# REPORT OF
# GEOTECHNICAL SITE CHARACTERIZATION
# PROPOSED POTEAT PLACE & JEFFERSON DRIVE
# SEWER INSTALLATION

**FRANKLIN, TENNESSEE**

**Submitted to:**

**City of Franklin**
**Franklin, Tennessee**

**Submitted by:**

**AMEC Earth & Environmental, Inc.**
**Nashville, Tennessee**


**March 2009**

**AMEC File No. 5-6160-0000**

March 13, 2009

Mr. Eric Gardner
City of Franklin
109 3rd Avenue South
Franklin, Tennessee 37064

Attention: Mr. Eric Gardner

**RE: Report of Geotechnical Site Characterization**
**Proposed Poteat Place & Jefferson Drive Sewer Installation**
**Franklin, Tennessee**
**AMEC File No. 5-6160-0000**

Dear Mr. Gardner:

AMEC Earth & Environmental, Inc. (AMEC) has completed the authorized study and herewith submits the data, comments, and recommendations. Our services were performed in general accordance with the terms of our December 31, 2008 proposal (No. 2008-166) to you. The scope of work includes general subsurface exploration and the development of general recommendations to address geotechnical engineering issues.

AMEC appreciates this opportunity to be of service to you. At your convenience, we are available to discuss the details of this report and any questions that you may have

Sincerely,

**AMEC**

Wesley W. Cockerham, E.I.
Staff Geotechnical Engineer

Mario Glorioso, P.E.
Geo-Design Services Manager

AMEC Earth & Environmental, Inc.
3800 Ezell Road, Suite 100
Nashville, Tennessee 37211
USA
TEL (615) 333-0630
FAX (615) 781-0655
www.amec.com

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**LIST OF APPENDICES**

## 1.0 INTRODUCTION

AMEC has completed the authorized field investigation for this project and herewith submits the data and our conclusions. The scope of work was performed in general accordance with our December 31, 2008 Proposal and Agreement. The purposes of this study are to explore the general subsurface conditions across the site and to provide comments and general recommendations regarding the geotechnical aspects of the site. The site is under consideration for installation of sewer line laterals.

## 2.0 EXPLORATION AND TESTING

The subsurface exploration phase of this project incorporated five geotechnical soil borings performed on February 19. Borings were advanced at the approximate locations and to the depths shown on the Plan and Logs contained in Appendix 2. Using predetermined locations and depths provided by the city, our field representative established the points of exploration by taping distances from existing features, and the locations should be considered approximate. Bedrock was cored at two locations. Upon completion, each boring was checked for the presence of ground water and backfilled with the exploration-generated spoil. Asphalt patch material was then applied to the road surface.

Our representative documented the exploration and logged the soil samples in the field. Soil samples were field classified with respect to material type and consistency. Bedrock core samples were returned to our office where they were logged by a senior geologist. Our interpretations of the subsurface conditions are presented on the appended Logs.

Soil and rock samples were transported to the AMEC Geotechnical and Construction Materials Laboratory in Nashville, Tennessee. Selected samples were subjected to index testing to assess some of the soils' mechanical properties including natural moisture content, grain size distribution analyses, standard Proctor compaction, and Atterberg limits. Samples not consumed will be stored at our laboratory for no less than 60 days after which they will be discarded unless you request otherwise. Results of the laboratory testing are presented in Appendix 3.

## 3.0 SITE CONDITIONS

The subject site is located east of and adjacent to Hillsboro Road, along Poteat Place and Jefferson Drive in Monticello Subdivision, in Franklin, Tennessee. Topography within the

project area is gently rolling with drainage directed primarily to the west and to the south towards the Harpeth River.

The boring locations were situated within a residential neighborhood (Monticello Subdivision) along the centerlines of Poteat Place and Jefferson Drive, both of which contain asphalt surfaces. Various underground utilities are present at the site along the edges of and across the streets mentioned above.

## 4.0 SUBSURFACE CONDITIONS

At the locations explored, the generalized surface interval includes four to five inches of asphalt with a crushed stone base of approximately 6 inches. Beneath the crushed stone base, borings encountered silty and/or sandy clay soils that extended to the termination or refusal depths as shown on the appended Plan and Logs.

Where encountered, the depth to refusal (the weathered bedrock surface) ranged from 3.7 feet below the ground surface at B-5 to 15.2 feet at B-1. A summary of boring data is provided on the appended Plan. The boring Logs in Appendix 2 contain our descriptions and interpretations of the materials encountered.

No groundwater was encountered while drilling within the overburden. Water was used as a drilling fluid and was observed at a depth of 2.7 feet in B-1 once coring was complete and tools were removed from the bore hole. The observed water is likely to be drill water that was returned during the coring operation; however, perched water sources are not uncommon and may be encountered during construction. Perched water should be expected to occur near the soil\bedrock interface during wet weather. In any event, we expect that the permanent water table is below the depths explored and should not significantly impact construction at the site, except as previously discussed, provided the work is performed during dry seasons.

| Monticello Subdivision (Poteat Place) - Bore Log Summary | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 19-Feb-09 | Asphalt Depth (ft) | Cr. Stone Depth (ft) | Soil Depth (ft) | Rock Encountered? | Depth to Rock (ft) | Rock Core Depth (ft) | Average Rock Recovery | Average Rock Quality (RQD) | Total Depth (ft) | Comments |
| B-1 | 0.3 | 0.5 | 14.4 | YES | 15.2 | 5.0 | 88.0% | 88.0% | 20.2 | No ground water encountered during soil sampling/drilling. 100% drill water recovered during coring. Water measured at 2.7' upon completion of coring and removal of tools. |
| B-2 | 0.4 | 0.5 | 19.6 | NO | N/A | N/A | N/A | N/A | 20.5 | Dry upon completion |
| B-3 | 0.4 | 0.5 | 14.1 | NO | N/A | N/A | N/A | N/A | 15.0 | Dry upon completion |
| B-4 | 0.3 | 0.5 | 20.0 | NO | N/A | N/A | N/A | N/A | 20.8 | Dry upon completion |
| B-5 | 0.3 | 0.5 | 2.9 | YES | 3.7 | 12.8 | 69.8% | 32.3% | 16.5 | Drill water lost at 12.0'. Void from 12.0' - 16.5'. |

## 5.0 GEOLOGY

Published geological literature indicates that the site is underlain by the light gray, calcareous, massively bedded limestone of the Bigby-Cannon Formation. This unit generally weathers to form a mantle of reddish-brown, phosphatic, sandy to highly plastic clay with an average thickness of about 10 feet. The relatively pure limestone of this formation is typically susceptible to solution weathering along near-vertical fractures and gently dipping bedding planes. An extension of this weathering process is the formation of a highly irregular bedrock surface characterized by soil-filled joints (cutters) and rock pinnacles. In addition, the Bigby-Cannon Formation is susceptible to the formation of sinkholes.

## 6.0 GEOLOGIC HAZARDS

Because this site is underlain by carbonate rock, there is a risk of sinkhole development within the area proposed for construction. We did not note any closed surface depressions at the site during our field work. In any event, we believe the potential for sinkhole development at the subject site is no greater than for other sites within this geologic setting. The risk, in our judgment, is similar wherever Bigby-Cannon Limestone is present. Present state-of-the-art geotechnical engineering does not permit accurate prediction of where or when sinkholes will occur. The Owner should realize that the possibility for post-construction sinkhole development cannot be completely eliminated, and that construction on this property, or essentially any other sites within this geologic setting, carries with it some risk that future sinkholes may occur.

## 7.0 DESIGN CONSIDERATIONS

You indicated to us that proposed improvements at the site include the installation of a sewer line laterals along the centerlines of the Poteat Place and Jefferson Drive. Information regarding the size, type, length of the sewer laterals was not known at the time of this report.

The comments and general recommendations that follow are predicated upon our experience in similar geologic settings, design assumptions stated above, and data obtained during this study.

## 8.0 COMMENTS AND RECOMMENDATIONS

### 8.1 General Assessment

In light of the above discussion and assumptions, the geotechnical aspects of the site should be generally straightforward. The majority of excavation for the project is expected to encounter

predominately soil materials; however, excavations of modest depths are likely to encounter rock. Our experience within similar settings suggests that the weathering nature of the host bedrock can be quite differential and is prominent and preferential along joints and fractures. Based on our familiarity with the host geology and upon review of the bedrock cores, some of the upper weathered portions of the bedrock can probably be machine excavated. However, it is likely that blasting or other intensive removal methods, such as hoe-ramming, will be required for the excavation of underlying bedrock. Ultimately, the geotechnical engineer or his representative should review site preparation operations to confirm that conditions are as anticipated.

### 8.2 Excavation & Backfill

Initially, the existing pavement section should be saw-cut to provide smooth edges for repair of the asphalt surface. Based upon data collected during the subsurface exploration, most of the soil that will be generated during the required excavation will consist predominately of silty clay with varying amounts of chert. Excavated materials may be stockpiled and assessed for use as engineered fill. Organic-free soil derived from on-site excavations containing no debris, rocks larger than 6-inches in maximum dimension, other objectionable material, and is of a suitable moisture content will be suitable for use as engineered fill provided it meets plasticity requirements presented below.

Once the sewer laterals have been installed in compliance with the manufacturer's requirements, engineered soil fill should be placed in maximum eight inch loose lifts and compacted to at least 95% of the soil's maximum dry density as per ASTM D698.

Engineered soil fill, whether generated from the site or imported from off-site, should consist of soils having a liquid limit (LL) of less than 40 and a plasticity index (PI) of less than 25. All soil used as engineered fill should be moisture conditioned to within ±2% of the soil's optimum moisture content.

Should the contractor choose to use Dense Graded Aggregate (DGA) in lieu of engineered soil fill, loose lifts with a maximum thickness of six inches should be placed and compacted using mechanical vibratory compactors.

Sidewalls of trenches or other temporary excavations should in no case exceed the maximum safe inclination as specified by OSHA (OSHA 29 CFR Part 1926). If workers are to enter

trenches or excavations greater than four feet in depth, or work areas adjacent to excavated slopes that do not have sidewalls laid back to maximum safe inclinations mandated by OSHA, an OSHA-approved trench box or shoring/sheeting system designed by a registered engineer must be utilized to protect work crews.

### 8.3 Pavement Design

For the purposes of this study, we presume that the pavement subgrade support will be provided by backfill that, when properly compacted, will develop support characteristics approximately equivalent to the previously existing subgrade of the roadway, which we estimate to exhibit a California Bearing Ratio (CBR) of 5. Current traffic frequency/loadings have not been provided to us; therefore, we recommend the new pavement section for repairing the sewer trench excavation match the existing pavement section.

Immediately prior to installation of the mineral aggregate base course, the pavement subgrade should be proofrolled in order to detect unstable areas. Any unstable areas should be undercut and replaced with compacted engineered fill. During construction of the aggregate base, in-place density tests and thickness checks should be performed to evaluate compliance with project specifications. Ultimately, it is essential that the bituminous pavement element only be installed on a uniformly stable aggregate base.

## 9.0 REPORT LIMITATIONS

The conclusions and recommendations given in this report are based on our observation and experience as well as information determined at the boring locations. Information contained herein in no way reflects on the environmental aspects of the project, unless otherwise stated. Subsurface and groundwater conditions between and beyond the boring locations may differ from those encountered at the locations explored, and conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation. We recommend the geotechnical engineer be retained during construction to confirm the subsurface conditions across the site do not deviate materially from those encountered in the boreholes.

The design recommendations given in this report are applicable only to the project described in the text, and then only if constructed substantially in accordance with the details stated in this report. Since all details of the design are not known, we recommend that we be retained during the final design stage to verify the design is consistent with our recommendations and that assumptions made in our analysis are valid.

The comments made in this report relating to potential construction problems and possible methods of construction are intended only for the guidance of the designer. The number of borings may not be sufficient to determine all the factors that may affect construction methods and costs. For example, the soil overburden thickness and character may vary markedly and unpredictably. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work. This work has been undertaken in accordance with normally accepted geotechnical engineering practices. No other warranty is expressed or implied.

As stated in our proposal, specifically excluded from the scope of this study is any assessment of the environmental aspects of the site. This report was prepared with the assumption that construction at the site will be in accordance with applicable standards and codes, regulations of authorities having jurisdiction, and prudent engineering practices.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. AMEC accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

## 10.0 CLOSURE

There should also be an ongoing liaison with AMEC during both final design and construction phases of the project to ensure that recommendations in this report have been interpreted and implemented correctly. The ASFE organization has prepared important information regarding studies of the type performed, and a copy of their brochure is attached for your review.

This report is prepared for the exclusive use of the City of Franklin for the site and criteria stipulated herein. Questions or interpretation regarding any portion of the report should be addressed directly by the geotechnical engineer. Reliance upon, usage, or implementation of the information or recommendations stated in this report by any member of the project team should not be undertaken without direct consultation of the City of Franklin and the geotechnical engineer.

# APPENDIX 1

# Important Information About Your

# Geotechnical Engineering Report

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

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

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

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

## Read the Full Report

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

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

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

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

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

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

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

## Subsurface Conditions Can Change

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

## Most Geotechnical Findings Are Professional Opinions

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

## A Report's Recommendations Are *Not* Final

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

## A Geotechnical Engineering Report Is Subject To Misinterpretation

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

## Do Not Redraw the Engineer's Logs

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

## Give Contractors a Complete Report and Guidance

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

## Read Responsibility Provisions Closely

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

## Geoenvironmental Concerns Are Not Covered

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

## Rely on Your Geotechnical Engineer for Additional Assistance

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

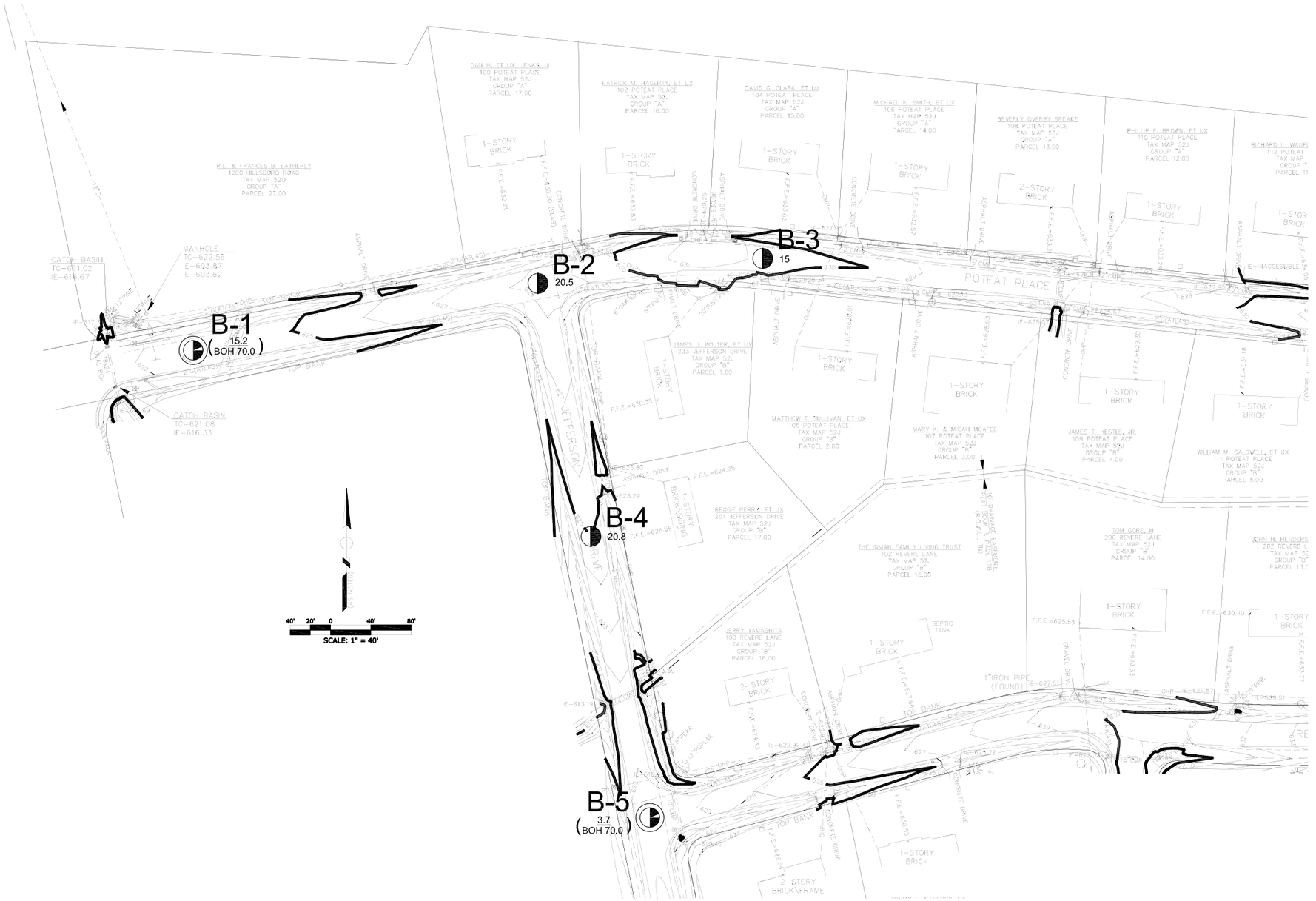
ASFE

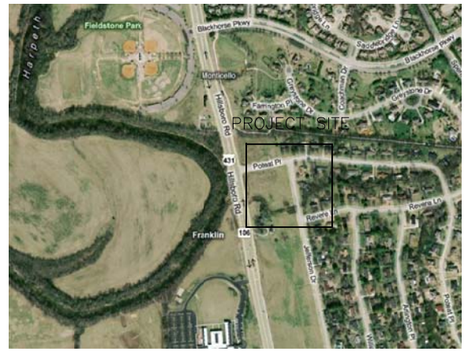
8811 Colesville Road Suite G106 Silver Spring, MD 20910
Telephone: 301-565-2733 Facsimile: 301-589-2017
email: info@asfe.org www.asfe.org



IIGER1000.10M

# APPENDIX 2




## VICINITY MAP

NOT TO SCALE

## LEGEND

- DRIVE–SAMPLED HOLE
- DRIVE–SAMPLED & CORED HOLE
- 5.0 TOTAL DEPTH OF HOLE (FEET)
- (5.0 / BOH 70.0) REFUSAL DEPTH OF CORED HOLE AND TOTAL (BOH) DEPTH (FEET)

## NOTES

1. PLAN ADAPTED FROM DRAWING PROVIDED BY SMITH, SECKMAN, REID, INC DATED NOVEMBER 2008.
2. BORING LOCATIONS AND LAYOUT BY OTHERS AND SHOULD BE CONSIDERED APPROXIMATE.
3. BORINGS B–1 THROUGH B–5 DRILLED FEBRUARY 19,2009.

NOTE: THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE AMEC EARTH & ENVIRONMENTAL REPORT No.5–6160–0000 DATED MARCH 2009.

| REV | D | M | Y | ISSUE/REVISION DESCRIPTION | ENG. | APPR. |
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| G | | | | | | |
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| A | | | | | | |

Client Logo:

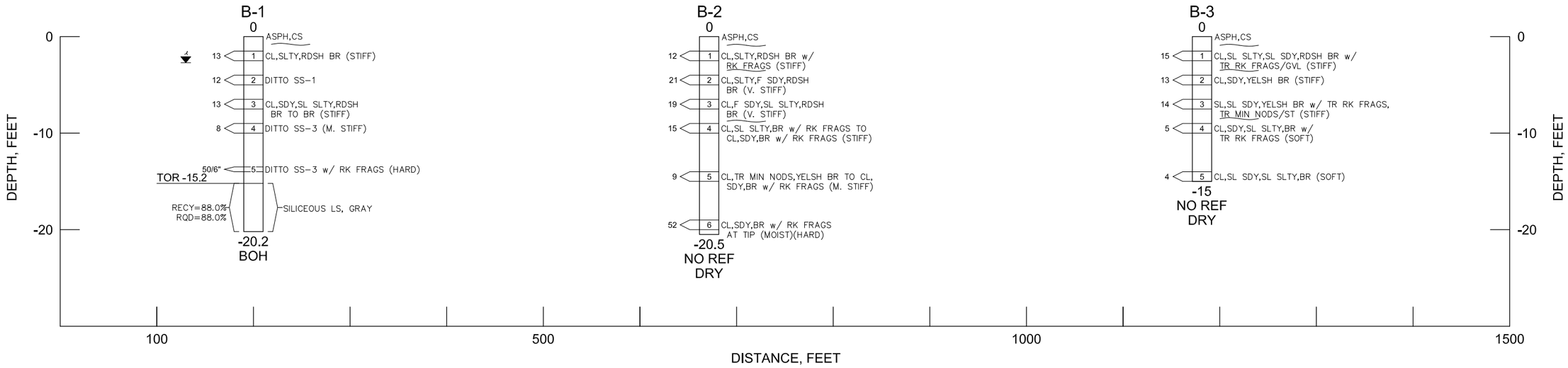
Client: CITY OF FRANKLIN

AMEC Earth & Environmental
3800 Ezell Road, Suite 100 Nashville, Tennessee 37211
Phone: 615–333–0630 Fax: 615–781–0655
www.amec.com/earthandenvironmental

DRAWN BY: SDD
CHECKED BY:
REVIEWED BY:
SCALE: AS SHOWN

PROJECT: POTEAT PLACE SEWER LINES
TITLE: PLAN

PROJECT NO.: 5-6160-0000
DATE: 03/13/2009
SHEET NO.: 1 of 2

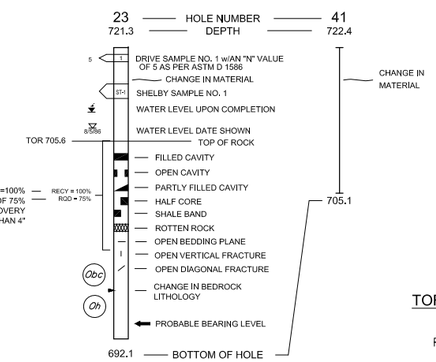



## ABBREVIATIONS

| | | | | | |
|---|---|---|---|---|---|
| ABUND | -ABUNDANT | GVL/Y | -GRAVEL/LY | REF | -REFUSAL |
| APPROX | -APPROXIMATE | GYP | -GYPSUM | RK | -ROCK |
| ARG | -ARGILLACEOUS | HD | -HARD | RTN | -ROTTEN |
| ASPH | -ASPHALT | HYCB | -HONEYCOMBED | RTS | -ROOTS |
| AX | -CORE DRILL SIZE | I | -INITIAL WATER LEVEL DURING DRILLING | SAT | -SATURATED |
| BD/S | -BAND/S | JTD | -JOINTED | SCATT | -SCATTERED |
| BENT | -BENTONITE | KSF | -KIPS PER SQUARE FOOT | SDY | -SANDY |
| BGS | -BELOW GROUND SURFACE | LAM | -LAMINATED | SVRLY | -SEVERELY |
| BL | -BLUE | LDW | -LOST DRILL WATER | SEV | -SEVERAL |
| BLDR/S | -BOULDER/S | LEA | -LEACHED | SHLY | -SHALEY |
| BLK | -BLACK | LG | -LARGE | SL | -SLIGHTLY |
| BLSH | -BLUISH | LGT | -LIGHT | SLSD | -SLICKENSIDED |
| BP/S | -BEDDING PLANE/S | LL | -LIQUID LIMIT | SLTY | -SILT/SILTY |
| BR | -BROWN | LS | -LIMESTONE | SM | -SOME |
| BRECC | - BRECCIATED | LSE | -LOOSE | SML | -SMALL |
| BRK/S | -BRICK/S | LTL | -LITTLE | S | -SOFT |
| BRNSH | -BROWNISH | LYS | -LAYERS | SOFN | -SOFTENED |
| BX/BQ | -CORE DRILL SIZE | LZ | -LENSES | SOLN | -SOLUTION |
| C | -COARSE | M | -MEDIUM | SPLE | -SAMPLE |
| CALC | -CALCAREOUS | MATL | -MATERIAL | SS | -SANDSTONE |
| CAVY | -CAVITY/CAVITIES | MAX | -MAXIMUM | ST | -STAINED |
| CBLS | -COBBLES | MC | -MICACEOUS | STA | -STATION |
| CEM | -CEMENT/CEMENTED | MIN | -MINIMUM | STKS | -STREAKS |
| CHT/Y | -CHERT/CHERTY | MINL | -MINERAL | STRAT | -STRATIFIED |
| CLY | -CLAY/CLAYEY | MOD | -MODERATELY | SURF | -SURFACE |
| CNDS | - CINDERS | MOTT | -MOTTLED | T | -TAN |
| CONC | - CONCRETE | NX | -CORE DRILL SIZE | TOR | -TOP OF ROCK |
| CS | -CRUSHED STONE | NOD/S | -NODULE/S | TR/S | -TRACE/TRACES |
| CSG | -CASING | NUM | -NUMEROUS | TSF | -TONS PER SQUARE FOOT |
| D | -DENSE/DENSELY | OCC | -OCCASIONAL/OCCASIONALLY | USC | -UNIFIED SOIL CLASSIFICATION |
| DEB | - DEBRIS | ORG | -ORGANICS | V | -VERY |
| DEC | - DECOMPOSED | OSBP/S | -OPEN,STAINED BEDDING PLANE/S | VAR | -VARIABLE/VARIABILITY |
| DF/S | -DIAGONAL FRACTURE/S | OSDF/S | -OPEN,STAINED DIAGONAL FRACTURE/S | VEG | -VEGETATION |
| DGA | -DENSE GRADED AGGREGATE | OSLBP/S | -OPEN,STAINED LEACHED BEDDING PLANE/S | VF/S | -VERTICAL FRACTURE/S |
| DISPL | -DISPLACEMENT | OSLV/F/S | -OPEN,STAINED,LEACHED VERTICAL FRACTURE/S | W | -%,NATURAL MOISTURE CONTENT |
| DK | -DARK | OSV/F/S | -OPEN,STAINED VERTICAL FRACTURE/S | w/ | -WITH |
| DLLG | -DRILLING | OVB | -OVERBURDEN | W/B | -WASHBOARD |
| DO | -DITTO | PF | -PARTLY FILLED | WD | -WOOD |
| DOL | -DOLOMITE | PHOS | -PHOSPHATIC | WEA | -WEATHERED |
| DWR | -DRILL WATER RETAINED | PI | -PLASTICITY INDEX | WHT | -WHITE |
| ELEV | -ELEVATION | POSS | -POSSIBLE/POSSIBLY | WT | -WEIGHT |
| EST | -ESTIMATED | PL | -PLASTIC LIMIT | WTR | -WATER |
| F | -FINE/FINELY | PP | -POCKET PENETROMETER (TSF) | X/CPT | -EXCEPT |
| FRM | -FIRM | PROB | -PROBABLE/PROBABLY | XLN | -CRYSTALLINE |
| FS | -FERROUS | PROJ | -PROJECTED | YEL | -YELLOW |
| FN | -FORMATION | PT/D | -PARTING | YELSH | -YELLOWISH |
| FOSS | -FOSSILIFEROUS | PTLY | -PARTLY | ZHS | -ZONE/S |
| FRAC/S | -FRACTURE/S | PTTD | -FITTED | γd | -DRY UNIT WEIGHT IN PCF |
| FRAG/S | -FRAGMENT/S | PZ | -PIEZOMETER | γw | -ACRET UNIT WEIGHT IN PCF |
| GD | -GROUND | RDSH | -REDDISH | qu | -UNCONFINED COMPRESSIVE STRENGTH IN KSF |
| GPM | -GALLONS PER MINUTE | RECY | -RECOVERY | | |
| GR | -GRAY | | | | |
| GRN | -GREEN | | | | |
| GRNID | -GRAINED | | | | |
| GRNSH | -GREENISH | | | | |
| GRSH | -GRAVISH | | | | |

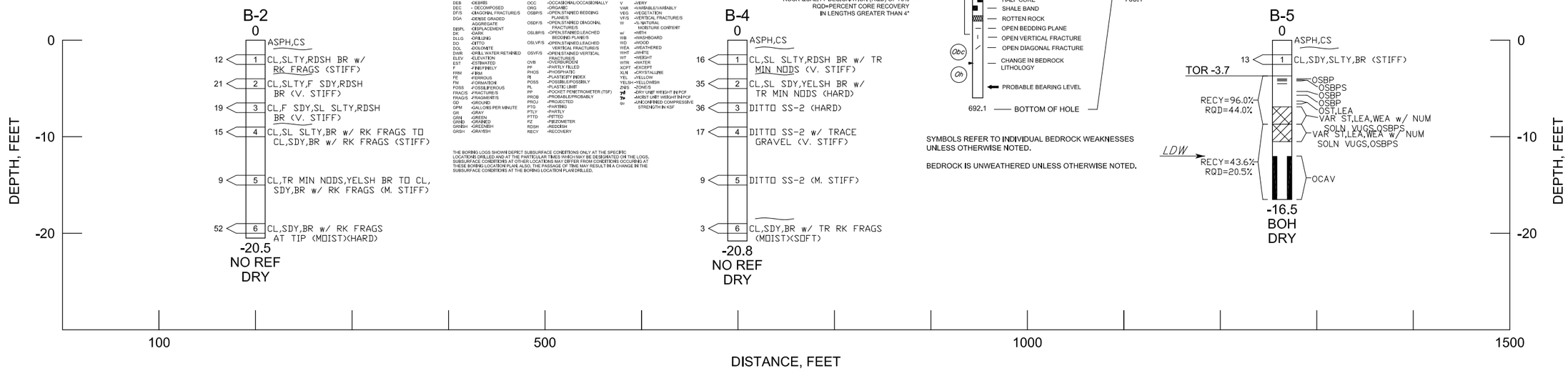
THE BORING LOGS SHOWN DEPICT SUBSURFACE CONDITIONS ONLY AT THE SPECIFIC LOCATIONS DRILLED AND AT THE PARTICULAR TIMES WHICH MAY BE DESIGNATED ON THE LOGS. SUBSURFACE CONDITIONS AT OTHER LOCATIONS MAY DIFFER FROM CONDITIONS OCCURRING AT THESE BORING LOCATION PLAN. ALSO, THE PASSAGE OF TIME MAY RESULT IN A CHANGE IN THE SUBSURFACE CONDITIONS AT THE BORING LOCATION PLAN DRILLED.

## LEGEND




SYMBOLS REFER TO INDIVIDUAL BEDROCK WEAKNESSES UNLESS OTHERWISE NOTED.

BEDROCK IS UNWEATHERED UNLESS OTHERWISE NOTED.




NOTE: THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE AMEC EARTH & ENVIRONMENTAL REPORT No. 5-6160-0000 DATED MARCH 2009.

| REV | D | M | Y | ISSUE/REVISION DESCRIPTION | ENG. | APPR. |
|---|---|---|---|---|---|---|
| G | | | | | | |
| F | | | | | | |
| E | | | | | | |
| D | | | | | | |
| C | | | | | | |
| B | | | | | | |
| A | | | | | | |

Client: CITY OF FRANKLIN

AMEC Earth & Environmental
3800 Ezell Road, Suite 100 Nashville, Tennessee 37211
Phone: 615-333-0630 Fax: 615-781-0655
www.amec.com/earthandenvironmental

DRAWN BY: SDD
CHECKED BY:
REVIEWED BY:
SCALE: AS SHOWN

PROJECT: POTEAT PLACE SEWER LINES
TITLE: BORING LOGS

PROJECT NO.: 5-6160-0000
DATE: 03/13/2009
SHEET NO.: 2 of 2

**GEOTECHNICAL BRANCH**
**NASHVILLE, TENNESSEE**

LOG OF BORING B-1
SHEET 1 OF 1

| | | | |
|---|---|---|---|
| PROJECT | POTEAT PLACE SEWER LINES | DRILLER | TRI-STATE DRILLING |
| PROJECT NO. | 5-6160-0000-0000 | ON-SITE REP. | WWC |
| BORING NO. / LOCATION | B-1 / 2.0' south of CL of Poteat | DRY ON COMPLETION ? | YES, PRIOR TO CORING |
| DATE | February 19, 2009 | SURFACE ELEV. | FT. |
| REFUSAL: | DEPTH 15.2 FT. | ELEV. -15.2 FT. | |
| SAMPLED | 15.2 FT. | | |
| TOP OF ROCK | DEPTH 15.2 FT. | ELEV. -15.2 FT. | |
| BEGAN CORING | DEPTH 15.2 FT. | ELEV. -15.2 FT. | |
| FOOTAGE CORED (LF) | 5.0 FT. | | |
| BOTTOM OF HOLE DEPTH | 20.2 FT. | ELEV. -20.2 FT. | |

**WATER LEVEL DATA (IF APPLICABLE)**

| | | |
|---|---|---|
| COMPLETION: | DEPTH | 2.7 FT. |
| | ELEV. | -2.7 FT. |
| AFTER 24 HRS. | DEPTH | FT. |
| | ELEV. | FT. |
| LDW AT: | DEPTH | FT. |
| | ELEV. | FT. |

BORING ADVANCED BY: CORING . POWER AUGERING X WASHBORING

| STRATUM DEPTH FT. | SAMPLE DEPTH FROM FT. | SAMPLE DEPTH TO FT. | SAMPLE OR RUN NO. | SAMPLE TYPE | SPLE/CORE RECOV'D (INCH.) | SPT VALUES 6" | 6" | 6" | N | STRATUM DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.0 | 0.8 | | A | | | | | | Asphalt, crushed stone |
| | 0.8 | 1.0 | | A | | | | | | Clay, silty, reddish-brown |
| | 1.0 | | SS-1 | SS | | 9 | 7 | 6 | 13 | Clay, silty, reddish-brown |
| 2.5 | | 2.5 | | | | | | | | (Stiff) |
| | 2.5 | | | A | | | | | | |
| | | 3.5 | | | | | | | | |
| | 3.5 | | SS-2 | SS | | 6 | 6 | 6 | 12 | DITTO SS-1 |
| | | 5.0 | | | | | | | | |
| 5.0 | 5.0 | | | A | | | | | | |
| | | 6.0 | | | | | | | | |
| | 6.0 | | SS-3 | SS | | 5 | 6 | 7 | 13 | Clay, sandy, slightly silty, reddish brown to brown |
| | | 7.5 | | | | | | | | (Stiff) |
| 7.5 | 7.5 | | | A | | | | | | |
| | | 8.5 | | | | | | | | |
| | 8.5 | | SS-4 | SS | | 4 | 4 | 4 | 8 | DITTO SS-3 |
| | | 10.0 | | | | | | | | (Medium Stiff) |
| 10.0 | 10.0 | | | | | | | | | |
| | | | | A | | | | | | |
| 12.5 | | | | | | | | | | |
| | | 13.5 | | | | | | | | |
| | 13.5 | 14.0 | SS-5 | SS | | 50/.5 | | | 50/.5 | DITTO SS-3 with rock fragments |
| | 14.0 | | | A | | | | | | (Hard) |
| | | 15.2 | | | | | | | | Auger Refusal @ 15.2', Dry on Completion |
| 15.0 | 15.2 | | RUN 1 |  | | | | | | Begin NQ Coring @ 15.2', 100% DWR |
| | | | RAN 5.0 | | | | | | | |
| | | | REC 4.4 | | | | | | | |
| | | | RQD = 88.0 | | | | | | | |
| 17.5 | | | | | | | | | | Siliceous Limestone |
| | | | | | | | | | | |
| | | 20.2 | | | | | | | | Boring Terminated @ 20.2', 100% DWR |
| 20.0 | | | | | | | | | | |

REMARKS:

**GEOTECHNICAL BRANCH**
**NASHVILLE, TENNESSEE**

LOG OF BORING B-2
SHEET 1 OF 2

| | | | |
|---|---|---|---|
| PROJECT | POTEAT PLACE SEWER LINES | DRILLER | TRI-STATE DRILLING |
| PROJECT NO. | 5-6160-0000-0000 | ON-SITE REP. | WWC |
| BORING NO. / LOCATION | B-2 / 4.0' south of CL of Poteat | DRY ON COMPLETION ? | YES |
| DATE | February 19, 2009 | SURFACE ELEV. | FT. |
| REFUSAL: | DEPTH FT. | ELEV. | FT. |
| SAMPLED | 20.5 FT. | | |
| TOP OF ROCK | DEPTH FT. | ELEV. | FT. |
| BEGAN CORING | DEPTH FT. | ELEV. | FT. |
| FOOTAGE CORED (LF) | FT. | | |
| BOTTOM OF HOLE DEPTH | 20.5 FT. | ELEV. | -20.5 FT. |

**WATER LEVEL DATA (IF APPLICABLE)**

| | | |
|---|---|---|
| COMPLETION: | DEPTH | FT. |
| | ELEV. | FT. |
| AFTER 24 HRS. | DEPTH | FT. |
| | ELEV. | FT. |
| LDW AT: | DEPTH | FT. |
| | ELEV. | FT. |

BORING ADVANCED BY: . POWER AUGERING X WASHBORING

| STRATUM DEPTH FT. | SAMPLE DEPTH FROM FT. | SAMPLE DEPTH TO FT. | SAMPLE OR RUN NO. | SAMPLE TYPE | SPLE/CORE RECOV'D (INCH.) | SPT VALUES 6" | 6" | 6" | N | STRATUM DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.0 | 0.9 | | A | | | | | | Asphalt, crushed stone |
| | 0.9 | 1.0 | | A | | | | | | Clay, silty, reddish-brown |
| | 1.0 | | SS-1 | SS | | 7 | 6 | 6 | 12 | Clay, silty, reddish-brown with rock fragments |
| 2.5 | | 2.5 | | | | | | | | (Stiff) |
| | 2.5 | 3.5 | | A | | | | | | |
| | 3.5 | | SS-2 | SS | | 8 | 9 | 12 | 21 | Clay, silty, fine sandy, reddish-brown |
| 5.0 | | 5.0 | | | | | | | | (Very Stiff) |
| | 5.0 | 6.0 | | A | | | | | | |
| | 6.0 | | SS-3 | SS | | 8 | 7 | 12 | 19 | Clay, fine sandy, slightly silty, reddish-brown |
| 7.5 | | 7.5 | | | | | | | | (Very Stiff) |
| | 7.5 | 8.5 | | A | | | | | | |
| | 8.5 | | SS-4 | SS | | 6 | 7 | 8 | 15 | Clay, slightly silty, brown with rock fragments to |
| 10.0 | | 10.0 | | | | | | | | Clay, sandy, brown with rock fragments |
| | 10.0 | | | | | | | | | (Stiff) |
| | | | | A | | | | | | |
| 12.5 | | | | | | | | | | |
| | | 13.5 | | | | | | | | |
| | 13.5 | | SS-5 | SS | | 3 | 4 | 5 | 9 | Clay, trace mineral nodules, yellowish-brown to |
| | | 15.0 | | | | | | | | clay, sandy, brown with rock fragments |
| 15.0 | 15.0 | | | | | | | | | (Medium Stiff) |
| | | | | A | | | | | | |
| 17.5 | | | | | | | | | | |
| | | 18.5 | | | | | | | | |
| | 18.5 | | SS-6 | SS | | 3 | 2 | 50/.2 | 50/.2 | Clay, sandy, brown with rock fragments at tip |
| 20.0 | | 20.0 | | | | | | | | (Moist)(Hard) |

REMARKS: Continued on Page 2.

**GEOTECHNICAL BRANCH**
**NASHVILLE, TENNESSEE**

LOG OF BORING B-2
SHEET 2 OF 2

PROJECT: POTEAT PLACE SEWER LINES
PROJECT NO.: 5-6160-0000-0000
BORING NO. / LOCATION: B-2 / 4.0' south of CL of Poteat
DATE: February 19, 2009
SURFACE ELEV. ____ FT.
REFUSAL: DEPTH ____ FT. ELEV. ____ FT.
SAMPLED: 20.5 FT.
TOP OF ROCK: DEPTH ____ FT. ELEV. ____ FT.
BEGAN CORING: DEPTH ____ FT. ELEV. ____ FT.
FOOTAGE CORED (LF): ____ FT.
BOTTOM OF HOLE DEPTH: 20.5 FT. ELEV. -20.5 FT.
BORING ADVANCED BY: ____ POWER AUGERING X WASHBORING ____

DRILLER: TRI-STATE DRILLING
ON-SITE REP.: WWC
DRY ON COMPLETION ?: YES

**WATER LEVEL DATA (IF APPLICABLE)**
COMPLETION: DEPTH ____ FT. ELEV. ____ FT.
AFTER 24 HRS. DEPTH ____ FT. ELEV. ____ FT.
LDW AT: DEPTH ____ FT. ELEV. ____ FT.

| STRATUM DEPTH FT. | SAMPLE DEPTH FROM FT. | SAMPLE DEPTH TO FT. | SAMPLE OR RUN NO. | SAMPLE TYPE | SPLE/CORE RECOV'D (INCH.) | SPT VALUES 6" | 6" | 6" | N | STRATUM DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|
| | 20.0 | 20.5 | | A | | | | | | |

Boring Terminated @ 20.5'
Dry on Completion
Note: Touching rock, but no refusal.

22.5
25.0
27.5
30.0
32.5
35.0
37.5
40.0

REMARKS: ____

**GEOTECHNICAL BRANCH**
**NASHVILLE, TENNESSEE**

LOG OF BORING B-3
SHEET 1 OF 1

PROJECT: POTEAT PLACE SEWER LINES
PROJECT NO.: 5-6160-0000-0000
BORING NO. / LOCATION: B-3 / 3.5' south of CL of Poteat
DATE: February 19, 2009
SURFACE ELEV. ____ FT.
REFUSAL: DEPTH ____ FT. ELEV. ____ FT.
SAMPLED: 15.0 FT.
TOP OF ROCK: DEPTH ____ FT. ELEV. ____ FT.
BEGAN CORING: DEPTH ____ FT. ELEV. ____ FT.
FOOTAGE CORED (LF): ____ FT.
BOTTOM OF HOLE DEPTH: 15.0 FT. ELEV. -15.0 FT.
BORING ADVANCED BY: ____ POWER AUGERING: X WASHBORING: ____

DRILLER: TRI-STATE DRILLING
ON-SITE REP.: WWC
DRY ON COMPLETION ?: YES

**WATER LEVEL DATA (IF APPLICABLE)**

| | | |
|---|---|---|
| COMPLETION: | DEPTH | FT. |
| | ELEV. | FT. |
| AFTER 24 HRS. | DEPTH | FT. |
| | ELEV. | FT. |
| LDW AT: | DEPTH | FT. |
| | ELEV. | FT. |

| STRATUM DEPTH FT. | SAMPLE DEPTH FROM FT. | SAMPLE DEPTH TO FT. | SAMPLE OR RUN NO. | SAMPLE TYPE | SPLE/CORE RECOV'D (INCH.) | SPT VALUES 6" | 6" | 6" | N | STRATUM DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.0 | 0.9 | | A | | | | | | Asphalt, crushed stone |
| | 0.9 | 1.0 | | A | | | | | | Clay, silty, reddish-brown |
| | 1.0 | | SS-1 | SS | | 6 | 7 | 8 | 15 | Clay, slighlty silty, slightly sandy, reddish-brown with trace rock fragments/gravel (Stiff) |
| 2.5 | | 2.5 | | | | | | | | |
| | 2.5 | | | A | | | | | | |
| | | 3.5 | | | | | | | | |
| | 3.5 | | SS-2 | SS | | 6 | 6 | 7 | 13 | Clay, sandy, yellowish-brown (Stiff) |
| | | 5.0 | | | | | | | | |
| 5.0 | 5.0 | | | A | | | | | | |
| | | 6.0 | | | | | | | | |
| | 6.0 | | SS-3 | SS | | 5 | 6 | 8 | 14 | Clay, slightly sandy, yellowish-brown with trace rock fragments, trace mineral nodules/staining (Stiff) |
| | | 7.5 | | | | | | | | |
| 7.5 | 7.5 | | | A | | | | | | |
| | | 8.5 | | | | | | | | |
| | 8.5 | | SS-4 | SS | | 3 | 2 | 3 | 5 | Clay, sandy, slightly silty, brown with trace rock fragments (Soft) |
| | | 10.0 | | | | | | | | |
| 10.0 | 10.0 | | | | | | | | | |
| | | | | A | | | | | | Auger through soft rock. Possibly side of pinnacle. |
| 12.5 | | | | | | | | | | |
| | | 13.5 | | | | | | | | |
| | 13.5 | | SS-5 | SS | | 2 | 2 | 2 | 4 | Clay, slightly sandy, slightly silty, brown (Soft) |
| | | 15.0 | | | | | | | | |
| 15.0 | | | | | | | | | | Boring Terminated @ 15.0' Dry on Completion |
| 17.5 | | | | | | | | | | |
| 20.0 | | | | | | | | | | |

REMARKS: ____

**GEOTECHNICAL BRANCH**
**NASHVILLE, TENNESSEE**

LOG OF BORING B-4
SHEET 1 OF 2

| | | | |
|---|---|---|---|
| PROJECT | POTEAT PLACE SEWER LINES | DRILLER | TRI-STATE DRILLING |
| PROJECT NO. | 5-6160-0000-0000 | ON-SITE REP. | WWC |
| BORING NO. / LOCATION | B-4, 5' west of CL of Jefferson Drive | DRY ON COMPLETION ? | YES |
| DATE | February 19, 2009 | SURFACE ELEV. | FT. |
| REFUSAL: | DEPTH FT. | ELEV. | FT. |
| SAMPLED | 20.8 FT. | | |
| TOP OF ROCK | DEPTH FT. | ELEV. | FT. |
| BEGAN CORING | DEPTH FT. | ELEV. | FT. |
| FOOTAGE CORED (LF) | FT. | | |
| BOTTOM OF HOLE DEPTH | 20.8 FT. | ELEV. -20.8 | FT. |

**WATER LEVEL DATA (IF APPLICABLE)**

| | | |
|---|---|---|
| COMPLETION: | DEPTH | FT. |
| | ELEV. | FT. |
| AFTER 24 HRS. | DEPTH | FT. |
| | ELEV. | FT. |
| LDW AT: | DEPTH | FT. |
| | ELEV. | FT. |

BORING ADVANCED BY: . POWER AUGERING X WASHBORING

| STRATUM DEPTH FT. | SAMPLE DEPTH FROM FT. | SAMPLE DEPTH TO FT. | SAMPLE OR RUN NO. | SAMPLE TYPE | SPLE/CORE RECOV'D (INCH.) | SPT VALUES 6" | 6" | 6" | N | STRATUM DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.0 | 0.8 | | A | | | | | | Asphalt, crushed stone |
| | 0.8 | 1.0 | | A | | | | | | Clay, silty, reddish-brown |
| | 1.0 | | SS-1 | SS | | 6 | 6 | 10 | 16 | Clay, slightly silty, reddish-brown with trace mineral nodules (Very Stiff) |
| 2.5 | 2.5 | 3.5 | | A | | | | | | |
| | 3.5 | | SS-2 | SS | | 12 | 15 | 20 | 35 | Clay, slightly sandy, yellowish-brown with trace mineral nodules (Hard) |
| 5.0 | 5.0 | 6.0 | | A | | | | | | |
| | 6.0 | | SS-3 | SS | | 13 | 14 | 22 | 36 | DITTO SS-2 (Hard) |
| 7.5 | 7.5 | 8.5 | | A | | | | | | |
| | 8.5 | | SS-4 | SS | | 4 | 6 | 11 | 17 | DITTO SS-2 with trace gravel (Very Stiff) |
| 10.0 | 10.0 | 13.5 | | A | | | | | | |
| 12.5 | 13.5 | | SS-5 | SS | | 5 | 5 | 4 | 9 | DITTO SS-2 (Medium Stiff) |
| 15.0 | 15.0 | 18.5 | | A | | | | | | |
| 17.5 | 18.5 | | SS-6 | SS | | 2 | 2 | 1 | 3 | Clay, sandy, brown with trace rock fragments (Moist)(Soft) |
| 20.0 | | 20.0 | | | | | | | | |

REMARKS: Continued on Page 2.

**GEOTECHNICAL BRANCH**
**NASHVILLE, TENNESSEE**

LOG OF BORING B-4
SHEET 2 OF 2

| | | | |
|---|---|---|---|
| PROJECT | POTEAT PLACE SEWER LINES | DRILLER | TRI-STATE DRILLING |
| PROJECT NO. | 5-6160-0000-0000 | ON-SITE REP. | WWC |
| BORING NO. / LOCATION | B-4, 5' west of CL of Jefferson Drive | DRY ON COMPLETION ? | YES |

DATE February 19, 2009 SURFACE ELEV. ____ FT.

REFUSAL: DEPTH ____ FT. ELEV. ____ FT.

SAMPLED 20.8 FT.

TOP OF ROCK DEPTH ____ FT. ELEV. ____ FT.

BEGAN CORING DEPTH ____ FT. ELEV. ____ FT.

FOOTAGE CORED (LF) ____ FT. ____

BOTTOM OF HOLE DEPTH 20.8 FT. ELEV. -20.8 FT.

**WATER LEVEL DATA (IF APPLICABLE)**

COMPLETION: DEPTH ____ FT.
ELEV. ____ FT.
AFTER 24 HRS. DEPTH ____ FT.
ELEV. ____ FT.
LDW AT: DEPTH ____ FT.
ELEV. ____ FT.

BORING ADVANCED BY: ____ POWER AUGERING X WASHBORING ____

| STRATUM DEPTH FT. | SAMPLE DEPTH FROM FT. | SAMPLE DEPTH TO FT. | SAMPLE OR RUN NO. | SAMPLE TYPE | SPLE/CORE RECOV'D (INCH.) | SPT VALUES 6" | 6" | 6" | N | STRATUM DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|
| | 20.0 | 20.8 | | A | | | | | | |
| 22.5 | | | | | | | | | | Boring Terminated @ 20.8' Dry on Completion Note: 20.8' possibly top of rock. |
| 25.0 | | | | | | | | | | |
| 27.5 | | | | | | | | | | |
| 30.0 | | | | | | | | | | |
| 32.5 | | | | | | | | | | |
| 35.0 | | | | | | | | | | |
| 37.5 | | | | | | | | | | |
| 40.0 | | | | | | | | | | |

REMARKS: ____

**GEOTECHNICAL BRANCH**
**NASHVILLE, TENNESSEE**

LOG OF BORING B-5
SHEET 1 OF 1

| | | | |
|---|---|---|---|
| PROJECT | POTEAT PLACE SEWER LINES | DRILLER | TRI-STATE DRILLING |
| PROJECT NO. | 5-6160-0000-0000 | ON-SITE REP. | WWC |
| BORING NO. / LOCATION | B-5 / 3.0' west of CL of Jefferson Drive | DRY ON COMPLETION ? | YES, PRIOR TO CORING |
| DATE | February 19, 2009 | SURFACE ELEV. | FT. |
| REFUSAL: | DEPTH 3.7 FT. | ELEV. -3.7 | FT. |
| SAMPLED | 3.7 FT. | | |
| TOP OF ROCK | DEPTH 3.7 FT. | ELEV. -3.7 | FT. |
| BEGAN CORING | DEPTH 3.7 FT. | ELEV. -3.7 | FT. |
| FOOTAGE CORED (LF) | 12.8 FT. | | |
| BOTTOM OF HOLE DEPTH | 16.5 FT. | ELEV. -16.5 | FT. |

**WATER LEVEL DATA (IF APPLICABLE)**

| | | |
|---|---|---|
| COMPLETION: | DEPTH | FT. |
| | ELEV. | FT. |
| AFTER 24 HRS. | DEPTH | FT. |
| | ELEV. | FT. |
| LDW AT: | DEPTH | FT. |
| | ELEV. | FT. |

BORING ADVANCED BY: CORING . POWER AUGERING X WASHBORING

| STRATUM DEPTH FT. | SAMPLE DEPTH FROM FT. | SAMPLE DEPTH TO FT. | SAMPLE OR RUN NO. | SAMPLE TYPE | SPLE/CORE RECOV'D (INCH.) | SPT VALUES 6" | 6" | 6" | N | STRATUM DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.0 | 0.8 | | A | | | | | | Asphalt, crushed stone |
| | 0.8 | 1.0 | | A | | | | | | Clay, sandy, silty, brown |
| | 1.0 | | SS-1 | SS | | 5 | 6 | 7 | 13 | Clay, sandy, silty, brown (Stiff) |
| 2.5 | 2.5 | 3.7 | | A | | | | | | Auger Refusal @ 3.7', Dry on Completion |
| | 3.7 | | RUN 1 RAN 5.0 REC 4.8 RQD= 44.0 |  | | | | | | Begin NQ Coring @ 3.7', 100% DWR |
| 5.0 | | | | | | | | | | Siliceous limestone, open stained, leached gray to light gray with numerous solution vugs, and open stained bedding planes |
| 7.5 | | 8.7 | | | | | | | | |
| | 8.7 | | RUN 2 RAN 7.8 REC 3.4 RQD= 20.5 |  | | | | | | |
| 10.0 | | | | | | | | | | Siliceous limestone, variably stained, leached, weathered, light gray to gray with numerous solution vugs, open stained bedding planes, and open cavity 12.0' to 16.5' |
| 12.5 | | | | | | | | | | 100% DWL @ 12.0' |
| 15.0 | | 16.5 | | | | | | | | |
| 17.5 | | | | | | | | | | Boring Terminated @ 16.5', 100% DWL |
| 20.0 | | | | | | | | | | |

REMARKS:

# APPENDIX 3

# AMEC GEOTECHNICAL AND CONSTRUCTION MATERIALS LABORATORY

5211 Linbar Drive, Suite 513, Nashville, Tennessee 37211

Telephone: 615/831-9202 Fax: 615/831-9516

## SUMMARY OF LABORATORY TEST RESULTS

**PROJECT:** Poteat Pl & Jefferson Dr Sewer Installation
**PROJECT NO.:** 5-6160-0000
**DATE:** March 12, 2009

| Boring/ Test Pit No. | Sample No. | Sample Type * | Depth ( Ft. ) | Natural Moisture ( % ) | UNIT WEIGHT MOIST. ( % ) | UNIT WEIGHT Dry DENSITY ( PCF) | Atterberg Limits Liquid Limit | Atterberg Limits Plasticity Index | Unified Soil Classification | Soil pH | Other Test ** | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B-1 | S-1 | SS | 1.0-2.5 | 23 | | | | | | | | CLAY, silty, reddish-brown |
| B-1 | S-2 | SS | 3.5-5.0 | 20 | | | | | | | | CLAY, silty, reddish-brown |
| B-1 | S-3 | SS | 6.0-7.5 | 25 | | | 34 | 14 | CL | | S | CLAY, silty, reddish-brown |
| B-1 | S-4 | SS | 8.5-10.0 | 21 | | | | | | | | CLAY, silty, reddish-brown |
| B-2 | S-1 | SS | 1.0-2.5 | 14 | | | | | | | | CLAY, silty, reddish-brown with weathered chert |
| B-2 | S-2 | SS | 3.5-5.0 | 33 | | | 38 | 15 | CL | | S | CLAY, silty, reddish-brown with weathered chert |
| B-2 | S-3 | SS | 6.0-7.5 | 33 | | | | | | | | CLAY, silty, reddish-brown with weathered chert |
| B-2 | S-4 | SS | 8.5-10.0 | 34 | | | | | | | | CLAY, silty, reddish-brown with weathered chert |
| B-3 | S-1 | SS | 1.0-2.5 | 27 | | | | | | | | CLAY, silty, reddish-brown |
| B-3 | S-2 | SS | 3.5-5.0 | 26 | | | | | | | | CLAY, silty, yellosish-brown |
| B-3 | S-3 | SS | 6.0-7.5 | 33 | | | | | | | | CLAY, silty, brown |
| B-3 | S-4 | SS | 8.5-10.0 | 44 | | | | | | | | CLAY, silty, brown |
| B-4 | S-1 | SS | 1.0-2.5 | 22 | | | | | | | | CLAY, silty, reddish-brown |
| B-4 | S-2 | SS | 3.5-5.0 | 29 | | | | | | | | Clay, silty, reddish- to yellowish-brown |
| B-4 | S-3 | SS | 6.0-7.5 | 25 | | | | | | | | CLAY, silty, yellosish-brown |
| B-4 | S-4 | SS | 8.5-10.0 | 28 | | | | | | | | CLAY, silty, yellosish-brown |
| Composite | B-1 | B | 2.0-5.0 | | 25.3 | 96.9 | 43 | 22 | CL | | S | Clay, silty, reddish- to yellowish-brown |
| | | | | | | | | | | | | |
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* ST-SHELBY TUBE, SS-SPLIT SPOON / SPLIT-BARREL SAMPLER, B-BAG / BULK, C-CORE

**C- Consolidation Test
S-Sieve or Grain Size Analysis
U-Unconfined Compression Test
R-Relative Density
SL-Shrinkage Limits
P-Permeability
D-Direct Shear
T-Triaxial Compression Test
CBR-California Bearing Ratio
H-Hydrometer

NOTE:

DATA CHECKED _____

**AMEC GEOTECHNICAL AND CONSTRUCTION MATERIALS LABORATORY**
5211 Linbar Drive, Suite 513, Nashville, Tennessee 37211
Telephone: 615/831-9202 Fax: 615/831-9516

## MOISTURE DETERMINATIONS

**CLIENT:** City of Franklin **PROJECT NO.:** 5-6160-0000-0000

**PROJECT NAME:** Poteat Place (Monticello Subdivision Sewer) **DATE:** March 11, 2009

**DATE SAMPLE(S) RECEIVED:** Feb. 2009

| Hole No. | B-1 | B-1 | B-1 | B-1 | | B-2 | B-2 | B-2 | B-2 |
|---|---|---|---|---|---|---|---|---|---|
| Sample No. | 1.0'-2.5' | 3.5'-5.0' | 6.0'-7.5' | 8.5'-10.0' | | 1.0'-2.5' | 3.5'-5.0' | 6.0'-7.5' | 8.5'-10.0' |
| Container No. | 11 | F | 12 | 13 | | 4 | 5 | 6 | 7 |
| Weight of Container | 0.42 | 138.26 | 0.40 | 0.40 | | 0.41 | 0.41 | 0.41 | 0.39 |
| Container + Wet Soil | 80.93 | 756.48 | 69.32 | 100.30 | | 51.23 | 79.47 | 109.27 | 96.38 |
| Container + Dry Soil | 65.75 | 653.80 | 55.72 | 82.82 | | 45.13 | 59.83 | 82.35 | 71.80 |
| Weight of Water | 15.18 | 102.68 | 13.60 | 17.48 | | 6.10 | 19.64 | 26.92 | 24.58 |
| Container + Dry Soil | 65.75 | 653.80 | 55.72 | 82.82 | | 45.13 | 59.83 | 82.35 | 71.80 |
| Weight of Dry Soil | 65.33 | 515.54 | 55.32 | 82.42 | | 44.72 | 59.42 | 81.94 | 71.41 |
| Percent Water | 23.2% | 19.9% | 24.6% | 21.2% | | 13.6% | 33.1% | 32.9% | 34.4% |

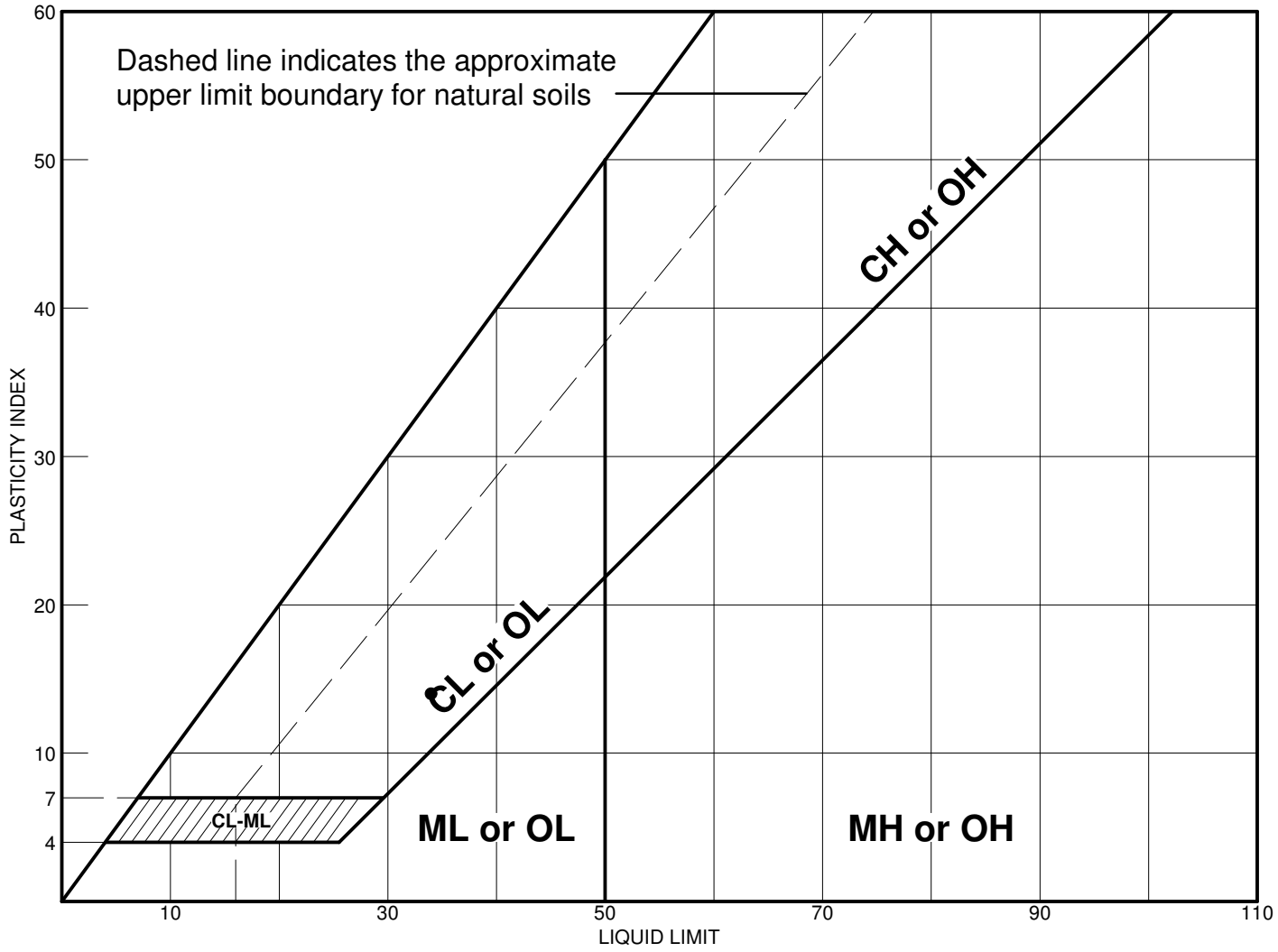
| Hole No. | B-3 | B-3 | B-3 | B-3 | | B-4 | B-4 | B-4 | B-4 |
|---|---|---|---|---|---|---|---|---|---|
| Sample No. | 1.0'-2.5' | 3.5'-5.0' | 6.0'-7.5' | 8.5'-10.0' | | 1.0'-2.5' | 3.5'-5.0' | 6.0'-7.5' | 8.5'-10.0' |
| Container No. | 8 | 4 | 9 | 10 | | 1 | 2 | AM | 3 |
| Weight of Container | 0.41 | 135.38 | 0.42 | 0.41 | | 0.42 | 0.41 | 111.06 | 0.40 |
| Container + Wet Soil | 110.43 | 780.32 | 110.46 | 114.13 | | 112.93 | 74.32 | 886.52 | 91.54 |
| Container + Dry Soil | 87.18 | 647.30 | 83.15 | 79.66 | | 92.88 | 57.57 | 731.90 | 71.62 |
| Weight of Water | 23.25 | 133.02 | 27.31 | 34.47 | | 20.05 | 16.75 | 154.62 | 19.92 |
| Container + Dry Soil | 87.18 | 647.30 | 83.15 | 79.66 | | 92.88 | 57.57 | 731.90 | 71.62 |
| Weight of Dry Soil | 86.77 | 511.92 | 82.73 | 79.25 | | 92.46 | 57.16 | 620.84 | 71.22 |
| Percent Water | 26.8% | 26.0% | 33.0% | 43.5% | | 21.7% | 29.3% | 24.9% | 28.0% |

NOTE: Test results shown were derived from tests performed in accordance with the applicable test method(s), unless otherwise noted

**LABORATORY SUPERVISOR**

amec

# LIQUID AND PLASTIC LIMITS TEST REPORT




| | MATERIAL DESCRIPTION | LL | PL | PI | %<#40 | %<#200 | USCS |
|---|---|---|---|---|---|---|---|
| ● | Clay, silty, reddish-brown | 34 | 20 | 14 | 68 | 52 | CL |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

**Project No.** 5-6160- **Client:** City of Franklin

**Project:** Poteat Place (Monticello Subdivision Sewer)

● **Source:** soil borings **Sample No.:** B-1 **Elev./Depth:** 6.0'-7.5'

**Remarks:**

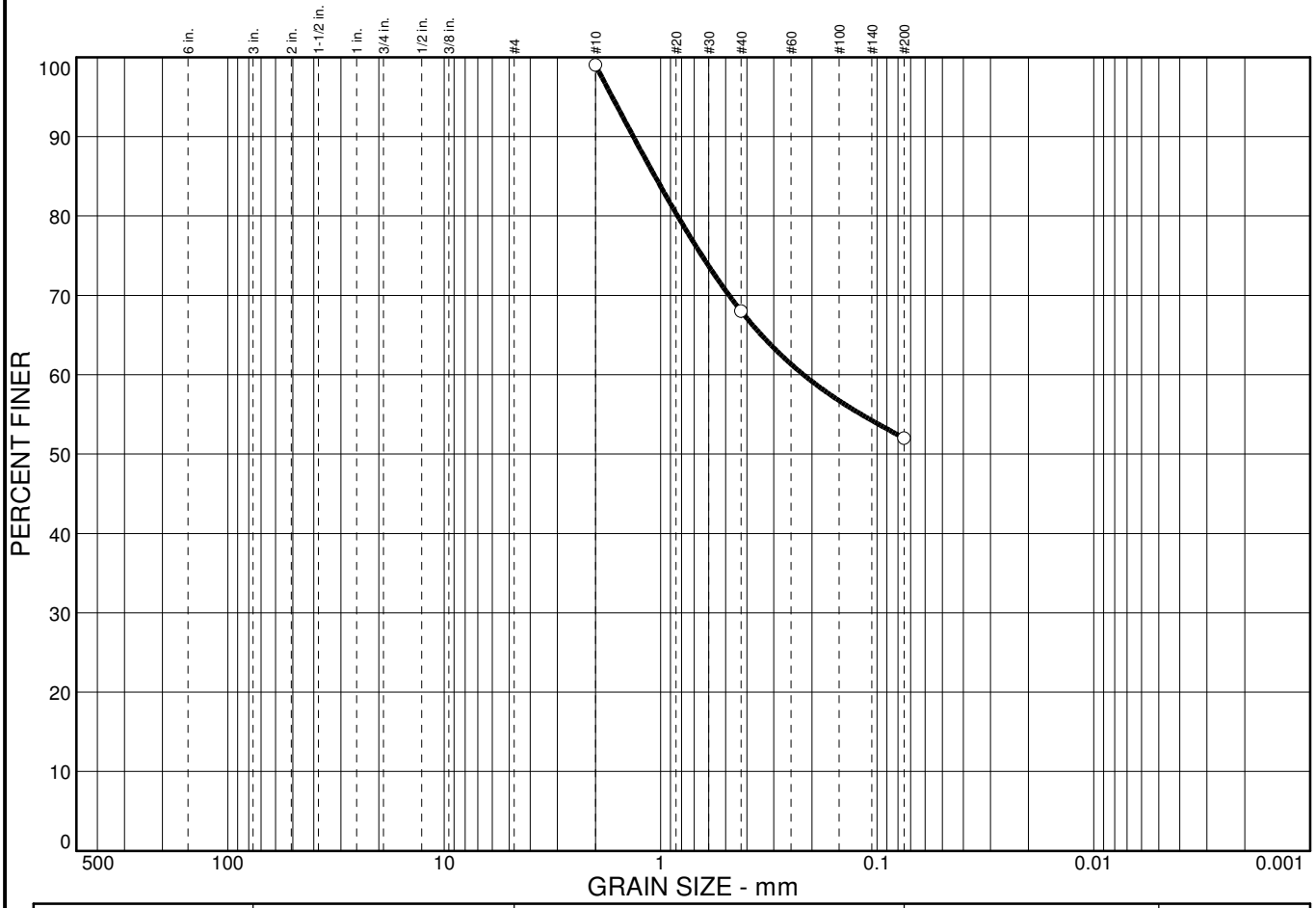
●

LIQUID AND PLASTIC LIMITS TEST REPORT

**AMEC GEOTECHNICAL AND CONSTRUCTION MATERIALS LABORATORY**

**Plate** B-1

# Particle Size Distribution Report




| % COBBLES | % GRAVEL | % SAND | % SILT | % CLAY |
|---|---|---|---|---|
| | | | 52 | |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|---|---|---|---|
| #10 | 99 | | |
| #40 | 68 | | |
| #200 | 52 | | |

* (no specification provided)

**Soil Description**

Clay, silty, reddish-brown

**Atterberg Limits**

PL= 20 LL= 34 PI= 14

**Coefficients**

$D_{85}$= 1.06 $D_{60}$= 0.219 $D_{50}$=
$D_{30}$= $D_{15}$= $D_{10}$=
$C_u$= $C_c$=

**Classification**

USCS= CL AASHTO=

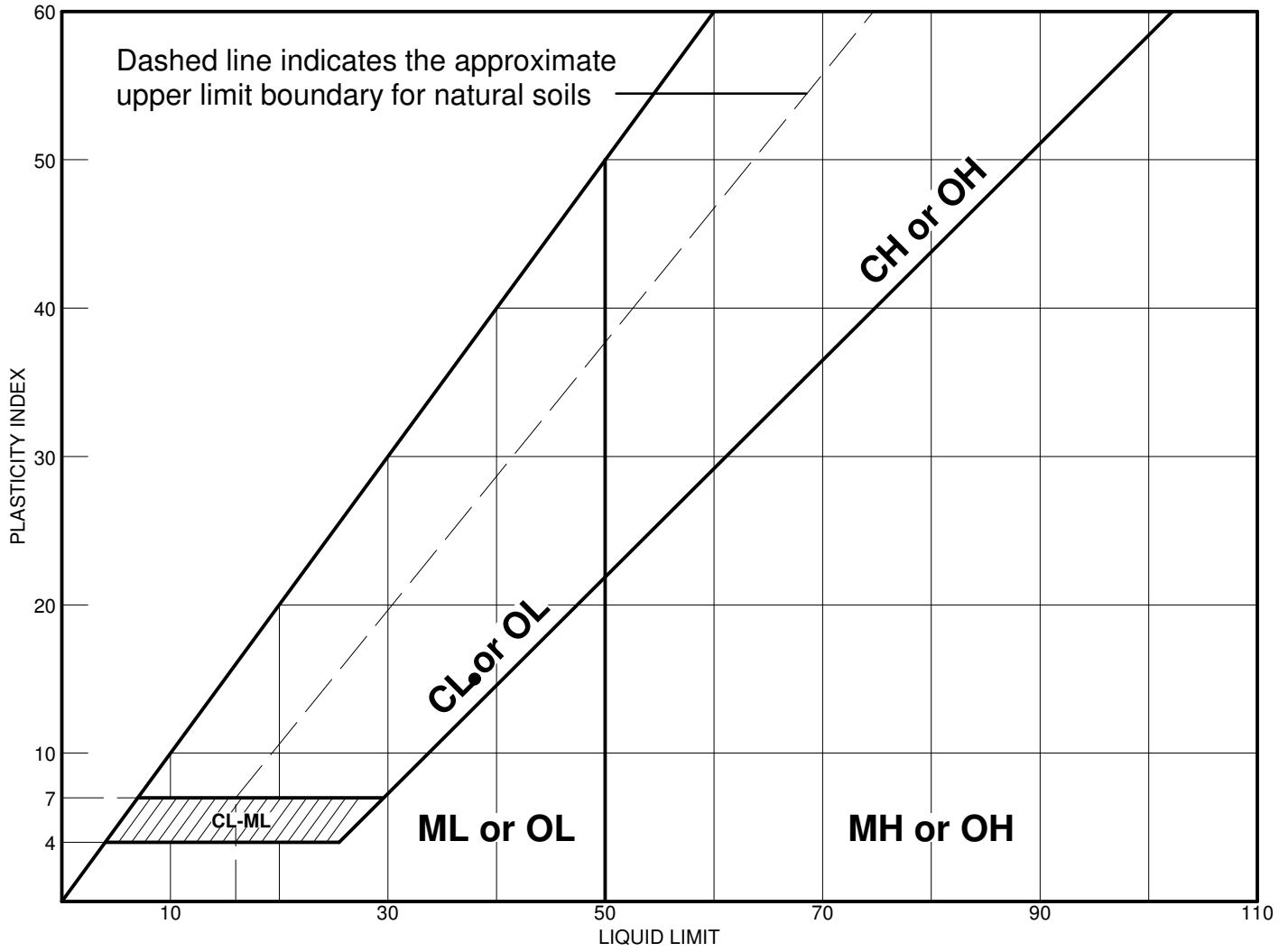
**Remarks**

**Sample No.:** B-1 **Source of Sample:** soil borings **Date:** 3-11-09
**Location:** **Elev./Depth:** 6.0'-7.5'

**AMEC GEOTECHNICAL AND CONSTRUCTION MATERIALS LABORATORY**

**Client:** City of Franklin
**Project:** Poteat Place (Monticello Subdivision Sewer)
**Project No:** 5-6160-0000-0000 **Plate** B-1

# LIQUID AND PLASTIC LIMITS TEST REPORT




| | MATERIAL DESCRIPTION | LL | PL | PI | %<#40 | %<#200 | USCS |
|---|---|---|---|---|---|---|---|
| ● | Clay, silty, reddish-brown with weathered chert | 38 | 23 | 15 | 71 | 54 | CL |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

**Project No.** 5-6160- **Client:** City of Franklin

**Project:** Poteat Place (Monticello Subdivision Sewer)

● **Source:** soil borings **Sample No.:** B-3 **Elev./Depth:** 3.5'-5.0'

**Remarks:**

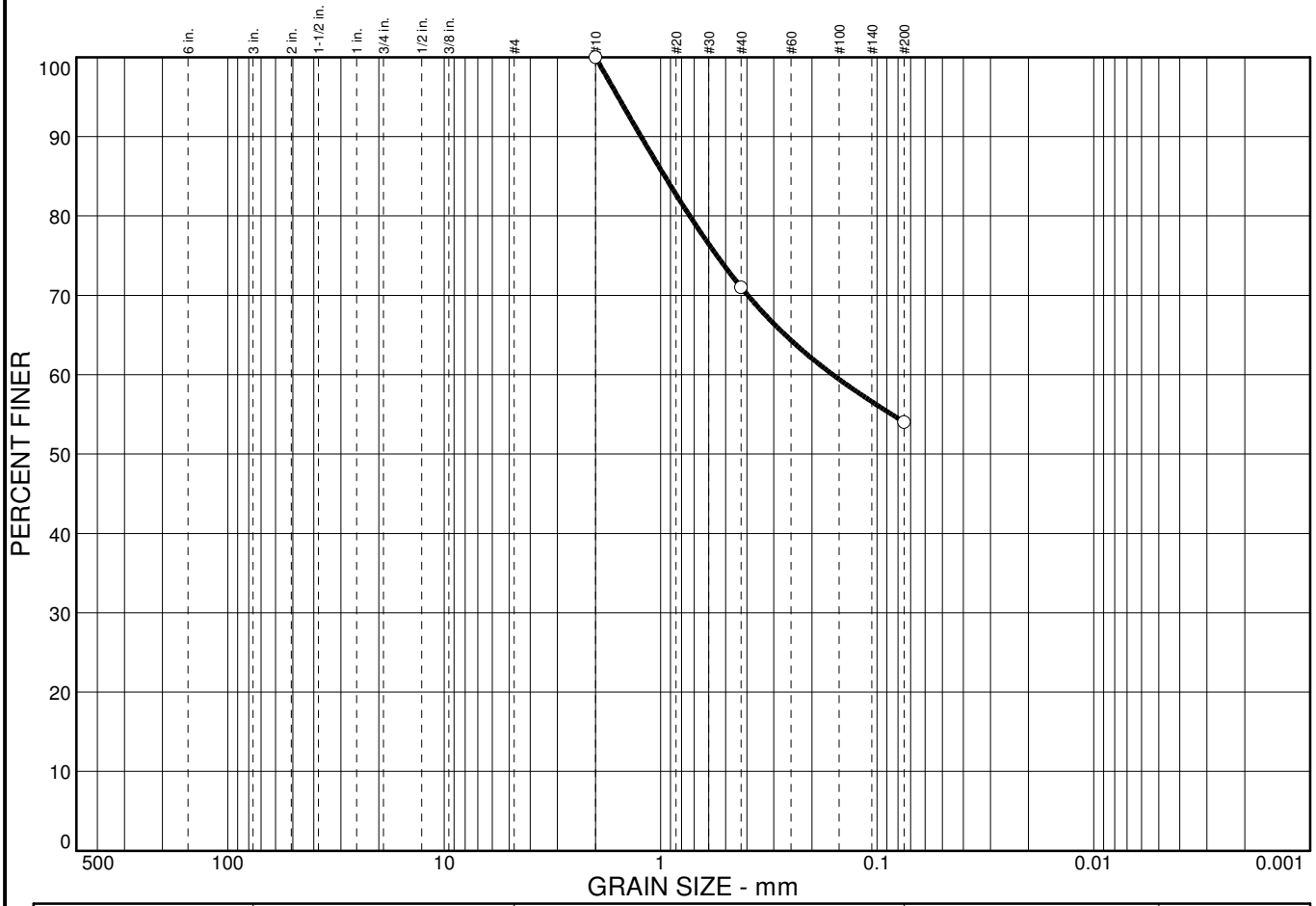
●

LIQUID AND PLASTIC LIMITS TEST REPORT

**AMEC GEOTECHNICAL AND CONSTRUCTION MATERIALS LABORATORY**

**Plate** B-3

# Particle Size Distribution Report




| % COBBLES | % GRAVEL | % SAND | % SILT | % CLAY |
|---|---|---|---|---|
| 0 | 0 | 46 | 54 | |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|---|---|---|---|
| #10 | 100 | | |
| #40 | 71 | | |
| #200 | 54 | | |

* (no specification provided)

**Soil Description**

Clay, silty, reddish-brown with weathered chert

**Atterberg Limits**

PL= 23 LL= 38 PI= 15

**Coefficients**

$D_{85}$= 0.957 $D_{60}$= 0.160 $D_{50}$=
$D_{30}$= $D_{15}$= $D_{10}$=
$C_u$= $C_c$=

**Classification**

USCS= CL AASHTO=

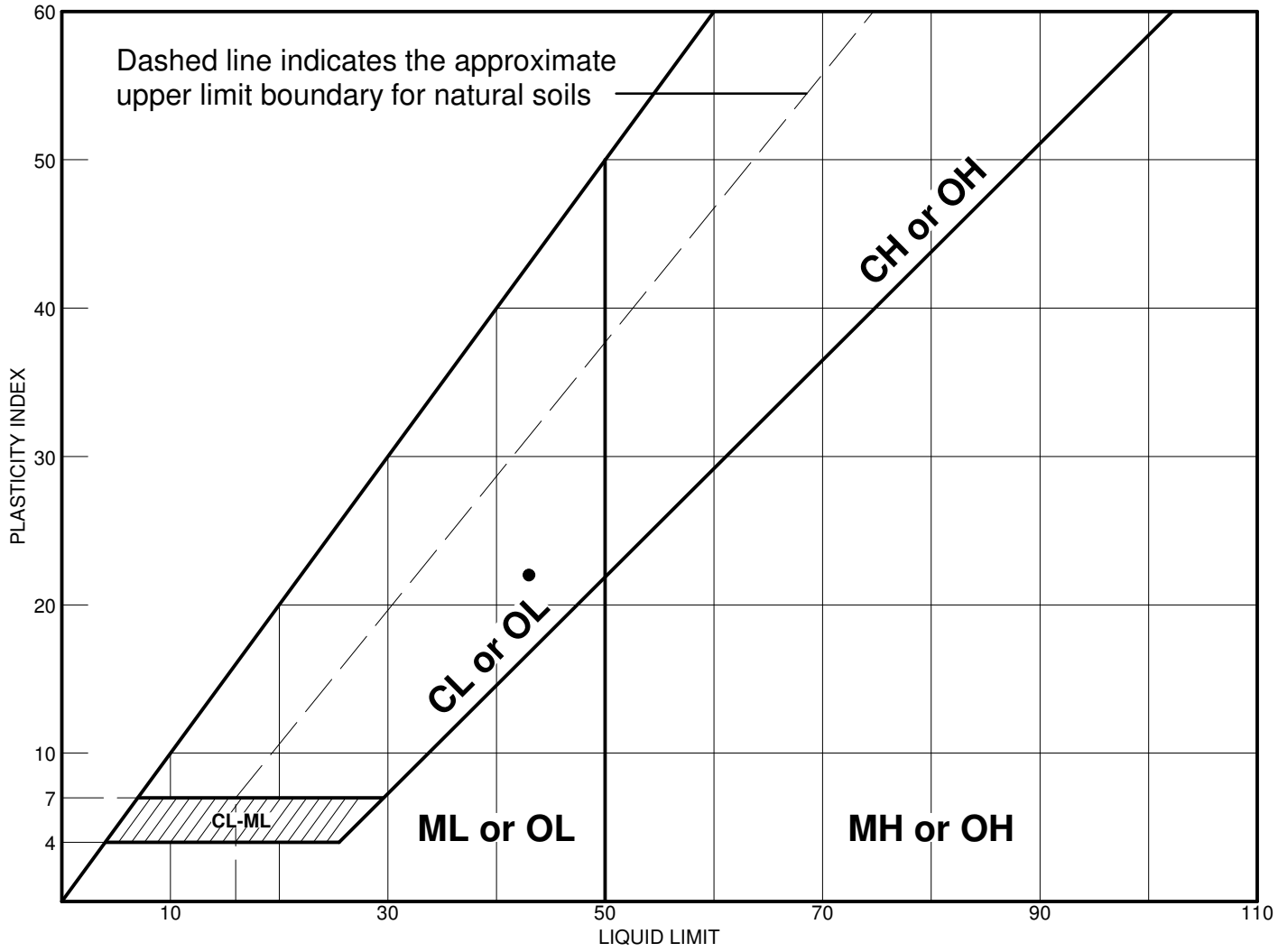
**Remarks**

**Sample No.:** B-3 **Source of Sample:** soil borings **Date:** 3-11-09
**Location:** **Elev./Depth:** 3.5'-5.0'

**AMEC GEOTECHNICAL AND CONSTRUCTION MATERIALS LABORATORY**

**Client:** City of Franklin
**Project:** Poteat Place (Monticello Subdivision Sewer)
**Project No:** 5-6160-0000-0000 **Plate** B-3

# LIQUID AND PLASTIC LIMITS TEST REPORT




| | MATERIAL DESCRIPTION | LL | PL | PI | %<#40 | %<#200 | USCS |
|---|---|---|---|---|---|---|---|
| ● | Clay, silty, reddish to yellowish-brown | 43 | 21 | 22 | 81 | 62 | CL |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

**Project No.** 5-6160- **Client:** City of Franklin

**Project:** Poteat Place (Monticello Subdivision Sewer)

● **Source:** bulk **Sample No.:** S-1

**Remarks:**

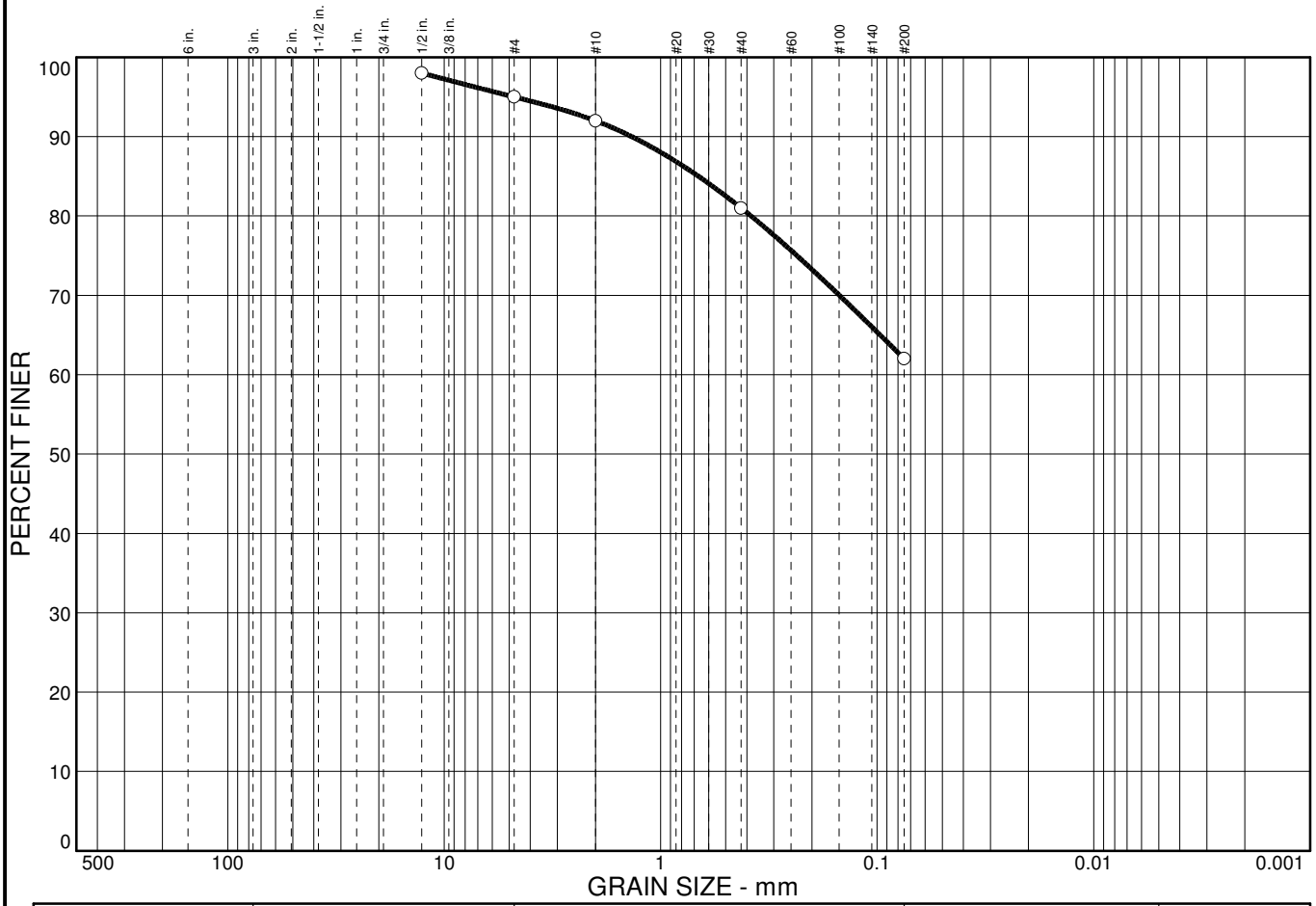
●

LIQUID AND PLASTIC LIMITS TEST REPORT

**AMEC GEOTECHNICAL AND CONSTRUCTION MATERIALS LABORATORY**

**Plate** bulk

# Particle Size Distribution Report




| % COBBLES | % GRAVEL | % SAND | % SILT | % CLAY |
|---|---|---|---|---|
| | | 33 | 62 | |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|---|---|---|---|
| .5 in. | 98 | | |
| #4 | 95 | | |
| #10 | 92 | | |
| #40 | 81 | | |
| #200 | 62 | | |

* (no specification provided)

**Soil Description**

Clay, silty, reddish to yellowish-brown

**Atterberg Limits**

PL= 21 LL= 43 PI= 22

**Coefficients**

$D_{85}$= 0.670 $D_{60}$= $D_{50}$=
$D_{30}$= $D_{15}$= $D_{10}$=
$C_u$= $C_c$=

**Classification**

USCS= CL AASHTO=

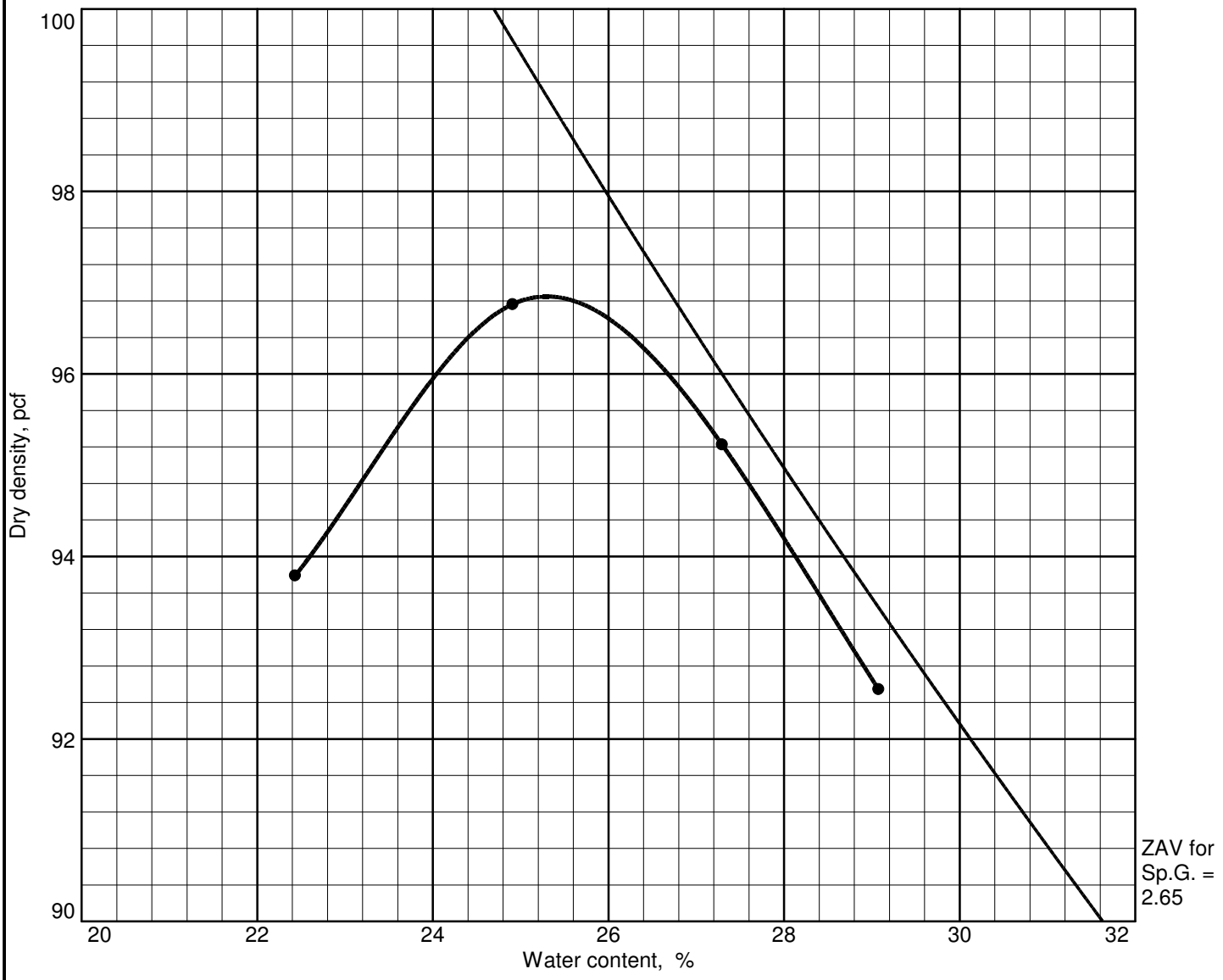
**Remarks**

**Sample No.:** S-1 **Source of Sample:** bulk **Date:** 3-11-09
**Location:** **Elev./Depth:**

**AMEC GEOTECHNICAL AND CONSTRUCTION MATERIALS LABORATORY**

**Client:** City of Franklin
**Project:** Poteat Place (Monticello Subdivision Sewer)
**Project No:** 5-6160-0000-0000 **Plate** bulk

# COMPACTION TEST REPORT




Test specification: ASTM D 698-78 Method A Standard

| Elev/ Depth | Classification | | Nat. Moist. | Sp.G. | LL | PI | % > No.4 | % < No.200 |
|---|---|---|---|---|---|---|---|---|
| | USCS | AASHTO | | | | | | |
| | CL | | | | 43 | 22 | 5 | 62 |

| TEST RESULTS | MATERIAL DESCRIPTION |
|---|---|
| Maximum dry density = 96.9 pcf<br>Optimum moisture = 25.3 % | Clay, silty, reddish to yellowish-brown |

**Project No.** 5-6160- **Client:** City of Franklin

**Project:** Poteat Place (Monticello Subdivision Sewer)

● **Source:** bulk **Sample No.:** S-1

COMPACTION TEST REPORT

**AMEC GEOTECHNICAL AND CONSTRUCTION MATERIALS LABORATORY**

**Remarks:**

**Plate** bulk