Document Type: EA-Administrative Record
Index Field: Environmental Assessment
Project Name: ARC Grant – Emory Valley
Project Number: 2014-25

APPALACHIAN REGIONAL COMMISSION GRANT PROPOSAL FOR EMORY VALLEY CENTER SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT

Anderson County, Tennessee

Prepared by:
TENNESSEE VALLEY AUTHORITY
Knoxville, Tennessee

July 2015

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Purpose and Need for Action

In March 2015, the Tennessee Valley Authority (TVA) completed an environmental assessment (EA) to document the potential environmental effects of TVA administering a grant from the Appalachian Regional Commission (ARC) to the Emory Valley Center (EVC). The EVC is a non-profit agency that serves children and adults with physical and developmental disabilities. The EVC would apply the $500,000 ARC grant toward the construction of a new multi-purpose facility.

As stated in the EA, the EVC planned to construct a new multi-purpose building on its property. An existing building (the Work Training Center) would be demolished, and the new building would be constructed on that site. Since the release of the EA, EVC has changed plans and now proposes to acquire an adjacent property that will be used as the site of the new building. An aerial view of the site is provided below as Figure 1.

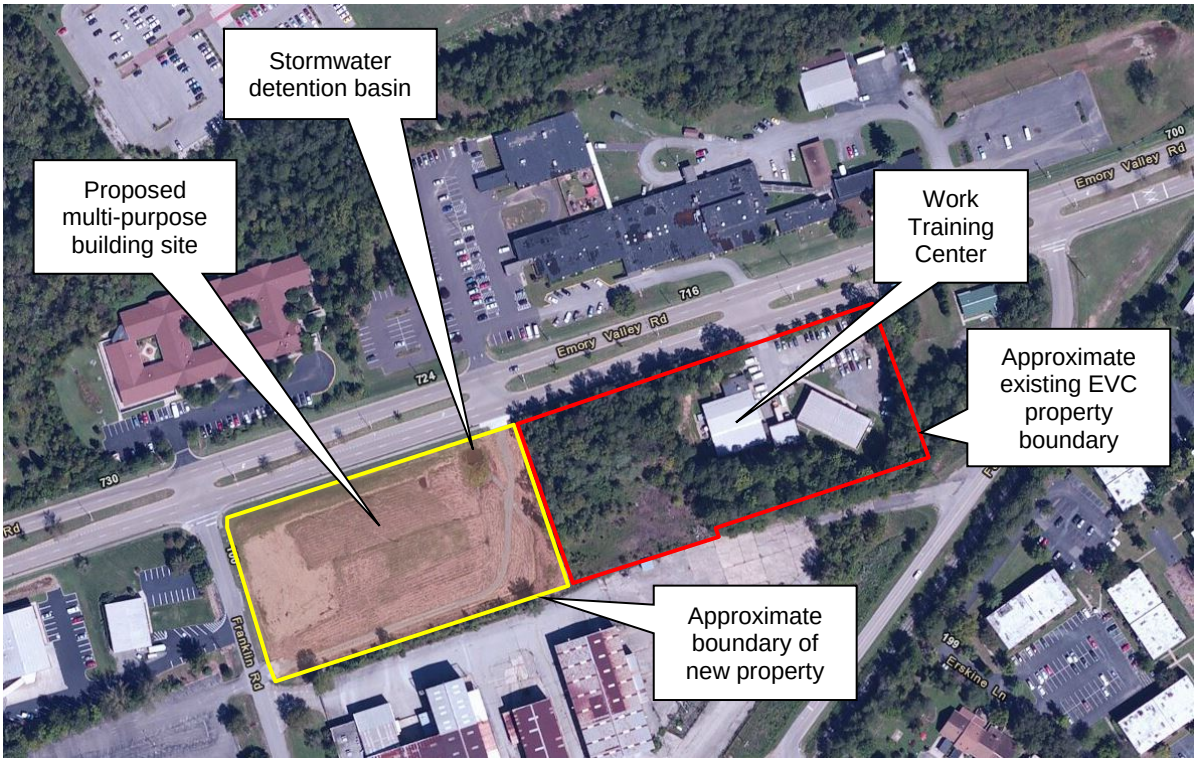

Figure 1. Emory Valley Center Property and Adjacent Vacant Lot

Proposed Action

A vacant property, approximately 2.8 acres in size, is situated adjacent to the EVC property, which includes a parcel that was to be used to site another proposed new facility. The EVC is now considering acquiring the property and using it as the site of the proposed multi-purpose building. Using the larger lot would afford improved flexibility in designing the new building, provide additional parking area, and improve vehicular access to the facility.

Permits, Licenses, and Approvals

The necessary permits and licenses mentioned in the EA remain relevant and applicable to the construction of the proposed facility on new site.

Alternatives

As stated in the EA, there are two alternatives available to TVA. Under the No Action Alternative, TVA would not administer the ARC grant. Consequently, the EVC could secure alternate funding. If adequate funding were secured from other sources, EVC could proceed with plans to construct a new building. Overall, the resulting environmental consequences would likely be similar to those anticipated under the Action Alternative.

Under the Action Alternative, TVA would administer the ARC grant to the EVC. EVC would use the grant funds toward the construction of the planned multi-purpose building. As stated in the EA, the EVC planned to demolish the existing Work Training Center building and use the site for the proposed multi-purpose building. Under the revised plans, the EVC would purchase an approximately 2.8-acre adjacent parcel and construct the proposed multi-purpose building there. The current Work Training Center building would not require demolition, and the EVC may or may not continue to use that building.

As stated in the EA, the EVC would be responsible for ensuring that the proposed work is conducted in an environmentally responsible manner, including the implementation of appropriate construction best management practices (BMPs) and any measures stipulated in the Construction Stormwater Permit or other applicable permits. This would remain in effect. TVA has not identified any non-routine measures necessary to prevent or compensate for adverse environmental effects.

Preferred Alternative

TVA's preferred alternative is the Action Alternative.

Affected Environment and Anticipated Impacts

Site Description

The EVC is located at 715 Emory Valley Road in Oak Ridge, Tennessee. Emory Valley Road is a divided 4-lane roadway. The physical setting of the EVC property is described in the 2015 EA. The approximately 2.8-acre vacant lot that the EVC is considering to use as the site for the proposed multi-purpose building is located adjacent to the EVC property on the west side, as shown in Figure 1. This parcel was formerly forested. However, in 2010, the lot was cleared and prepared for development. The property is maintained with a grass cover and is mowed as needed to prevent the establishment of woody vegetation. Vehicular access to the lot from the west is via Franklin Road, which is a side street connecting to Emory Valley Road. There is also access to the property from Emory Valley Road.

Impacts Evaluated

The March 2015 EA documented potential effects to the following environmental resources.

- Air quality
- Water quality and aquatic life
- Terrestrial life
- Threatened and endangered species
- Wetlands
- Cultural resources
- Socioeconomic conditions and environmental justice

- Transportation
- Solid and hazardous waste
- Aesthetic qualities

Because of the similarity of the revised proposed action to the original actions addressed in the EA, potential effects to many of the resources listed above would be the same under either scenario. Specifically, the potential effects to air quality and aquatic life, and those associated with the generation of solid and hazardous wastes as stated in the EA remain relevant for the new site. If the EVC chooses to keep the Work Training Center building, less solid waste would be produced, and any air quality or solid waste related effects from demolishing that building would not occur. Additional analyses were undertaken to assess potential effects of construction on the adjacent lot to water quality, terrestrial life, threatened and endangered species, wetlands, cultural resources, transportation, and aesthetic qualities.

Water Quality and Aquatic Life

The 2.8-acre property to be acquired has been leveled but slopes slightly to the east. A low berm surrounds the property to prevent surface water from draining off site. Several shallow vegetated swales were constructed along the length of the site to facilitate surface water drainage to a small (approximately 40 by 50 feet) detention basin located near the northeast corner of the property. This basin has a raised concrete outlet that drains to the city stormwater collection system. Surface runoff water tends to stand in a portion of this basin. Other than this basin, there is no surface water on the 2.8-acre site. This small ponded area is approximately 15 to 20 feet in diameter and with the exception of common aquatic insects, provides limited habitat for most common aquatic life.

As stated in the EA, the EVC would be responsible for acquiring a Construction Stormwater Permit from the Tennessee Department of Environment and Conservation prior to construction. This permit would require the preparation of a Stormwater Pollution Prevention Plan to address measures to be taken to avoid effects to surface waters. With these measures in place, any potential effects to surface water and groundwater quality are expected to be minor. In the event a new or modified detention basin is required under the Stormwater Pollution Prevention Plan, the loss of the current aquatic habitat in the existing detention basin would be minor.

Terrestrial Life

The adjacent 2.8-acre parcel is a large, open area that is mowed as needed to prevent woody vegetation from becoming established. Ground cover is grass and other herbaceous and weedy growth. Thus, the site provides only marginal habitat for most common wildlife. The conversion of this site from an open area to a building site would result in a minor loss of wildlife habitat.

Threatened and Endangered Species

The onsite catchment basin is the only available water on the 2.8-acre site. This basin does not provide suitable habitat for any state-listed or federally listed threatened or endangered aquatic species. Similarly, the site does not provide suitable habitat for any of the state-listed or federally listed threatened terrestrial species described in the EA.

Therefore, siting the proposed multi-purpose building on the 2.8-acre site would cause no direct or indirect impacts to and federally listed or state-listed species.

Wetlands

This onsite detention basin is approximately 400 square feet and was constructed when the site was cleared to contain surface stormwater runoff from the site. In a letter dated, February 5, 2014, the Tennessee Department of Environment and Conservation stated that the detention basin is not classified as a wetland (Attachment D). TVA concurs with this determination. No wetlands are present within the boundaries of the proposed project. The proposed project would have no significant direct, indirect, and/or cumulative impacts to wetlands and the associated wetland functions within the project area.

Cultural Resources

TVA has determined the area of potential effects (APE) for archaeological resources to be any area that would be affected by land-disturbing activities associated with the proposed undertaking. The APE for indirect (visual) effects is the area within a 0.5-mile radius surrounding the proposed undertaking.

Based on the geotechnical report conducted in January of 2008 (Attachment B), the daily field reports and construction materials testing results conducted in November of 2008 (Attachment C), aerial photographs, and the previous TVA Cultural Compliance fieldwork on the adjacent lot, this area has been affected by previous earth moving activities. The ground has been stripped to bedrock in most areas and filled with clay to level the lot. TVA finds that it is unlikely that any archaeological resources are present at this location.

One architectural resource is recorded in the architectural APE, Emory Valley School (EVS) complex. The EVS is comprised of a collection of buildings that were constructed between 1959 and 1992. TVA finds that proposed undertaking would have a visual effect on the EVS. However, this effect would not be adverse due to the presence of modern industrial development within view of the complex and the development of the Emory Valley Road into a major, divided, four-lane roadway, both of which have altered the setting such that it no longer possess historic integrity. As a result of these more recent changes in the setting, the property already has experienced a loss of integrity. TVA finds that no historic properties eligible for or listed on the NRHP would be adversely affected by the proposed undertaking. The Tennessee State Historic Preservation Officer (SHPO) concurred with this finding in a letter dated September 15, 2015, (Attachment A).

Transportation

Current vehicular access to the EVC facilities is via a single driveway connecting to Emory Valley Road. As originally proposed, vehicular access to the new multi-purpose building would be provided by another driveway connection to Emory Valley Road. Franklin Road provides access to the new property at the western side. Thus, as opposed to using the original site, access to the new property would be improved and provide safer turning for vehicles entering and leaving the site.

Aesthetic Qualities

The new site for the proposed building is currently a cleared lot. The EVC's new multi-purpose building would likely be more prominent on this open site than on the originally proposed site. As stated in the EA, the new building would be consistent with the visual character of the immediate area. The placement of a building with appropriate landscaping would improve the current visual character of the vacant lot. The amount of temporary visual discord, noise, and odors expected during construction of the proposed building are documented in the EA, and those findings remain relevant.

Cumulative Impacts

No additional cumulative effects beyond those documented in the EA were identified.

Mitigation Measures

As stated in the EA, TVA did not identify any non-routine measures necessary to prevent or compensate for adverse environmental effects. That finding remains valid and relevant.

TVA Preparers

Adam J. Dattilo, Botanist – Threatened and Endangered Species

Dana Vaughn, Contract NEPA Specialist – NEPA Compliance and Document Preparation

Kim Pilarski-Hall, Wetlands and Natural Areas Specialist – Wetlands

Elizabeth B. Hamrick, Biologist – Terrestrial Life and Threatened and Endangered Species

Marianne M. Shuler, Archaeologist – Cultural Resources and National Historic Preservation Act Section 106 Compliance

James F. Williamson, Contract NEPA Specialist – NEPA Compliance and Document Preparation

Donald Knotts, Economic Development Project Manager

Agencies and Others Consulted

In accordance with Section 106 of the National Historic Preservation Act, TVA consulted with the Tennessee Historical Commission regarding its determination that the proposed action will not adversely affect historic resources. The State Historic Preservation Officer SHPO concurred with TVA's findings in a letter of September 15, 2015.

References

Tennessee Valley Authority. 2015. *Appalachian Regional Commission Grant Proposal for Emory Valley Center, Anderson County, Tennessee*. Environmental Assessment. Knoxville, Tennessee. Available online at: <http://www.tva.gov/environment/reports/emory_valley/Emory-Valley_EA.pdf>.

Attachments

Attachment A: Correspondence with the Tennessee Historical Commission

Attachment B: January 2008 Geotechnical Report

Attachment C: Daily field reports and construction materials testing results conducted in November of 2008

Attachment D: Correspondence with Tennessee Department of Environment and Conservation

Attachment A – Correspondence with the Tennessee Historical Commission

TENNESSEE HISTORICAL COMMISSION
2941 LEBANON ROAD
NASHVILLE, TENNESSEE 37243-0442
OFFICE: (615) 532-1550

Received
9/21/15

September 15, 2015

Mr. Clinton E. Jones
Tennessee Valley Authority
400 W. Summet Hill Dr.
Knoxville, Tennessee, 37902-1499

RE: TVA, EMORY VALLEY CENTER/WTC/IMPVTS., UNINCORPORATED, ANDERSON COUNTY

Dear Mr. Jones:

In response to your request, received on Tuesday, September 8, 2015, we have reviewed the documents you submitted regarding your proposed undertaking. Our review of and comment on your proposed undertaking are among the requirements of Section 106 of the National Historic Preservation Act. This Act requires federal agencies or applicant for federal assistance to consult with the appropriate State Historic Preservation Office before they carry out their proposed undertakings. The Advisory Council on Historic Preservation has codified procedures for carrying out Section 106 review in 36 CFR 800. You may wish to familiarize yourself with these procedures (Federal Register, December 12, 2000, pages 77698-77739) if you are unsure about the Section 106 process. You may find additional information concerning the Section 106 process and the Tennessee SHPO's documentation requirements at http://www.tennessee.gov/environment/hist/federal/sect106.shtml

Considering available information, we find that the project as currently proposed will NOT ADVERSELY AFFECT ANY PROPERTY THAT IS ELIGIBLE FOR LISTING IN THE NATIONAL REGISTER OF HISTORIC PLACES. Therefore, this office has no objection to the implementation of this project. Please direct questions and comments to Joe Garrison (615) 770-1092.

We appreciate your cooperation.

Sincerely,

E. Patrick McIntyre, Jr.
Executive Director and
State Historic Preservation Officer

EPM/jyg

Attachment B – Geotechnical Report

Report of
Geotechnical Exploration

Lot #26.01 Emory Valley Road

Parcel ID #100-GA 08.00

Oak Ridge, Tennessee

S&ME Project No. 1431-07-678

Prepared for:

Mr. Jim Barker

1937 Hickory Glen Road

Knoxville, Tennessee 37921

Prepared by:

S&ME, Inc.

1413 Topside Road

Louisville, Tennessee 37777

January 21, 2008

January 21, 2008

Mr. Jim Barker
1937 Hickory Glen Road
Knoxville, TN 37921

Attention: Mr. Jim Barker

Reference: **Report of Geotechnical Exploration**
Franklin Road Property
Lot #26.01 Emory Valley Road
Parcel ID #100-GA 08.00
Oak Ridge, Tennessee
S&ME Project No. 1431-07-678

Dear Mr. Barker:

S&ME, Inc. (S&ME) is pleased to submit the following *Report of Geotechnical Exploration* conducted for the Franklin Road property located at Lot #26.01 Emory Valley Road (2.72 acres), Parcel ID #100-GA 08.00 in Oak Ridge, Tennessee. The report has been prepared in accordance with S&ME Proposal No. 313407933, dated December 11, 2007 and as authorized by you on December 19, 2007.

The following report presents our findings and recommendations for the proposed construction. Should you have any questions regarding this report, or if we can be of any further assistance, please contact us at your convenience.

Sincerely,
S&ME, Inc.

Nathan J. Peterson, R.G. FOR
Geotechnical Professional

Michael R. Stomer, P.G.
Vice President

Matthew B. Haston, P.E.
Geotechnical Engineer
TN License No. 109269

MATTHEW B. HASTON
REGISTERED ENGINEER
AGRICULTURE
COMMERCE
No. 109269
STATE OF TENNESSEE

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1.0 Executive Summary

S&ME, Inc (S&ME) has completed a geotechnical exploration for the Franklin Road property located at Lot #26.01 Emory Valley Road (2.72 acres), Parcel ID #100-GA 08.00 in Oak Ridge, Tennessee. The purpose of the geotechnical exploration was to provide geotechnical recommendations for general site grading and for design and construction of the foundation system, including allowable bearing capacity.

Published geologic information indicates that the project site is underlain by bedrock from the Chickamauga Group. However, in the area of this site the Chickamauga Group is not differentiated into its individual formations. It is our opinion that the risk of sinkhole development at this site is no greater than at other sites located within similar geologic settings that have been developed successfully. However, the owner must be willing to accept the low to moderate risk of sinkhole development at this site.

This geotechnical exploration included the observation, testing, and sampling of nine test pits at the Franklin Road property (Lot #26.01 Emory Valley Road, Parcel ID #100-GA 08.00). An S&ME staff professional was on site to observe the test pits at each site and to visually classify the soil encountered at each location.

Results of the field exploration indicate that the project site is generally underlain by existing fill material and residual soil. The test pit observations and testing data indicate that the proposed development may be supported using shallow foundation system. We recommend an allowable bearing pressure of 2,500 pounds per square foot (psf) for the design of foundations bearing in stiff, or better, residual soil and/or newly-placed, properly-compacted structural soil fill. The undercut and replacement of existing fill material and soft residual soil will be required in areas of the site where encountered at foundation subgrade elevation.

Refusal materials were encountered within three (test pits TP-6, TP-7, and TP-9) of the nine test pit locations at depths ranging from 2 to 4 feet below ground surface. Refusal is a designation applied to any material that cannot be penetrated by the power equipment. Refusal may indicate dense gravel or cobble layers, boulders, rock ledges or pinnacles, or the top of continuous bedrock. However, the character and continuity of the refusal materials was not determined as part of this exploration.

The recommendations conveyed in this report have been based upon data derived from limited sampling. Accordingly, the recommendations' appropriateness cannot be fully evaluated until the project proceeds into the design phase and the construction phase. Due to our familiarity with the project and the intent of our recommendations, it is in the best interest of this project to retain S&ME to continue to provide geotechnical services for this project and to observe the site grading and foundation construction.

2.0 Introduction

2.1 Purpose

The purpose of this geotechnical exploration was to characterize subsurface conditions for the proposed Franklin Road property development located at Lot #26.01 Emory Valley Road (2.72 acres), Parcel ID #100-GA 08.00 in Oak Ridge, Tennessee. This report provides geotechnical recommendations for general site grading and for design and construction of the foundation system, including allowable bearing capacity.

2.2 Project and Site Description

The project site is located at Lot #26.01 Emory Valley Road, Parcel ID #100-GA 08.00 in Oak Ridge, Tennessee (see Appendix A, Figure 1). The 4.5-acre site is moderately wooded with some open, grassy areas and has a gradual downward slope from south to north. The project site is bordered to the north by Emory Valley Road, to the south by the former Pathway Bellows facility, to the east by vacant property, and to the west by Franklin Road.

Based on the topographic site plan provided by ETE Consulting Engineering, Inc., the proposed construction will consist of a single story building of 25,000 square feet with surrounding asphalt pavements for vehicle parking. The building will have a concrete slab-on-grade. Information on anticipated foundation loads has not been provided at this time. Based on our experience, we anticipate maximum column loads in the range of 50 kips and continuous foundation loads of 2 to 3 kips per linear foot. In addition, new paved parking areas are proposed adjacent to the building. Based on the provided drawing, maximum earthwork fill depths of up to 5 feet and maximum cuts up to 10 feet will be required to bring the site to grade.

2.3 Scope of Services

This geotechnical exploration involved a site reconnaissance, field exploration, laboratory testing, and engineering analysis. The following sections of this report present discussions of the field exploration, laboratory testing programs, site conditions, and conclusions and recommendations. Following the text of this report, figures, test pit records, and laboratory test results are provided in the Appendices.

The scope of services for the geotechnical exploration did not include an environmental assessment for determining the presence or absence of wetlands, hazardous or toxic materials in the soil, bedrock, surface water, or air, on, or below, or around this site. Any statements in this report or on the boring logs regarding odors, colors, and unusual or suspicious items or conditions are strictly for informational purposes. We conducted testing on adjacent site areas as part of our environmental services which are provided under separate cover.

3.0 Exploration and Testing Programs

3.1 Field Exploration

The site subsurface conditions were explored with 9 test pits; 6 excavated in the proposed building area, 2 excavated in the proposed parking areas, and 1 excavated in the detention basin (see Appendix A, Figure 3). The test pit locations were selected by Mr. Jim Barker. The test pits were located in the field by S&ME personnel using the site plan provided. The test pits were excavated on December 19, 2007 using a mini-excavator and crew provided by Mr. Barker. An S&ME staff professional was on site to observe the excavation of all test pits and to visually classify the materials encountered. The test pits were loosely backfilled before leaving the site.

3.2 Laboratory Testing

After completion of the field exploration and sampling phase of this project, the soil samples were returned to our laboratory where they were classified by an S&ME staff professional in accordance with the Unified Soil Classification System (USCS). Samples were then selected and tested for natural moisture content (ASTM D 2216), Atterberg limits determinations (ASTM D 4318), and standard Proctor moisture-density relationship (ASTM D 698). The results of the laboratory testing are discussed in the following sections. A summary of these results is presented in Appendix B.

4.0 Subsurface Conditions

4.1 Geologic Conditions

The project site lies in the Appalachian Valley and Ridge Physiographic Province of East Tennessee. This Province is characterized by elongated, northeasterly-trending ridges formed on highly resistant sandstone and shale. Between ridges, broad valleys and rolling hills are formed primarily on less resistant limestone, dolomite, and shale.

Published geologic information indicates that the project site is underlain by bedrock from the Chickamauga Group. However, in the area of this site the Chickamauga Group is not differentiated into its individual formations. Where undivided, the Chickamauga Group is primarily composed of calcareous shale and crystalline limestone with minor amounts of sandstone. Bedrock from this geologic setting typically weathers to produce a thick, medium to high-plasticity clay residual soil. Silica in the form of chert is resistant to weathering and scattered throughout the residuum.

Since the bedrock underlying this site consists of carbonate rock, the site is susceptible to the typical carbonate hazards of irregular weathering, cave and cavern conditions, and overburden sinkholes. Carbonate rock, while appearing very hard and resistant, is soluble in slightly acidic water. This characteristic, along with differential weathering of the bedrock mass is responsible

for the hazards. Of these hazards, the occurrence of sinkholes is potentially the most damaging to overlying soil-supported structures. In East Tennessee, sinkholes occur primarily due to differential weathering of the bedrock and "flushing" or "raveling" of overburden soils into cavities formed within in the bedrock. The loss of solids creates a cavity or "dome" in the overburden. Growth of the dome over time or excavation over the dome can create a condition in which rapid, local subsidence or collapse of the roof of the dome occurs.

A certain degree of risk with respect to sinkhole formation and subsidence should be considered with any site located within geologic areas underlain by carbonate rock units. While a rigorous effort to assess the potential for sinkhole formation at this site was beyond the scope of this evaluation, our borings did not encounter obvious indications of sinkhole development. Furthermore, mapped sinkholes were not observed on the United States Geologic Survey (USGS - Clinton Quadrangle) topographic map in the immediate vicinity of the site. It is our opinion that the risk of sinkhole development at this site is no greater than at other sites located within similar geologic settings that have been developed successfully. However, the owner must be willing to accept the low to moderate risk of sinkhole development at this site. Recommendations to further reduce this risk are provided in Section 6.3.

4.2 Subsurface Conditions

From the existing ground surface in each of the test pits, a surface layer of topsoil approximately 6 to 12 inches in thickness was encountered. Beneath this surficial layer, existing fill material was encountered to depths ranging from 1.5 to 3.0 feet below the ground surface (bgs) in test pits TP-2 and TP-4. Fill material is defined as any material that has been transported and placed by man. The existing fill material encountered generally consisted of brown, black, and gray silt, sand, and clay with varying quantities of organic matter. The subsurface soil consistencies were observed in the field using a dynamic cone penetrometer (DCP). The conical point of the DCP was first seated to penetrate any loose cuttings, and then driven additional increments of 1.75 inches with blows from a 15- pound hammer falling 20 inches. The number of hammer blows required to achieve this penetration was recorded (N-values), and is used to determine the soil's consistency or relative density. The DCP N-values for the existing fill ranged from 6 to 11 blows per increment.

Beneath the topsoil and existing fill material; residual soil was encountered to test pit refusal or termination depths ranging from 2 to 8 feet bgs. The residual soil generally consisted of reddish brown and brown clay (USCS – CL/CH) with varying quantities of limestone boulders. The DCP N-values in the residual soil ranged from 3 to 25 blows per increment, indicating consistency ranging from soft to stiff. Laboratory plasticity testing (Atterberg limits) on a sample of the residual soil indicated a liquid limit (LL) of 41 percent and a plasticity index (PI) of 18 percent. The natural moisture content of the sample tested was 21.8 percent. Standard Proctor moisture-density relationship testing revealed a maximum dry density of 100 pounds per cubic foot (pcf) and an optimum moisture content of 21 percent.

Refusal materials were encountered within test pits TP-6, TP-7, and TP-9 at depth ranging from 2 to 4 feet bgs. Refusal is a designation applied to the material which could not be removed by the mini-excavator used to dig the test pits. Refusal may indicate dense gravel or cobble layers,

boulders, rock ledges or pinnacles, or the top of continuous bedrock. Rock coring was beyond the scope of this exploration; therefore, the character and continuity of the refusal materials were not determined.

The above subsurface description is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The test pit records included in the appendix should be reviewed for specific information at individual boring locations. The depth and thickness of the subsurface strata indicated on the test pit records were generalized from and interpolated between test locations. The transition between materials will be more or less gradual than indicated and may be abrupt. Information on actual subsurface conditions exists only at the specific test pit locations and is relevant to the time the exploration was performed. Variations may occur and should be expected between test pit locations. The stratification lines were used for our analytical purposes and, unless specifically stated otherwise, should not be used as the basis for design or construction cost estimates.

4.3 Subsurface Water

Subsurface water was observed in test pits TP-7 and TP-8. The subsurface water was flowing into the test pits from the south. The water was present at the interface between the residual clay and rock in TP-7, and was encountered at approximately 2 feet bgs in TP-8. Subsurface water levels may fluctuate due to seasonal changes in precipitation amounts or due to construction activities in the area. Additionally, discontinuous zones of perched water may exist within the overburden and/or at the contact with bedrock. The subsurface water information presented in this report is the information that was collected at the time of our field activities. We recommend that the contractor determine the actual subsurface water level at the site at the time of the construction activities.

5.0 Conclusions and Recommendations

5.1 General

The conclusions and recommendations presented in this report are based on the preceding project information, and the results of this exploration. Actual subsurface conditions may vary between or away from the test pit locations. If it becomes apparent during construction that encountered conditions vary substantially from those presented herein, this office should be notified at once. At that time, the conditions can be evaluated and the recommendations of this report modified, in written form, if necessary. Also, if the scope of the project should change significantly from that described herein, these recommendations may have to be re-evaluated.

5.2 Site Assessment

The results of the field exploration indicate that the site is generally underlain by existing fill material and residual clay overlying limestone bedrock. The samples of fill material encountered at the site contained varying quantities of organic matter; therefore, it is likely the fill was not

placed in a controlled manner. As is the case with any fill material placed without engineering observation, the possibility exists that the fill may contain concentrated amounts of deleterious material and soft compressible zones not disclosed by our test pits. Accordingly, there are certain risks associated with construction on this type of fill material. The risk primarily consists of excessive and/or non-uniform settlement caused by extensive zones or pockets of soft, loose, or un-compacted material. The risk could be better assessed with documentation supporting acceptable fill placement methods and compaction.

We do not recommend relying on fill material placed without technical observation for structural support. However, if the owner understands and is willing to accept the possibility of variable and non-uniform settlement, the existing fill may be used for the support of the building. If the owner is not willing to accept the above mentioned risk, the existing fill should be undercut and replaced with properly-compacted structural soil fill.

While a full-depth undercut and replacement of the existing fill in the proposed pavement areas would eliminate the risk associated with the existing fill, such an approach may not be economically desirable. It is our opinion that the risk associated with the existing fill can be significantly reduced by maintaining a minimum of 2 feet of new structural fill between a stable existing fill subgrade and the bottom of the pavement section. We recommend that the undercut depth in pavement areas be determined in the field during proofrolling and engineering observations.

The residual soil encountered had a consistency most commonly in the range of firm to stiff. The firm, or better, residual soil and/or newly-placed, properly-compacted structural soil fill should provide adequate bearing capacity to support the anticipated foundation loads using a shallow foundation system. However, at some of the test pit locations soft residual soil was encountered. These soils, if encountered at subgrade elevation, will require remediation for foundation and/or subgrade support. Careful observation of foundation excavations, proofrolling of subgrade material, and testing of should be performed to help identify these areas.

Refusal materials were encountered at test pits TP-6, TP-7, and TP-9 at depths ranging from 2 to 4 feet below ground surface (bgs). Therefore, it is possible that materials requiring difficult excavation (i.e. hoe-ramming, blasting) may be encountered during site excavations, Section 6.1.

5.3 Site Preparation

5.3.1 Subgrade

All vegetation, topsoil, organic matter, existing fill material, rock fragments greater than 6 inches in any one dimension, and other debris should be removed from the proposed construction area. After completion of stripping operations and any required excavations to reach subgrade level or prior to placement of structural fill, we recommend that the subgrade be proofrolled with a fully-loaded, tandem-axle dump truck or other pneumatic-tired construction equipment of similar weight. The geotechnical engineer or his qualified representative should observe proofrolling. Areas judged to perform unsatisfactorily by the engineer should be undercut and replaced with

structural soil fill or remediated at the geotechnical engineer's direction. Areas to receive structural soil fill should also be proofrolled prior to the placement of any fill.

5.3.2 Structural Soil Fill

Material considered suitable for use as structural soil fill should be clean soil, free of organics, trash, and other deleterious material, and containing no rock fragments greater than 6 inches in any one dimension. Preferably, structural soil fill should have a standard Proctor maximum dry density of 90 pounds per cubic foot (pcf) or greater and a plasticity index (PI) of 30 percent or less. Materials with a PI greater than 30 percent are susceptible to volume changes with changes in moisture content. Volume changes in the foundation subgrade can cause structural distress in structures and pavements. All material being used as soil fill should be tested and approved by the geotechnical engineer before being placed.

Structural fill should be placed in loose, horizontal lifts not exceeding 8 inches in thickness. Each lift should be compacted to at least 98 percent of the soil's maximum dry density per the standard Proctor method (ASTM D 698) and within the range of minus 1 percent to plus 3 percent of the optimum moisture content. Each lift should be compacted, tested by geotechnical personnel and approved before placing any subsequent lifts. Any areas which have become soft or frozen should be removed before additional structural fill is placed.

5.4 Shallow Foundations

5.4.1 Foundation Bearing Material

Foundations for the proposed building are anticipated to bear in stiff, or better, residual soil and/or newly-placed, properly-compacted structural soil fill. We recommend an allowable bearing capacity of 2,500 psf for design of shallow foundation bearing in these materials. We anticipate that areas of existing fill material and soft residual soil will be encountered during foundation excavations which will need to be undercut and replaced to achieve the recommended bearing pressure. Even if design loads would allow smaller sizes, we recommend that continuous foundations be a minimum of 24 inches wide and isolated spread foundations be a minimum of 36 inches wide to reduce the possibility of a localized punching shear failure. All exterior foundations should be designed to bear at least 24 inches below finished exterior grade to protect against frost heave. Interior foundations can be located on acceptable bearing materials at nominal depths compatible with architectural and structural considerations.

S&ME should be retained to perform foundation subgrade observations to confirm that the recommendations provided in this report are consistent with the site conditions encountered. A dynamic cone penetrometer (DCP) is commonly utilized to provide information that is compared to the data obtained in the geotechnical report. Where unacceptable materials are encountered, the material should be excavated to stiff, suitable soils or remediated at the geotechnical engineer's direction. Typical remedial measures consist of undercutting, over-excavation, or combinations thereof.

5.4.2 Foundation Construction

Foundation excavations should be opened, the subgrade evaluated, remedial work performed, and concrete placed in an expeditious manner. Exposure to weather often reduces foundation support capabilities, thus necessitating remedial measures prior to concrete placement. It is also important that proper surface drainage be maintained both during construction (especially in terms of maintaining dry foundation trenches) and after construction. Soil and/or compacted crusher run stone backfill for foundation should be placed in 4 to 6 inch thick lifts and uniformly compacted to 98 percent of the materials' standard Proctor maximum dry density. The compaction should be performed within the range of minus 1 percent to plus 3 percent of the materials optimum moisture content. Compaction should be monitored by field density testing or by other methods approved by the geotechnical engineer.

5.4.3 Slab-on-Grade

For slab-on-grade construction, the site should be prepared as described in Sections 4.3.1 and 4.3.2. We recommend that the subgrade be topped with a minimum 4-inch layer of crushed stone to act as a capillary moisture block. The subgrade should be proofrolled and approved prior to the placement of the crushed stone. Based on the conditions encountered on this site, we recommend that the floor slabs be designed using a subgrade modulus of 125 pounds per cubic inch (pci). This modulus is appropriate for small diameter loads (i.e. a 1ft. x 1ft. plate) and should be adjusted for wider loads.

Our recommendations are based upon the assumption that the subgrade has been properly prepared as described in this report and that any off-site soil borrow to be used to backfill to the final subgrade meets the requirements of Section 4.3.2 for structural soil fill.

6.0 Construction Considerations

6.1 Excavations

Refusal materials were encountered in test pits TP-6, TP-7, and TP-9 at depths ranging from 2 to 4 feet bgs. These materials are below the proposed finished grade for the building and parking areas on the subject site. However, the refusal materials encountered in test pit TP-9 were encountered above the invert of the proposed drainage easement located on the northeast side of the subject site. Generally, the weathering process is erratic and variations in the rock profile can occur in small lateral distances. Therefore, it is possible that some partially weathered rock and/or rock pinnacles or ledges requiring difficult excavation techniques may be encountered in site areas between our test pit locations. It is likely heavy excavation equipment, at minimum, will be required to remove these materials. Pneumatic equipment or light blasting may be required to remove the materials which could not be excavated by the mini-excavator used to dig the test pits.

6.1.1 Excavation Safety

Excavations should be sloped or shored in accordance with local, state, and federal regulations, including OSHA (29 CFR Part 1926) excavation trench safety standards. The contractor is usually solely responsible for site safety. This information is provided only as a service and under no circumstances should S&ME be assumed to be responsible for construction site safety.

6.2 Moisture Sensitive Soil

The upper fine grained soil encountered at this site may be sensitive to disturbances caused by construction traffic and changes in moisture content. During wet weather periods, increases in the moisture content of the soil can cause significant reduction in the soil strength and support capabilities. In addition, soil which becomes wet may be slow to dry and thus significantly retard the progress of grading and compaction activities. It will, therefore, be advantageous to perform earthwork and foundation construction activities during dry weather.

6.3 Sinkhole Corrective Actions

Based on our experience, corrective actions can be performed to reduce the potential for sinkhole development at this site. These corrective actions would decrease but not eliminate the potential for sinkhole development. Much can be accomplished to decrease the potential of future sinkhole activity by proper grade selection and maintaining positive site drainage. It is our opinion that the risk of sinkhole development at this site is no greater than at other sites located within similar geologic settings that have been developed successfully; provided site development incorporates the recommendations presented herein.

The portions of the site that will be excavated to achieve the desired grades will have a higher risk of sinkhole development than the areas to be filled, because of the exposure of relic fractures in the soil to rainfall and runoff. On the other hand, those portions of the site that will receive a modest amount of fill will have a decreased risk of sinkhole development caused by rainfall or runoff because the placement of a cohesive soil fill over these areas effectively caps the area with a relatively impervious "blanket" of remolded soil. Therefore, the recommendations that follow incorporate a modest remedial treatment program designed to make the surface interval of the soil in excavated areas less permeable.

Although it is our opinion that the risk of ground subsidence associated with sinkhole formation cannot be eliminated, we have found that several measures are useful in the design and site development to reduce this potential risk. These measures include:

- The scarification and re-compaction of the upper nine inches of soil exposed in cut sections, thereby creating a blanket of less permeable material.
- Maintaining positive site drainage to route surface waters well away from structural areas.
- The use of paved or membrane-lined ditches, particularly in cut areas, to collect and transport surface water to areas away from structures.

Considerations when building within a sinkhole prone area are to provide positive surface drainage away from any proposed building or parking area both during and after construction. Backfill in utility trenches, or other excavations should consist of compacted, well-graded material such as dense graded aggregate or compacted on site soils. The use of an open graded stone such as No. 57 stone is not recommended unless the stone backfill is provided an exit path and not allowed to pond. If sinkhole conditions are observed, the type of corrective action is most appropriately determined by S&ME on a case-by-case basis.

6.4 Drainage and Surface Water Concerns

To reduce the potential for undercuts and construction-induced sinkholes, water should not be allowed to collect on prepared subgrades of the construction area either during or after construction. Positive site surface drainage should be provided to reduce infiltration of surface water in the proposed parking lot. The grades should be sloped away from proposed parking lot and surface drainage should be collected and discharged such that water is not permitted to infiltrate the subgrades of the construction area.

6.5 Concrete Curing Considerations

Concrete must be properly cured, dependant upon field conditions, maintaining a satisfactory moisture content and temperature in concrete during some definite period immediately following placing and finishing so that the desired properties may develop. Curing has a strong influence on the properties of hardened concrete such as durability, strength, watertightness, abrasion resistance, volume stability, drying shrinkage and resistance to freezing and thawing and deicer salts. Curing is also of importance immediately after placement during the concrete's plastic state to reduce the effects of drying shrinkage.

Concrete can be kept moist (and in some cases at a favorable temperature) by three curing methods or combination thereof:

1) Methods that maintain the presence of mixing water in the concrete during the early hardening period. These include ponding, spraying or fogging, and saturated wet coverings. These methods afford some cooling through evaporation, which is beneficial in hot weather.
2) Methods that prevent loss of mixing water from the concrete by sealing the surface. This can be done by covering the concrete with impervious paper or plastic sheeting, or by applying membrane forming curing compounds.
3) Methods that accelerate strength gain by supplying heat and additional moisture to the concrete accomplished by live steam, heating coils, or electrically heated forms or pads.

It is best to moist-cure concrete continuously from the time it is placed until it has gained sufficient strength, impermeability, and resistance to abrasion, freezing and thawing, and chemical attack (adapted from Portland Cement Association Engineering Bulletin "Design and Control of Concrete Mixtures", Thirteenth Edition, 1988).

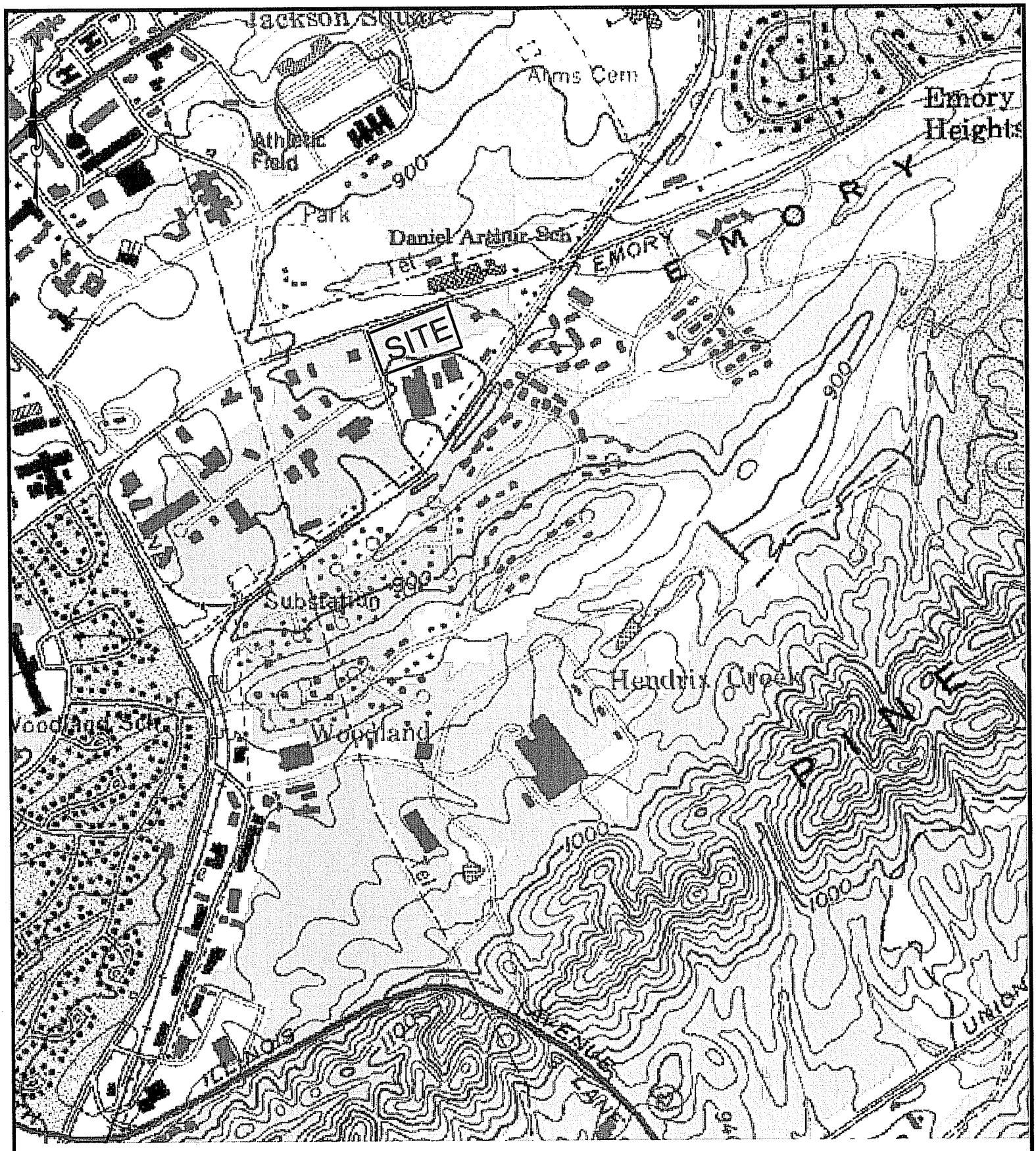
7.0 Limitations

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. This report is for our geotechnical work only. Environmental assessment efforts have been performed and reported under separate cover. The conclusions and recommendations contained in this report are based upon applicable standards of our practice in this geographic area at the time this report was prepared. No other warranty, express or implied, is made.

The analyses and recommendations submitted herein are based, in part, upon the data obtained from the exploration. The nature and extent of variations between the borings will not become evident until construction. We recommend that S&ME be retained to observe the project construction in the field. S&ME cannot accept responsibility for the conditions which deviate from those described in this report if not retained to perform construction observation and testing. If variations appear evident, then we will re-evaluate the recommendations of this report. In the event that any changes in the nature, design, or location of the structures are planned, the conclusions and recommendations contained in this report will not be considered valid unless the changes are reviewed and conclusions modified or verified in writing.

Appendix A

Figures



NOTES:

1) Base Map: USGS – Clinton Quadrangle (TN)

SCALE:	N.T.S.
CHECKED BY:	MBH
DRAWN BY:	BJM
DATE:	01–21–2008

S&ME

Site Vicinity Map
Lot #26.01 Emory Valley Road
Parcel ID #100–GA 08.00
Oak Ridge, Tennessee

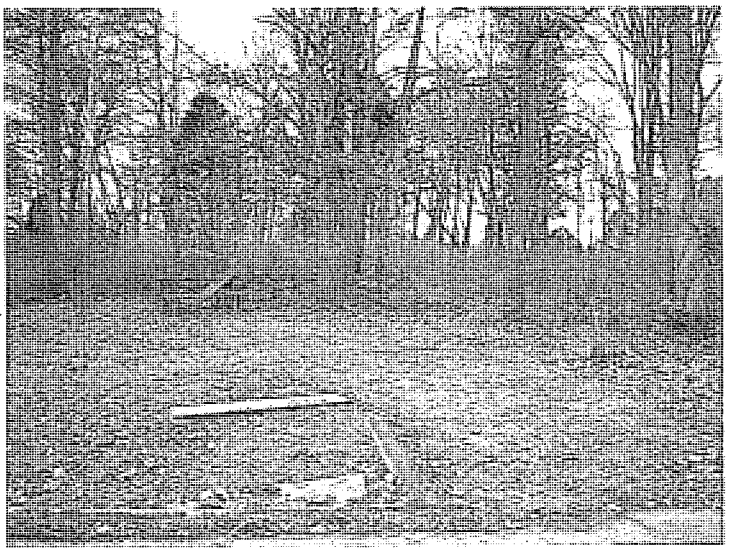
JOB NO: 1431–07–678

FIGURE NO: 1

Lot #26.01 Emory Valley Road
Parcel ID #100-GA 08.00
Oak Ridge, TN
Project #: 1431-07-678
Sheet 1 of 5

S&ME
1413 Topside Road
Louisville, TN 37777

Photograph 1

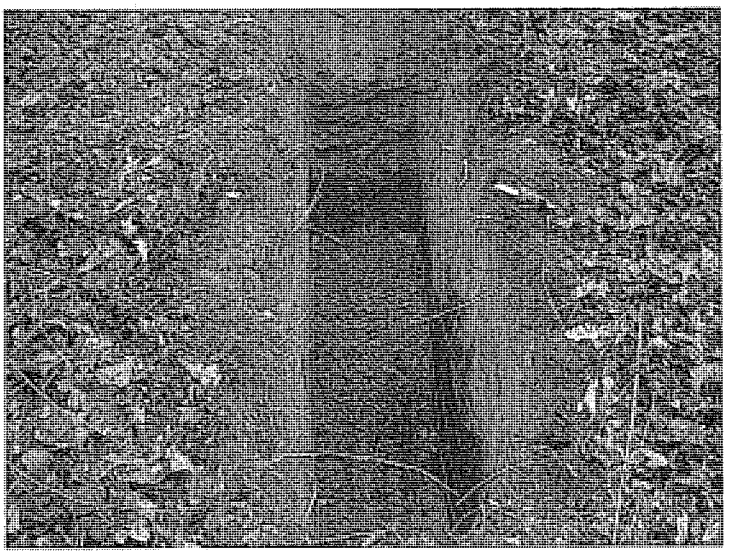


Date: 12/19/07

Photographer: Nathan J. Peterson

Location / Orientation	Southeast corner of proposed development, facing north.
Remarks	Proposed cut area on southeast side of proposed development.

Photograph 2



Date: 12/19/07

Photographer: Nathan J. Peterson

Location / Orientation	View of materials at TP-1 facing southeast.
Remarks	View from ground surface to 8.0 feet in TP-1.

Lot #26.01 Emory Valley Road
Parcel ID #100-GA 08.00
Oak Ridge, TN
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Sheet 2 of 5

S&ME
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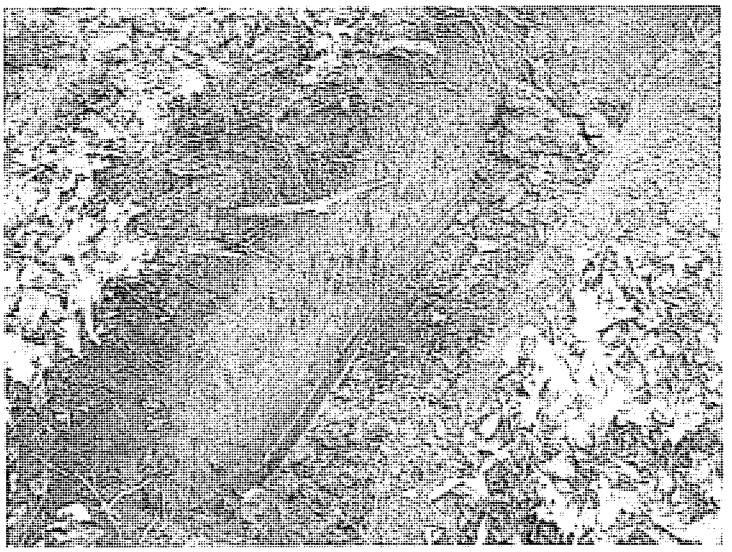
Photograph 3



Date: 12/19/07

Photographer: Nathan J. Peterson

Location / Orientation	View of TP-3 facing west.
Remarks	Materials encountered in TP-3 from ground surface to 5.0 feet.

Photograph 4

Date: 12/19/07

Photographer: Nathan J. Peterson

Location / Orientation	View of TP-4 facing north.
Remarks	View of materials encountered in TP-4 from ground surface to 6 feet.

Franklin Road Property
Proposed Development-Test Pits
Oak Ridge, TN
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Sheet 3 of 5

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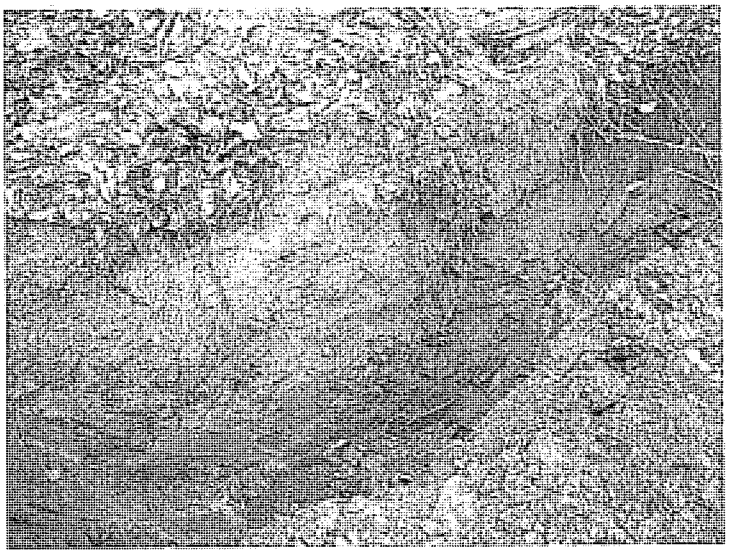
Photograph 5



Date: 12/19/07

Photographer: Nathan J. Peterson

Location / Orientation	View of TP-5 facing west.
Remarks	Materials encountered in TP-5 from ground surface to 6.0 feet.

Photograph 6

Date: 12/19/07

Photographer: Nathan J. Peterson

Location / Orientation	View of TP-6 facing east.
Remarks	View of materials encountered in TP-6 from ground surface to 4 feet. Excavator encountered limestone at 0.5 feet and refused at 4.0 feet.

Franklin Road Property
Proposed Development-Test Pits
Oak Ridge, TN
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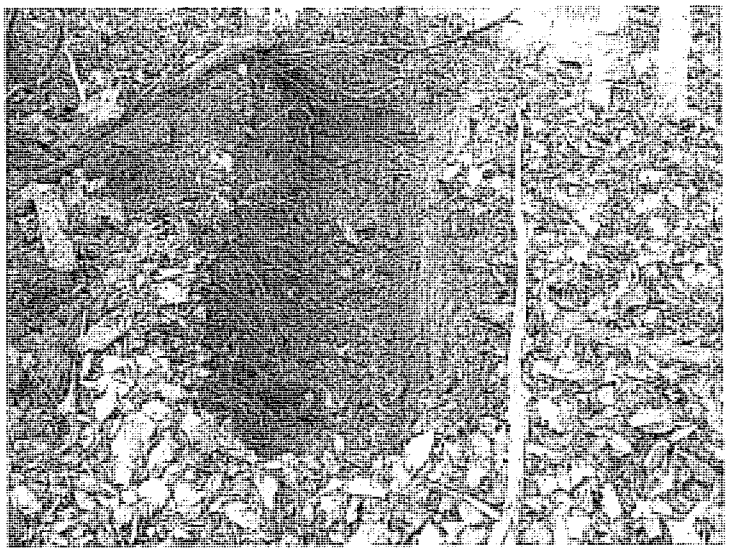
Photograph 7



Date: 12/19/07

Photographer: Nathan J. Peterson

Location / Orientation	View of TP-7 facing north.
Remarks	Refusal materials encountered at 4.0 feet in TP-7.

Photograph 8

Date: 12/19/07

Photographer: Nathan J. Peterson

Location / Orientation	View to the south of TP-7.
Remarks	Drainage feature that flows across site from south to north. TP-7 excavated within drainage feature and encountered water beneath topsoil layer.

Franklin Road Property
Proposed Development-Test Pits
Oak Ridge, TN
Project #: 1431-07-678
Sheet 5 of 5

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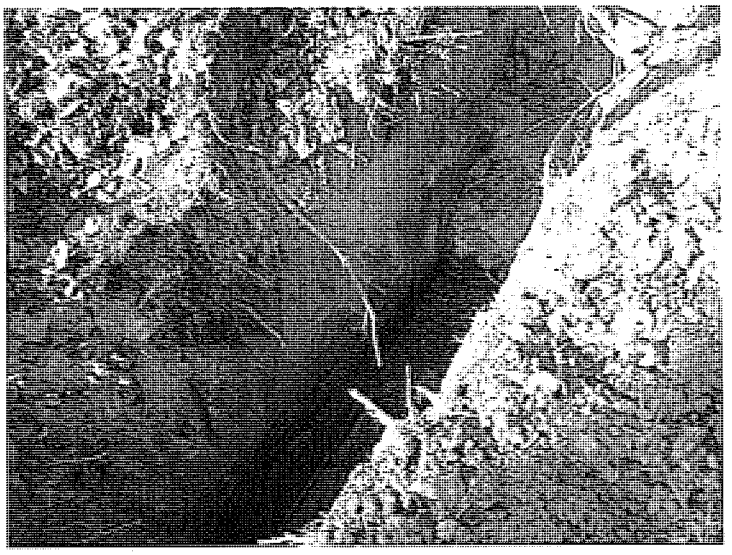
Photograph 9



Date: 12/19/07

Photographer: Nathan J. Peterson

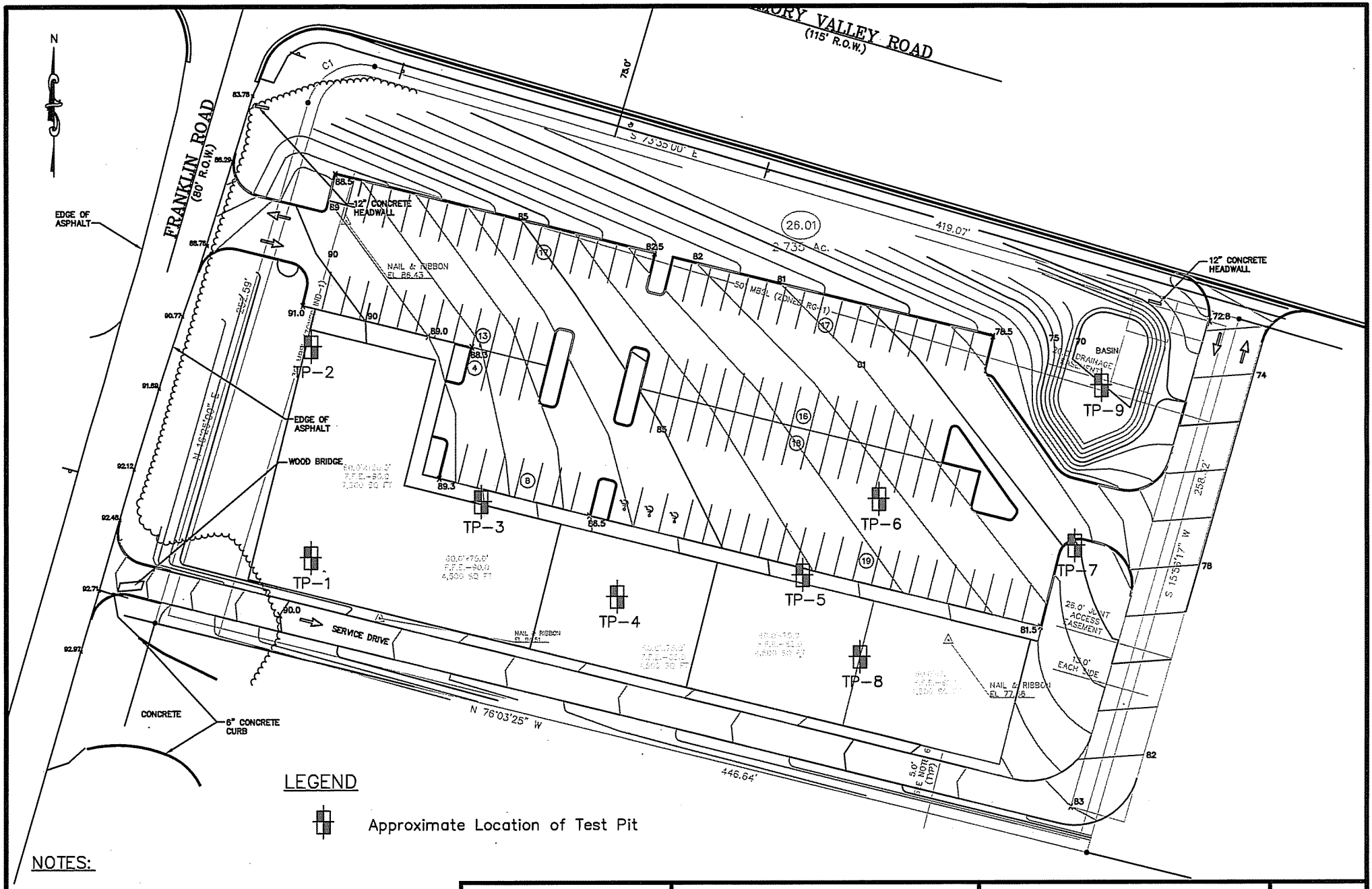
Location / Orientation	View of TP-8 facing northwest.
Remarks	Materials encountered in TP-8 from ground surface to 8.0 feet.

Photograph 10

Date: 12/19/07

Photographer: Nathan J. Peterson

Location / Orientation	View to the east of TP-8.
Remarks	Wet materials excavated from TP-8. Water encountered flowing beneath the topsoil layer in TP-8.



LEGEND

Approximate Location of Test Pit

NOTES:

1) Test Pit locations are shown in general arrangement only.
2) Do not use test pit locations for determination of distances or quantities.
3) Base map provided by ETE Engineering, Inc.

SCALE:	N.T.S.
CHECKED BY:	MBH
DRAWN BY:	BJM
DATE:	01-21-2008

S&ME

Test Pit Location Plan
Lot #26.01 Emory Valley Road
Parcel ID #100-GA 08.00
Oak Ridge, Tennessee

JOB NO: 1431-07-678

FIGURE NO: 3

Appendix B

Test Pit Logs

PROJECT: **Lot #26.01 Emory Valley Road, Parcel ID #00-GA 08.00**
Oak Ridge, Tennessee
S&ME Project No. 1431-07-678

BORING LOG TP-1

DATE DRILLED: **12/19/07**	ELEVATION: **Not Available**
DRILLING METHOD: **Test Pit**	BORING DEPTH: **8.0** feet
LOGGED BY: **NJP**	WATER LEVEL @ TOB:
DRILLER:	WATER LEVEL @ 24 hrs:

NOTES: **Soil descriptions based on visual observation of materials encountered at test pit locations.**

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO. SAMPLE TYPE	STANDARD PENETRATION TEST DATA (blows/ft) 10 20 30 60 80	N VALUE
		Topsoil with root hairs (12 inches)					
		CLAY (CH) - Yellowish brown; firm; moist; (RESIDUUM)			1		16
					2		50
5		Lean CLAY (CL) - yellowish brown with black oxide staining; stiff; moist; (RESIDUUM)			3		38
					4		36
		Test Pit Terminated at 8.0 Feet					

BORING LOG NEW 07-678.GPJ S&ME.GDT 1/21/08

NOTES:

1. *THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.*
2. *BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.*
3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*

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PROJECT: **Lot #26.01 Emory Valley Road, Parcel ID #00-GA 08.00**
Oak Ridge, Tennessee
S&ME Project No. 1431-07-678

BORING LOG TP-2

DATE DRILLED: **12/19/07**
ELEVATION: **Not Available**
DRILLING METHOD: **Test Pit**
BORING DEPTH: **6.0** feet
LOGGED BY: **NJP**
WATER LEVEL @ TOB:
DRILLER:
WATER LEVEL @ 24 hrs:

NOTES: **Soil descriptions based on visual observation of materials encountered at test pit locations.**

DEPTH (feet)	MATERIAL DESCRIPTION	SAMPLE NO.	SAMPLE TYPE	N VALUE
	SILT (ML) with roots - black; dry; sandy silt; (FILL)	1		22
	CLAY (CH) - yellowish brown; stiff; moist; (RESIDUUM)	2		46
5	CLAY (CH) - reddish brown; stiff; dry; (RESIDUUM)	3		50
	Test Pit Terminated at 6.0 Feet			

STANDARD PENETRATION TEST DATA (blows/ft)
10 20 30 60 80

BORING LOG NEW 07-678.GPJ S&ME.GDT 1/21/08

NOTES:

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2. *BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.*
3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*

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PROJECT: **Lot #26.01 Emory Valley Road, Parcel ID #00-GA 08.00**
Oak Ridge, Tennessee
S&ME Project No. 1431-07-678

BORING LOG TP-3

DATE DRILLED: **12/19/07**
ELEVATION: **Not Available**
DRILLING METHOD: **Test Pit**
BORING DEPTH: **5.0** feet
LOGGED BY: **NJP**
WATER LEVEL @ TOB:
DRILLER:
WATER LEVEL @ 24 hrs:

NOTES: **Soil descriptions based on visual observation of materials encountered at test pit locations.**

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO. SAMPLE TYPE	STANDARD PENETRATION TEST DATA (blows/ft) 10 20 30 60 80	N VALUE
		Topsoil with roots (12 inches)					
		CLAY (CH) - yellowish brown; firm to stiff; moist; (RESIDUUM)			1		10
					2		18
5		Test Pit Terminated at 5.0 Feet					

BORING LOG NEW 07-678.GPJ S&ME.GDT 1/21/08

NOTES:

1. *THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.*
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3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
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PROJECT: **Lot #26.01 Emory Valley Road, Parcel ID #00-GA 08.00**
Oak Ridge, Tennessee
S&ME Project No. 1431-07-678

BORING LOG TP-4

DATE DRILLED: **12/19/07**
ELEVATION: **Not Available**
DRILLING METHOD: **Test Pit**
BORING DEPTH: **6.0** feet
LOGGED BY: **NJP**
WATER LEVEL @ TOB:
DRILLER:
WATER LEVEL @ 24 hrs:

NOTES: **Soil descriptions based on visual observation of materials encountered at test pit locations.**

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO. SAMPLE TYPE	STANDARD PENETRATION TEST DATA (blows/ft) 10 20 30 60 80	N VALUE
		Topsoil with roots (6 inches)					
		CLAY (CH) with rock and construction debris - dark brown and gray; moist; (FILL)			1		12
		CLAY (CH) - yellowish brown; firm to stiff; moist to dry; (RESIDUUM)			2		50
5					3		50
		Test Pit Terminated at 6.0 Feet					

BORING LOG NEW 07-678.GPJ S&ME.GDT 1/21/08

NOTES:

1. *THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.*
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3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*

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PROJECT: **Lot #26.01 Emory Valley Road, Parcel ID #00-GA 08.00**
Oak Ridge, Tennessee
S&ME Project No. 1431-07-678

BORING LOG TP-5

DATE DRILLED: **12/19/07**
ELEVATION: **Not Available**
DRILLING METHOD: **Test Pit**
BORING DEPTH: **6.0** feet
LOGGED BY: **NJP**
WATER LEVEL @ TOB:
DRILLER:
WATER LEVEL @ 24 hrs:

NOTES: **Soil descriptions based on visual observation of materials encountered at test pit locations.**

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO. SAMPLE TYPE	STANDARD PENETRATION TEST DATA (blows/ft) 10 20 30 60 80	N VALUE
		CLAY (CH) - reddish brown, yellowish brown, and black; firm; wet; (RESIDUUM)			1		14
		CLAY (CH) with limestone boulders - yellowish brown to grayish brown; firm; moist; (RESIDUUM)			2		12
5		Test Pit Terminated at 6.0 Feet			3		50

BORING LOG NEW 07-678.GPJ S&ME.GDT 1/21/08

NOTES:

1. *THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.*
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3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*

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PROJECT: **Lot #26.01 Emory Valley Road, Parcel ID #00-GA 08.00**
Oak Ridge, Tennessee
S&ME Project No. 1431-07-678

BORING LOG TP-6

DATE DRILLED: **12/19/07**
ELEVATION: **Not Available**
DRILLING METHOD: **Test Pit**
BORING DEPTH: **4.0** feet
LOGGED BY: **NJP**
WATER LEVEL @ TOB:
DRILLER:
WATER LEVEL @ 24 hrs:

NOTES: **Soil descriptions based on visual observation of materials encountered at test pit locations.**

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO. SAMPLE TYPE	STANDARD PENETRATION TEST DATA (blows/ft) 10 20 30 60 80	N VALUE
		Topsoil with roothairs (6 inches)					
		CLAY (CH) with limestone boulders - grayish brown; stiff; moist; (RESIDUUM)			1	●	22
		Excavator Refusal at 4.0 Feet					

BORING LOG NEW 07-678.GPJ S&ME.GDT 1/21/08

NOTES:

1. *THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.*
2. *BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.*
3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*

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PROJECT: **Lot #26.01 Emory Valley Road, Parcel ID #00-GA 08.00**
Oak Ridge, Tennessee
S&ME Project No. 1431-07-678

BORING LOG TP-7

DATE DRILLED: **12/19/07**
ELEVATION: **Not Available**
DRILLING METHOD: **Test Pit**
BORING DEPTH: **4.0** feet
LOGGED BY: **NJP**
WATER LEVEL @ TOB:
DRILLER:
WATER LEVEL @ 24 hrs:

NOTES: **Soil descriptions based on visual observation of materials encountered at test pit locations.**

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	STANDARD PENETRATION TEST DATA (blows/ft) 10 20 30 60 80	N VALUE
		Topsoil with roots (12 inches)						
		CLAY (CH) with limestone boulders - grayish brown; firm; wet; (RESIDUUM)			1	X	●	10
		Excavator Refusal at 4.0 Feet						

BORING LOG NEW 07-678.GPJ S&ME.GDT 1/21/08

NOTES:

1. *THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.*
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3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*

S&ME

PROJECT: **Lot #26.01 Emory Valley Road, Parcel ID #00-GA 08.00**
Oak Ridge, Tennessee
S&ME Project No. 1431-07-678

BORING LOG TP-8

DATE DRILLED: **12/19/07**	ELEVATION: **Not Available**
DRILLING METHOD: **Test Pit**	BORING DEPTH: **8.0** feet
LOGGED BY: **NJP**	WATER LEVEL @ TOB:
DRILLER:	WATER LEVEL @ 24 hrs:

NOTES: **Soil descriptions based on visual observation of materials encountered at test pit locations.**

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO. SAMPLE TYPE	STANDARD PENETRATION TEST DATA (blows/ft) 10 20 30 60 80	N VALUE
		Topsoil with roots (12 inches)					
		CLAY (CH) - yellowish brown with black oxide staining; soft to stiff; wet to moist; (RESIDUUM)			1		6
					2		8
5					3		6
		Test Pit Terminated at 8.0 Feet			4		20

BORING LOG NEW 07-678.GPJ S&ME.GDT 1/21/08

NOTES:

1. *THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.*
2. *BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.*
3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*

S&ME

PROJECT: **Lot #26.01 Emory Valley Road, Parcel ID #00-GA 08.00**
Oak Ridge, Tennessee
S&ME Project No. 1431-07-678

BORING LOG TP-9

DATE DRILLED: **12/19/07**
ELEVATION: **Not Available**
DRILLING METHOD: **Test Pit**
BORING DEPTH: **2.0** feet
LOGGED BY: **NJP**
WATER LEVEL @ TOB:
DRILLER:
WATER LEVEL @ 24 hrs:

NOTES: **Soil descriptions based on visual observation of materials encountered at test pit locations.**

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO. SAMPLE TYPE	STANDARD PENETRATION TEST DATA (blows/ft) 10 20 30 60 80	N VALUE
		Topsoil with root hairs (12 inches)					
		CLAY (CH) - yellowish brown; moist; (RESIDUUM)					
		Excavator Refusal at 2.0 Feet					

BORING LOG NEW 07-678.GPJ S&ME.GDT 1/21/08

NOTES:

1. *THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.*
2. *BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.*
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S&ME

Appendix C

Laboratory Data

Laboratory Report Version 4.2

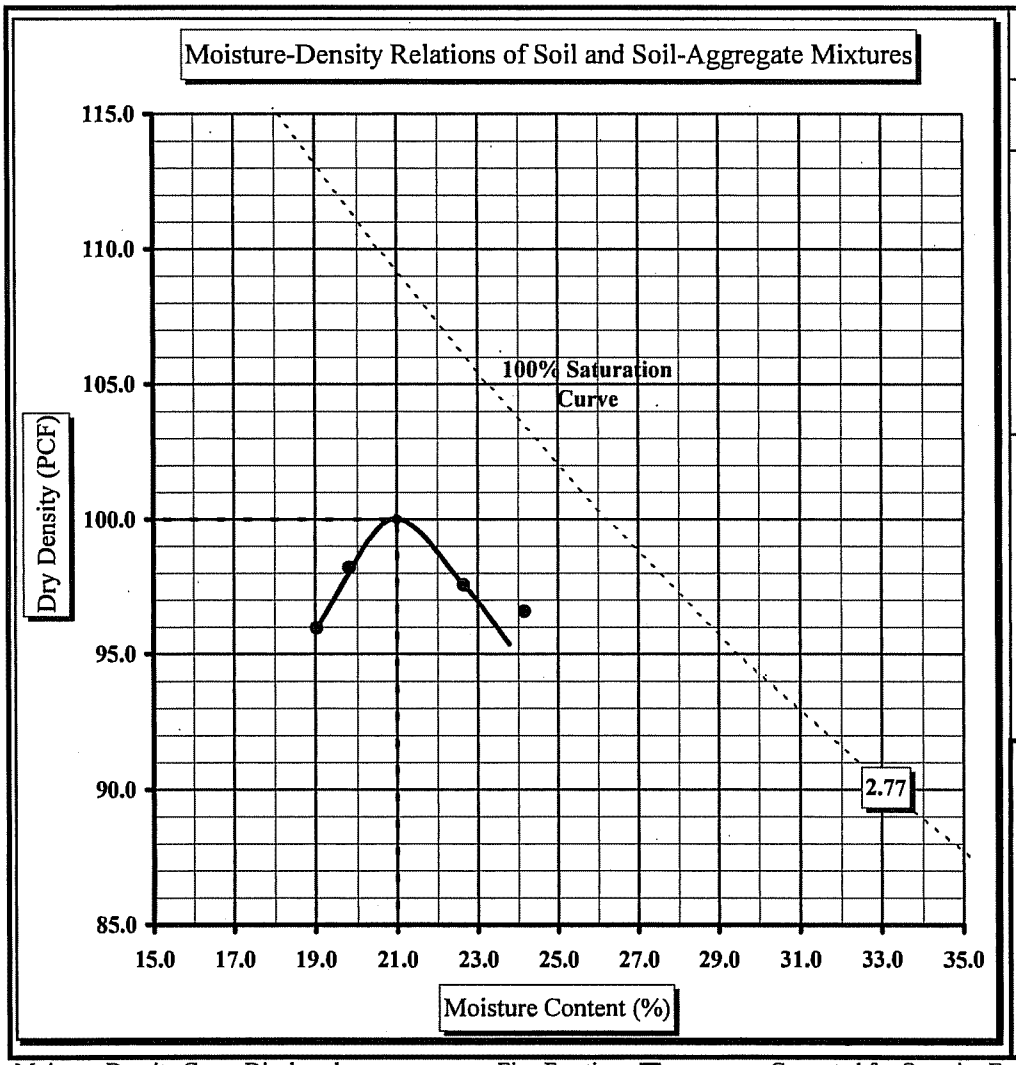
Moisture - Density Report

S&ME Project #:	**1431-07-678**	Report Date:	January 2, 2008
Project Name:	**Franklin Road Propoerties**	Test Date(s):	December 26, 2007
Client Name:	Mr. Jim Barker	Log #:	5911
Client Address:	1937 Hickory Glen Road, Knoxville, TN. 37921		

Boring #:	TP-1	Sample #:	Bag	Sample Date:	December 19, 2007
Location:	Oak Ridge, Tennessee			Depth:	0.0 - 5.0'
Sample Description:	Tannish Brown Silty Clay with Shale				

Maximum Dry Density **100.0** **PCF.** **Optimum Moisture Content** **21.0** **%**

ASTM D 698 Method B



Soil Properties

Natural Moisture Content:	21.8%
Liquid Limit:	41
Plastic Limit:	23
Plastic Index:	18

Oversize Correction

Bulk Sp. Gravity	NA
% Moisture	NA
% Oversize	<5%
MDD	**NA**
Opt. % MC	**NA**

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☐ 3/8 inch Sieve ☒ 3/4 inch Sieve ☐

Mechanical Hammer ☐ Manual Hammer ☒ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Notes:
Soil description is by appearance, consistency, and the minus 40 material gropup symbol

Technical Responsibility: N. Randy Rainwater *Signature* Soils Lab Supervisor

Attachment C – Daily field reports and construction materials testing results

S&ME

Celebrating 35 Years
1973 • 2008

November 20, 2008

Jim Barker
1937 Hickory Glenn Road
Knoxville, Tennessee 37921

Subject: **DAILY FIELD REPORTS AND CONSTRUCTION MATERIALS TESTING RESULTS**
Lot #26.01 Emory Valley Road
Oak Ridge, Tennessee
1433-08-469

Dear Mr. Barker:

S&ME appreciates the privilege to provide construction testing and monitoring services for the above referenced project. Our services were performed in general accordance with S&ME Proposal No.3308558 dated September 3, 2008.

Attached are the daily field reports (DFR) for services performed between October 29, 2008 and November 5, 2008. The time shown on our invoices that is not presented on a DFR is for project meetings, administrative review, engineering analysis and report preparation.

It is a pleasure to be of service to you. If you have any questions regarding our services, please feel free to contact us.

Sincerely,
S&ME, Inc.

M. Reid Beebe, III, P.E.
Project Manager

S&ME

FIELD REPORT

1413 Topside Road Louisville, Tennessee 37777 865-970-0003 Fax 865-970-2312

Project:	Lot #26.01 Emory Valley Road
S&ME Project No:	1433-08-469
Client:	Jim Barker
Contractor:	Robert Giles
S&ME Personnel:	Jeff Rymer
Date:	October 29, 2008
Total Time:	3.0 Hours
Mileage:	50 Miles

Mr. Rymer traveled to the project site at the reqnest of Mr. Robert Giles to conduct proofroll testing on the portion of the site to receive fill. Upon arrival, Mr. Rymer met with Mr. Giles and Mr. Jim Barker. A loaded tandem axle dump truck was used to perform the proofroll. During the proofroll, an area in the approximate grid location of G-16 indicated some soft soils, with the remainder of the site to receive fill not revealing any soft soils. Mr. Rymer recommended that some additional stripping be performed in the area of G-16 since less than 2' of fill soils were to be placed in this area. The plan was to undercut this area, but with the presence of rock outcrops in this area it would be difficult to remove all of the topsoil between the crevices of rock. It was determined that this activity could be conducted later in the day and that the area would be ready for observation on October 30, 2008. While onsite, Mr. Rymer collected a proctor sample of the soils being delivered to the site from the west Wolf Valley Road borrow site and returned it to the S&ME soils lab for processing and testing.

RB/bjs

Project Manager

S&ME

1413 Topside Road Louisville, Tennessee 37777 865-970-0003 Fax 865-970-2312

FIELD REPORT

Project:	Lot #26.01 Emory Valley Road
S&ME Project No:	1433-08-469
Client:	Jim Barker
Contractor:	Robert Giles
S&ME Personnel:	Jeff Rymer
Date:	October 30, 2008
Total Time:	2.0 Hours
Mileage:	50 Miles

Mr. Rymer traveled to the project site to observe the additional undercut that was recommended on October 29, 2008, near grid map location G-16. Upon arrival, Mr. Rymer found that as the crew tried to remove the topsoil in this area, additional rock was encountered. Without removing the rock outcrops, there won't be much more topsoil removed. Mr. Rymer approved the area for fill placement since this area was within the limits of the diversion ditch, or just inside the proposed curb line. After observing the site, Mr. Rymer returned to the office.

RB/bjs

Project Manager

S&ME

FIELD REPORT

1413 Topside Road Louisville, Tennessee 37777 865-970-0003 Fax 865-970-2312

Project:	Lot #26.01 Emory Valley Road
S&ME Project No:	1433-08-469
Client:	Jim Barker
Contractor:	Robert Giles
S&ME Personnel:	Jeff Rymer
Date:	November 3, 2008
Total Time:	2.5 Hours
Mileage:	50 Miles

Mr. Rymer traveled to the project site at the request of Mr. Robert Giles to observe the subgrade conditions at the east end of the site along grid lines 25 to 26 from H.5 to approximately line L (on somewhat of an angle following the property line). This area had been stripped of vegetation down to where rock had been encountered. This area was ready to receive fill. The grading crew waited until this was approved to begin placing fill. After observing this area, and discussing when density testing would be needed (the afternoon of November 4, 2008 or the morning of November 5, 2008), Mr. Rymer departed the site.

RB/bjs

Project Manager

S&ME

FIELD REPORT

1413 Topside Road Louisville, Tennessee 37777 865-970-0003 Fax 865-970-2312

Project:	Lot #26.01 Emory Valley Road
S&ME Project No:	1433-08-469
Client:	Jim Barker
Contractor:	Robert Giles
Weather:	Sunny
S&ME Personnel:	Vince Moore
Date:	November 3, 2008
Total Time:	4.5 Hours
Mileage:	60 Miles

Mr. Vince Moore traveled to this project site at the request of Mr. Jim Barker with Robert JAB Development to perform density testing services. The contractor was observed placing soil using one (1) truck, one (1) dozer and one (1) 815 compactor. Areas of fill were being placed in the north half and east end of the site. Mr. Moore performed nine (9) density tests using a nuclear density gauge, reporting the results to the superintendent with Giles Excavating prior to departure. See the attached density test summary for test results and locations.

RB/bjs

Project Manager

S&ME

Summary of Density Test Results

Report Date: November 04, 2008

Project No.: 1433-08-469

Project Name: Lot #26.01 Emory Valley Road

Client: Jim Barker

Test		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Location	Elevation or Stone Depth
No.	Date	Type	Dry Density	Moisture Content	Dry Density	Moisture Content	Type	Ref. Curve	MDD	Optimum Moisture Content	Percent Specified	Percent In-Place		
1	11/04/08	D 2922	**91.6**	**25.6**			D 698		92.6	27.4	95	**99**	E-11	-3.5'
2	11/04/08	D 2922	**90.0**	**24.6**			D 698		92.6	27.4	95	**97**	E.5-13	-3.5'
3	11/04/08	D 2922	**91.5**	**25.4**			D 698		92.6	27.4	95	**99**	F-15	-3'
4	11/04/08	D 2922	**92.0**	**25.6**			D 698		92.6	27.4	95	**99**	G.3-19.3	-3'
5	11/04/08	D 2922	**91.1**	**26.2**			D 698		92.6	27.4	95	**98**	H.5-21.5	-3'
6	11/04/08	D 2922	**89.9**	**25.9**			D 698		92.6	27.4	95	**97**	J-18	-3.5'
7	11/04/08	D 2922	**91.5**	**24.4**			D 698		92.6	27.4	95	**99**	L-20.5	-4'
8	11/04/08	D 2922	**91.7**	**24.8**			D 698		92.6	27.4	95	**99**	M-21	-4'
9	11/04/08	D 2922	**90.9**	**25.0**			D 698		92.6	27.4	95	**98**	L-23	-4'

* = Failed Specified Compaction, ** = Failed Specified Moisture Content

All Test Locations and Elevations are Approximate

Notes:

References: ASTM D 2922: Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth), ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Distribution:

Reid Beebe, P.E.
Name (Technical Responsibility)

Signature

Project Manager
Position

S&ME

1413 Topside Road Louisville, Tennessee 37777 865-970-0003 Fax 865-970-2312

FIELD REPORT

Project:	Lot #26.01 Emory Valley Road
S&ME Project No:	1433-08-469
Client:	Jim Barker
Contractor:	Robert Giles
Weather:	Clear, 75°
S&ME Personnel:	Neil Hinkle
Date:	November 5, 2008
Total Time:	5.0 Hours
Mileage:	45 Miles

Mr. Hinkle traveled to the project site to perform density testing services. Mr. Hinkle tested the compaction of fill material that the contractor had previously placed and recorded the test results and locations on the attached density sheet. Mr. Hinkle reported the test results to Mr. Brent Irwin with Giles Construction. The contractor stated that all fill material placed at this project site must be compacted to within 95% of the maximum dry density of a sample of that tested material and that the percentage of moisture contained in that fill material would not be specified.

Mr. Hinkle observed that the surface of that tested area did not display any significant deflections under the weight of a loaded dump truck that was driven over that tested area. Mr. Hinkle obtained a sample of the tested material and after he prepared a field report, he returned to the soils lab to process that soil sample.

RB/bjs

Project Manager

S&ME

Summary of Density Test Results

Report Date: November 20, 2008

Project No.: 1433-08-469

Project Name: Lot #26.01 Emory Valley Road

Client: Jim Barker

Test		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Location	Elevation or Stone Depth
No.	Date	Type	Dry Density	Moisture Content	Dry Density	Moisture Content	Type	Ref. Curve	MDD	Optimum Moisture Content	Percent Specified	Percent In-Place		
10	11/05/08	D 2922	**90.7**	**20.6**			D 698		92.5	26.7	95	**98**	J-18	-4'
11	11/05/08	D 2922	**93.5**	**22.8**			D 698		92.5	26.7	95	**100+**	K-21	-3'
12	11/05/08	D 2922	**92.0**	**22.6**			D 698		92.5	26.7	95	**99**	G-15	-1'
13	11/05/08	D 2922	**96.1**	**22.8**			D 698		92.5	26.7	95	**100+**	H-14	-2'
14	11/05/08	D 2922	**90.2**	**25.9**			D 698		92.5	26.7	95	**98**	G-11	-2'
15	11/05/08	D 2937	**93.7**	**22.9**			D 698		92.5	26.7	95	**100+**	K-21	-3'

* = Failed Specified Compaction, ** = Failed Specified Moisture Content

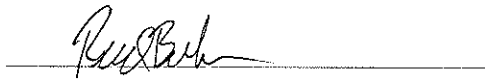
All Test Locations and Elevations are Approximate

Notes:

References: ASTM D 2937: Density of Soil In Place by the Drive Cylinder Method, ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort, ASTM D 2922: Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

Distribution:

Reid Beebe, P.E.
Name (Technical Responsibility)


Signature

Project Manager
Position

Attachment D – Correspondence with the Tennessee Department of Environment and Conservation

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER RESOURCES
KNOXVILLE ENVIRONMENTAL FIELD OFFICE
3711 MIDDLEBROOK PIKE
KNOXVILLE, TN 37921
PHONE 865-594-6035 **STATEWIDE 1-888-891-8332** **FAX 865-594-6105**

February 5, 2014

Ms Alicia McAuley
Michael Brady Inc.
299 N. Weisgarber Road
Knoxville, Tennessee 37919

Subject: **Stream, Wetland, and Endangered Species Information on Emory Valley Center at 715 Emory Valley Road; Oak Ridge, Anderson County, Tennessee**

Dear Ms. McAuley:

On December 19, 2013, I walked the property at 715 Emory Valley Road in Oak Ridge. The field west of Emory Valley Center (SE quadrant of intersection of Emory Valley nad Franklin) was the specific area of concern. There is a wet weather conveyance that runs along the southern boundary of the site and then flows north along the eastern boundary, discharging to a stormwater pond. Any activities that affect the conveyance should comply with: http://www.state.tn.us/environment/water/docs/wpc/arap-gp_wet-weather-conveyances.pdf.

The ponds and puddles on the site do have cattails growing in them, but are small in size, man-made, and not of concern to our office with regards to permitting. These ponds have not functioned as wetlands sufficiently long enough for the soils to turn hydric to any extent.

Treat this site as you would any other field – install the controls necessary to keep sediment and sediment-laden water from leaving the site as best possible. No ARAP permits are needed. If your construction activities will disturb more than one acre at the same point in time, you will need a construction stormwater permit from our office. If you can phase/manage the project in such a way that there is never more than an acre disturbed, then you will only need to address any local requirements (Oak Ridge and/or Anderson County).

Regarding your request for Endangered Species determination, I am unaware of anyone in our office that does field determinations for endangered species. I did look at our Threatened and Endangered Species database, and it showed no species of concern anywhere near this location.

If you have any further questions, please contact me at (865) 594-5583 or by e-mail at *Steven.Brooks@tn.gov*.

Sincerely,

Steven Brooks
Division of Water Resources
Knoxville Environmental Field Office