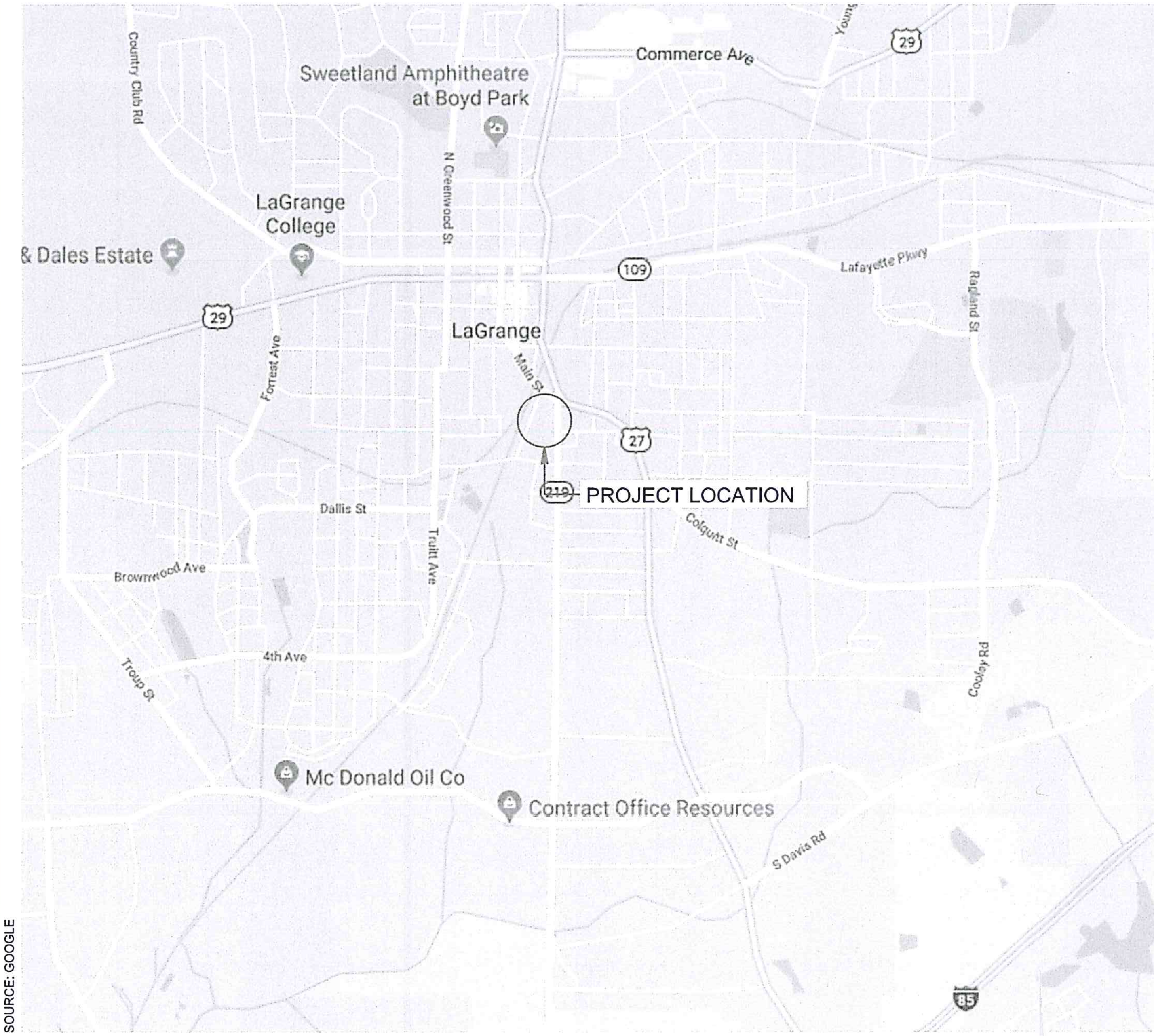
Appendices

Appendix A

Site Location Map

Boring Location Plan with Preliminary Site Plan

Boring Location Plan with Aerial Photograph



0 0.25 0.5 1 MILE 1.5 MILES 2 MILES

SCALE: 1" = 0.5 MILE

FIGURE 1: SITE LOCATION MAP
SUBSURFACE EVALUATION
PROPOSED SKATE PARK
PIERCE STREET
COLUMBUS, GA
GEC PROJECT NO. 180102.310

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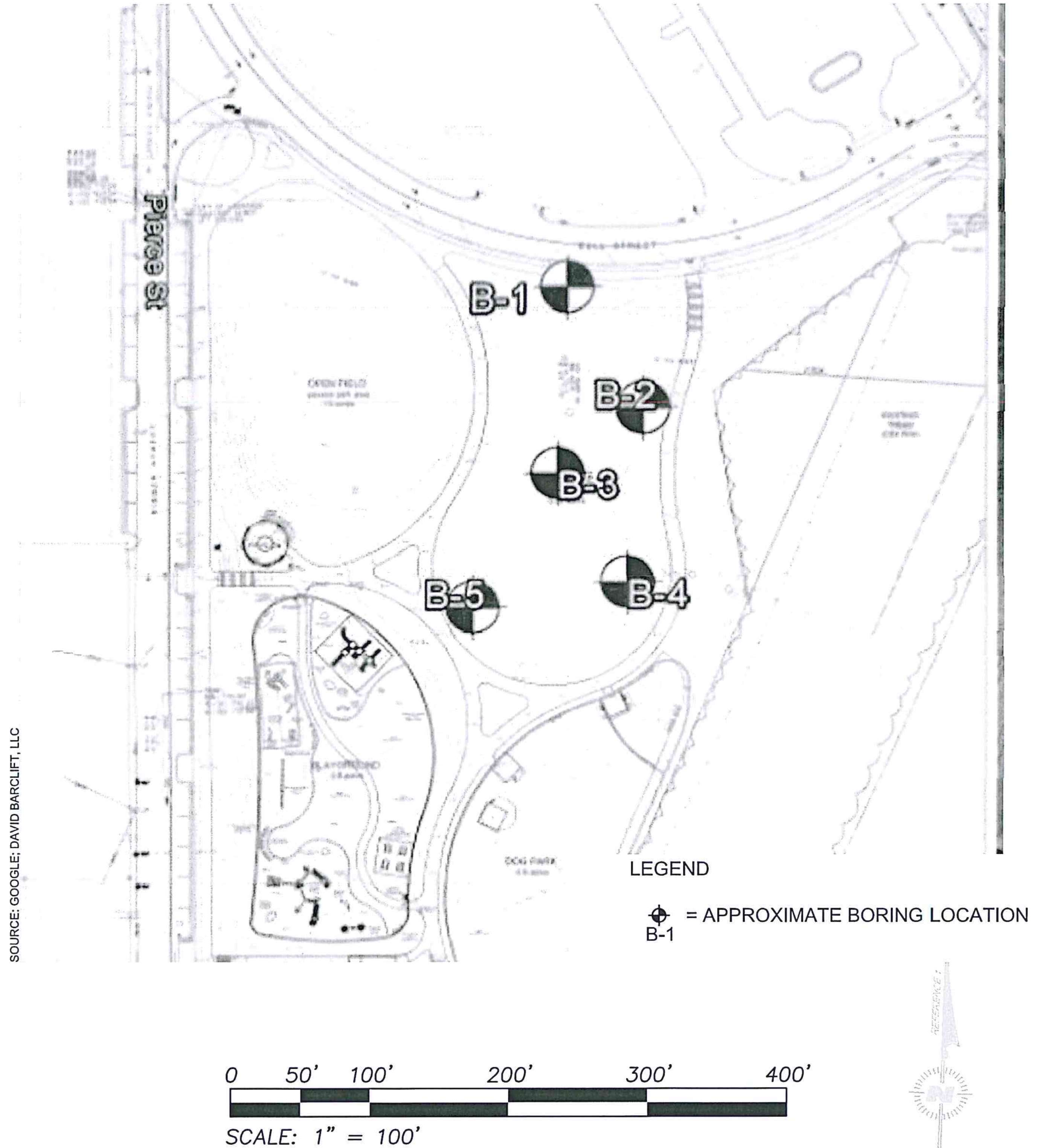

FIGURE 2A: BORING LOCATION PLAN
WITH PROPOSED SITE PLAN
PROPOSED SKATE PARK
PIERCE STREET
COLUMBUS, GA
GEC PROJECT NO. 180102.310

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LEGEND

= APPROXIMATE BORING LOCATION
B-1

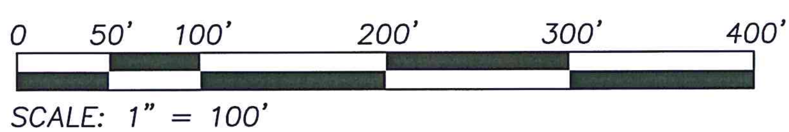

FIGURE 2B: BORING LOCATION PLAN
WITH AERIAL PHOTOGRAPH
PROPOSED SKATE PARK
PIERCE STREET
COLUMBUS, GA
GEC PROJECT NO. 180102.310

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Appendix B

Soil Classification Legend

Soiltest Boring Records

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	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 SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SOIL BORING RECORD

Project: **Skate Plaza at Southbend Park** Lagrange, Georgia	Boring No: **B-1** Project No: 180102.310
Location: **See Figure 2**	GS Elevation: 723.0 ft
Driller/Equipment: JD/ GEC: CME 45; 2.25" HSA; AUTO HAMMER	Drilling Date: February 24, 0218
Water Level: Dry at time of boring	Engineer/Geologist:

Elevation (ft)	Depth (ft)	Soil Symbol	Soil Description	Sample Type	Standard Penetration Test Data (blows/ft)	Blows
			FILL stiff, reddish brown, clayey, fine sandy **SILT (ML)**; with rock fragments, with mica	SS-1		10
718.0	5		stiff, reddish brown, fine sandy **SILT (ML)**; with organics	SS-2		15
			medium dense, dark grey, silty, fine **SAND (SM)**; with organics	SS-3		28
713.0	10		hard, reddish brown, clayey, fine sandy **SILT (ML)**; with organics	SS-4		35
			BORING TERMINATED AT 10.0ft			
708.0	15					
703.0	20					
698.0	25					
693.0	30					

SPT scale: 0, 10, 20, 30, 60, 80

· Boring and sampling performed in accordance with ASTM D 1586.
· Depths are measured from existing ground surface at time of drilling.
· Depths are shown to illustrate general arrangements of the strata encountered at the boring location.
· Do not use depths for determinations of quantities or distances.

NOTES:

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SOIL BORING RECORD

Project: **Skate Plaza at Southbend Park** Lagrange, Georgia	Boring No: **B-2** Project No: 180102.310
Location: **See Figure 2**	GS Elevation: 721.0 ft
Driller/Equipment: JD/ GEC: CME 45; 2.25" HSA; AUTO HAMMER	Drilling Date: February 24, 0218
Water Level: Dry at time of boring	Engineer/Geologist:

Elevation (ft)	Depth (ft)	Soil Symbol	Soil Description	Sample Type	Standard Penetration Test Data (blows/ft) 0 10 20 30 60 80	Blows
			FILL soft to stiff, reddish brown, clayey, fine sandy **SILT (ML)**	SS-1		4
				SS-2		9
716.0	5					
			AUGER REFUSAL ENCOUNTERED AT 6.0ft			
711.0	10					
706.0	15					
701.0	20					
696.0	25					
691.0	30					

- Boring and sampling performed in accordance with ASTM D 1586.
- Depths are measured from existing ground surface at time of drilling.
- Depths are shown to illustrate general arrangements of the strata encountered at the boring location.
- Do not use depths for determinations of quantities or distances.

NOTES:

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SOIL BORING RECORD

Project: **Skate Plaza at Southbend Park** Lagrange, Georgia	Boring No: **B-3**
	Project No: 180102.310
Location: **See Figure 2**	GS Elevation: 720.5 ft
Driller/Equipment: JD/ GEC: CME 45; 2.25" HSA; AUTO HAMMER	Drilling Date: February 24, 0218
Water Level: Dry at time of boring	Engineer/Geologist:

Elevation (ft)	Depth (ft)	Soil Symbol	Soil Description	Sample Type	Standard Penetration Test Data (blows/ft) 0 10 20 30 60 80	Blows
			RESIDUUM			
			stiff, reddish brown, fine sandy **SILT (ML)**	SS-1		10
715.5	5			SS-2		9
			stiff, multicolored, fine sandy **SILT (ML)**	SS-3		12
				SS-4		11
710.5	10		**BORING TERMINATED AT 10.0ft**			
705.5	15					
700.5	20					
695.5	25					
690.5	30					

- Boring and sampling performed in accordance with ASTM D 1586.
- Depths are measured from existing ground surface at time of drilling.
- Depths are shown to illustrate general arrangements of the strata encountered at the boring location.
- Do not use depths for determinations of quantities or distances.

NOTES:

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SOIL BORING RECORD

Project: **Skate Plaza at Southbend Park** Lagrange, Georgia	Boring No: **B-4**
	Project No: 180102.310
Location: **See Figure 2**	GS Elevation: 720.5 ft
Driller/Equipment: JD/ GEC: CME 45; 2.25" HSA; AUTO HAMMER	Drilling Date: February 24, 0218
Water Level: Dry at time of boring	Engineer/Geologist:

Elevation (ft)	Depth (ft)	Soil Description	Sample Type	Blows
		POSSIBLE FILL firm, tan reddish-brown, clayey, fine sandy **SILT (ML)**	SS-1	5
715.5	5		SS-2	8
		stiff, tan brown, fine sandy **SILT (ML)**		
		stiff, tan brown, fine sandy **SILT (ML)**; with mica	SS-3	9
			SS-4	9
710.5	10	**BORING TERMINATED AT 10.0ft**		
705.5	15			
700.5	20			
695.5	25			
690.5	30			

Standard Penetration Test Data (blows/ft): 0, 10, 20, 30, 60, 80

- Boring and sampling performed in accordance with ASTM D 1586.
- Depths are measured from existing ground surface at time of drilling.
- Depths are shown to illustrate general arrangements of the strata encountered at the boring location.
- Do not use depths for determinations of quantities or distances.

NOTES:
Refusal @ 2 feet offset 5 feet

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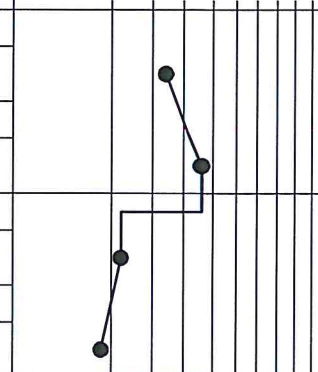
SOIL BORING RECORD

Project: **Skate Plaza at Southbend Park** Lagrange, Georgia	Boring No: **B-5** Project No: 180102.310
Location: **See Figure 2**	GS Elevation: 722.0 ft
Driller/Equipment: JD/ GEC: CME 45; 2.25" HSA; AUTO HAMMER	Drilling Date: February 24, 0218
Water Level: Dry at time of boring	Engineer/Geologist:

Elevation (ft)	Depth (ft)	Soil Symbol	Soil Description	Sample Type	Standard Penetration Test Data (blows/ft) 0 10 20 30 60 80	Blows
			FILL very stiff, reddish brown, clayey, fine sandy **SILT (ML)**; with organics; with rock fragments	SS-1		24
717.0	5			SS-2		36
			RESIDUUM firm to stiff, tan reddish-brown, clayey, fine sandy **SILT (ML)**	SS-3		12
712.0	10			SS-4		8
			BORING TERMINATED AT 10.0ft			
707.0	15					
702.0	20					
697.0	25					
692.0	30					



· Boring and sampling performed in accordance with ASTM D 1586.
· Depths are measured from existing ground surface at time of drilling.
· Depths are shown to illustrate general arrangements of the strata encountered at the boring location.
· Do not use depths for determinations of quantities or distances.

NOTES:

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Appendix C

Field and Laboratory Testing Procedures

LABORATORY TESTING PROCEDURES

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 investigations, samples obtained during drilling operations are examined in our laboratory and visually classified by an engineer. The soils are classified according to consistency (based on number of blows from standard penetration tests), color and texture. These classification descriptions are included on our "Log of Boring" records.

The classification system discussed above is primarily qualitative and for detailed soil classification two laboratory tests are necessary: grain size tests and atterberg limits tests. Using these test results, the soil can be classified according to the AASHTO or Unified Classification Systems (ASTM D-2487). Each of these classification systems and the in-place physical soil properties provides and index for estimating the soil's behavior. The soil classification and physical properties obtained are presented in this report.

GRAIN SIZE TESTS

Grain Size Tests are performed to aid in determining the soil classification and the grain size distribution. The soil samples are prepared for testing according to ASTM D-421 (dry preparation) or ASTM D-2217 (wet preparation). If only the grain size distribution of soils coarser than a number 200 sieve (0.074 mm opening) is desired, the grain size distribution is determined by washing the sample over a #200 sieve and after drying, passing the samples through a standard set of nested sieves. If the grain size distribution of the soils finer than the #200 sieve is also desired, the grain size distribution of the soils coarser than the #10 sieve is determined by passing the sample through a set of nested sieves. Materials passing the #10 sieve are dispersed with a dispersing agent and suspended in water and the grain size distribution calculated from the measured settlement rate of the particles. The tests are conducted in accordance with ASTM D-422.

ATTERBERG LIMITS

Atterberg Limits tests are accomplished to further classify soils and to obtain data on soil properties. These tests are used to measure the moisture content of the upper and lower limits of the range in which the soil is in the plastic state. The moisture content at the upper limit is known as the liquid limit and the moisture content of the lower limit is designated as the plastic limit. The numerical difference between the liquid limit and plastic limit, termed the plasticity index, is a measure of the soil plasticity. Liquidity index is the ratio of the difference between natural moisture content and the plastic limit to the plasticity index. ASTM method D-4318 is used in determining Atterberg Limits.

GENERAL NOTES

The "standard" penetration resistance is an indication of the density of cohesionless soils and of the strength of cohesive soils. The "standard" penetration test is measured with a 1.4 inch I.D., 2 inch O.D., sampler driven one (1) foot with a 140 pound hammer falling 30 inches.

RELATIVE DENSITY OF SOIL THAT IS PRIMARILY SAND

Number of Blows	Relative Density
0-4	Very Loose
5-10	Loose
11-30	Medium Dense
31-50	Dense
Over 50	Very Dense

CONSISTENCY OF SOIL THAT IS PRIMARILY SILT OR CLAY

Number of Blows	Consistency
0-2	Very Soft
3-4	Soft
5-8	Firm
9-15	Stiff
16-30	Very Stiff
Over 30	Hard

While individual test boring records are considered to be representative of subsurface conditions at the respective boring locations on the dates shown, it is not warranted that they are representative of subsurface conditions at other locations and times.

The soil classifications noted on the boring logs are visual classifications unless otherwise noted. Minor constituents of a soil sample are termed as follows:

Term	Percentage
Trace	0-10%
Some	11-30%
And	36-50%

If the silt content is sufficient so that silt dominates all soil properties, then silt becomes the principal noun with other soil constituents as modifiers: i.e., micaceous silt. Other minor soil constituents may be added to further define the classification: i.e., micaceous silt, trace sand.

FIELD TESTING PROCEDURES

INTRODUCTION

The general field procedures employed by Geotechnical & Environmental Consultants, Inc (GEC) are summarized in ASTM Specification D-420 which is entitled "Investigating and Sampling Soils and Rocks for Engineering Purposes." This recommended practice lists recognized methods for determining soil and rock distribution and ground water conditions. These methods include geophysical and in-situ methods as well as borings.

The test borings are made by mechanically advancing helical hollow stem augers into the ground. Samples are recovered at regular intervals in each of the borings following established procedures for performing the Standard Penetration Test, in accordance with ASTM Specification D-1586.

This drilling method is not capable of penetrating materials designated as "refusal materials." Refusal, thus indicated, may result from hard cemented soil, soft weathered rock, coarse gravel or boulders, thin rock seams, or the upper surface of sound continuous rock. Core boring procedures are required to determine the character and continuity of refusal materials.

The subsurface conditions encountered during drilling are reported on a field test boring record by a GEC representative. The record contains information concerning the boring method, samples attempted and recovered, indications of the presence of various materials such as coarse gravel, cobbles, etc., and observations between samples. Therefore, these boring records contain both factual and interpretive information. The field boring records are on file in our office.

The soil and rock samples plus the field boring records are reviewed by a geotechnical engineer. The engineer describes the soils in general accordance with the procedures outlined in ASTM Specification D-2488 and prepares the final boring records which are basis for all evaluations and recommendations.

The final boring records represent our interpretation of the contents of the field records based on the results of the engineering examinations and testing of selected field samples. These records depict subsurface conditions at the specific locations and at the particular time when drilled. Soil conditions at other locations may differ from conditions occurring at these boring locations. Also, the passage of time may result in changes in the ground water conditions at these boring locations. The lines designating the interface between strata on the records and on profiles represent approximate boundaries. The transition between materials may be gradual. The final boring records are included with this report.

The detailed data collection methods used during this study are discussed on the following pages.

WATER LEVEL READINGS

Water table readings are *normally* taken in conjunction with borings and are recorded on the "Boring Records". These readings indicate the approximate location of the hydrostatic water table at the time of our field exploration. Where relatively impervious soils (clayey soils) are encountered, the amount of water seepage into the boring is small, and it is generally not possible to establish the location of the hydrostatic water table through water level readings. The ground water table may also be dependent upon the amount of precipitation at the site during a particular period of time. Fluctuations in the water table should be expected with variations in precipitation, surface run-off, evaporation and other factors.

The time of boring (TOB) water level reported on the boring records is determined by field crews immediately after drilling. Additional water table readings are generally obtained at least 24 hours after the borings are completed. The time lag of at least 24 hours is used to permit stabilization of the ground water table which has been disrupted by the drilling operations. The readings are taken by dropping a weighted line down the boring or using an electrical probe to detect the water level surface.

Occasionally, the borings will cave-in, preventing water level readings from being obtained or trapping drilling water above the caved-in zone. The cave-in depth is also measured and recorded on the boring records.

PENETRATION TESTING AND SPLIT BARREL SAMPLING

Probe borings do not normally provide adequate information on the type, strength and compressibility of the subsurface soils. Therefore, standard penetration tests and split barrel sampling are normally conducted in the borings. The standard penetration test, when properly evaluated, provides an indication of the soil strength and compressibility.

The standard penetration test and split barrel sampling are conducted simultaneously using ASTM Designation D-1586 as a guide. At regular intervals, soil samples are obtained with a standard 1.4" I.D. X 2.0" O.D. barrel sampler inside the hollow stem auger. The sampler is first seated six inches to penetrate any loose cuttings, then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sample each six-inch interval is recorded. The number of blows to drive the sampler the final foot is designated the "penetration resistance." This driving resistance, known as the "N" value, is a measure of the relative density of granular soils and is an indication of the consistency of cohesive deposits. A table which correlates consistency and blow count is bound into this report (see General Notes). Representative portions of the soil samples obtained from each split barrel sample are placed in air tight containers and transported to our laboratory.

Descriptions of the split barrel samples and the penetration resistances are shown on the "Boring Records."

NATURAL MOISTURE CONTENT

Soil samples obtained using the *Split Barrel Sampler* are sealed in airtight containers and returned to our laboratory where natural moisture content determinations were made. Natural moisture content is a useful index of a soil's compressibility. It is also useful in relating in-situ moisture to optimum moisture during in-place density testing of the fill if required. These moisture contents may be found at the appropriate depths on the respective boring logs and are denoted by "W".