ECS SOUTHEAST, LLC
Geotechnical • Construction Materials • Environmental • Facilities

January 29, 2024

Mr. Zach Puckett, P.E., IMSA Level II
Pond & Company
3500 Parkway Lane, Suite 500
Peachtree Corners, GA 30092

Reference: Report of Limited Geotechnical Exploration
Town of Tyrone – 2024 Pavement Evaluation
Tyrone, Georgia

ECS Project Number 10:12117

Dear Mr. Puckett:

Thank you for selecting ECS Southeast, LLC (ECS) to complete a limited geotechnical exploration and pavement evaluation for the above referenced site. This letter report presents the results of our field exploration, our findings, and recommendations. The geotechnical exploration and report were performed in general accordance with ECS Proposal # 10:18826r3 dated November 3, 2023.

## 1.0 PROJECT INFORMATION

We understand the Town of Tyrone is considering re-paving several streets. The purpose of this exploration was to determine the existing pavement, soil, and groundwater conditions at the designated street test locations and to develop engineering recommendations to guide design and repair of the subject streets.

We accomplished the purposes of the study by:

1. Reviewing the existing condition of each street by performing a general site reconnaissance.
2. Coring the pavement and collecting asphalt core specimens to determine the current pavement section condition and record the asphalt and graded aggregate base (GAB) layer thicknesses.
3. Drilling borings to explore the shallow subsurface soil and groundwater conditions.
4. Performing laboratory tests on selected representative soil samples from the borings to evaluate pertinent engineering properties.
5. Evaluating the field and laboratory data to develop appropriate engineering recommendations.

We were provided locations with Pavement Condition Index (PCI) values. PCI values ranged from 33.5 to 66. The proposed paving locations and associated PCI ratings are shown in Table 1 below. From each of these locations, one pavement core was performed.

**Table 1 - Pavement Condition Index (PCI)**

| Corridor Name (Length – PCI value) | # Pavement Cores |
|---|---|
| Foxford Run (1,676.8 LF – PCI N/A) | 1 |
| Laurel Lake Road (1,295 LF - PCI 47) | 1 |
| Laurel Wood Drive (1,576.1 LF – PCI 38.4) | 1 |
| Laurel Wood Drive (1,815.3 LF – PCI 66) | 1 |
| Strawberry Lane (419.6 LF – PCI 39.9) | 1 |
| Tyrone Road (159.8 LF – PCI 33.5) | 1 |
| Ridge Road (2,418.8 LF – PCI 49.8) | 1 |
| **Total Number of Pavement Cores:** | **7** |

In general, a PCI rating of 100 represents a pavement in “excellent” condition and a rating of 0 is considered a “failed” condition. Pavements with a PCI rating of less than 55 is considered in “poor” condition and ratings less than 25 are in “serious” condition. Refer to ASTM D6433 for more information about the PCI rating.

A Site Location Diagram (Figure 1) is attached to this report. From our site reconnaissance, the existing asphalt pavement was observed to have moderate to severe distress throughout each of the roads listed. Most of the pavement distress was observed in the turn areas, such as the residential driveway entrances, along various streets, and in cul-de-sacs. Other distress areas observed within the study limits were along pavement joints, previously patched areas, and near utilities found in the roadway. The asphalt along Foxford Run was lower than the gutter by approximately 1 inch and it is possible that the topping course was not completed. Photographs showing representative levels of pavement distress are included in the attached Site Photo Log.

Our review of the Google Earth imagery suggests the pavement on Tyrone Road was last placed in 2007 and is approximately 16 years old. The pavement in the residential streets appears to be more than 20 years old.

## 2.0 FIELD EXPLORATION AND LAB TESTING

### 2.1 PAVEMENT CORES AND BORINGS

For this evaluation, seven (7) pavement cores and soil test borings were performed at selected locations within the subject study area. The attached Boring Location Diagram (Figure 2) shows the approximate test locations. The test locations were selected by ECS. At each test location, the pavement was cored, the asphalt and underlying graded aggregate base (GAB) thicknesses measured, and soil test borings were performed to approximately 5 feet below the asphalt.

The soil test borings were performed with an ATV mounted drill rig, which utilized hollow stem augers to advance the boreholes. No water or drilling fluid was introduced during the process. Representative

soil samples were obtained by means of the split-barrel sampling procedure in general accordance with ASTM Specification D-1586 with an automatic drive hammer. In this procedure, a 2-inch O.D., split-barrel sampler is driven into the soil for an interval of 24 inches by a 140-pound hammer falling 30 inches.
The number of blows required to drive the sampler through a 12-inch interval is termed the Standard Penetration Test (SPT) N-value and is indicated for each sample on the boring logs. This value can be used as a qualitative indication of the in-place relative density of cohesionless soils. In a less reliable way, it also indicates the consistency of cohesive soils.

An ECS geotechnical professional prepared a field log of the soil encountered in the borings. After recovery, each sample was removed from the sampler and visually classified by the ECS geotechnical professional. Representative portions of each sample were then sealed and brought to our laboratory in Marietta, Georgia for further visual examination and laboratory testing by ECS. In addition to the split spoon samples. Bulk samples were collected from the auger cuttings at select locations.

### 2.2 LABORATORY TESTING

Classification and index property tests were performed by ECS on representative soil samples obtained from the test borings and collected bulk samples to aid in classifying soils according to the Unified Soil Classification System and to quantify and correlate engineering properties. Laboratory testing included moisture content testing, Atterberg Limits, sieve gradation analyses, standard Proctor tests, and California Bearing Ratio (CBR) tests. The results of the laboratory testing program are attached to this report.

Each sample was visually classified based on texture and plasticity in accordance with ASTM D2488 Standard Practice for Description and Identification of Soils (Visual-Manual Procedures) and including USCS classification symbols, and ASTM D2487 Standard Practice for Classification for Engineering Purposes (Unified Soil Classification System (USCS)). After classification, the samples were grouped in the major zones noted on the boring logs. The group symbols for each soil type are indicated in parentheses along with the soil descriptions. The stratification lines between strata on the logs are approximate; in situ, the transitions may be gradual.

## 3.0 SUBSURFACE CONDITIONS

### 3.1 SOIL CONDITIONS

Data from the soil test borings is attached to this report. The subsurface conditions discussed in the following paragraphs and those shown on the boring logs represent an estimate of the subsurface conditions based on interpretation of the boring data using normally accepted geotechnical engineering judgments. We note that the transition between different soil strata is usually less distinct than those shown on the boring logs.

#### Asphalt Pavement

The existing asphalt pavement were approximately 1 ½ to 6 ½ inches. Pavement thickness variation should be expected within the project limits. The GAB layer below the asphalt pavement ranged from approximately 4 to 6 inches.

### Fill Materials

Fill may be any material that has been transported and deposited by man. Undocumented fill is considered any man placed materials with no moisture-density records from the time it was originally placed. Materials described as undocumented fill were encountered in Borings C-2, C-3, and C-4 extending to a depth of about 3 feet below the existing pavement surface. The composition of the fill material was variable typically consisting of firm sandy lean Clay (CL) at C-4 and loose to medium dense clayey sand (SC) at Borings C-2 and C-3. Standard Penetration Test values ranged from 5 to 15 blows per foot (bpf).

### Residual Soils

Residual soil, formed by in-place weathering of the parent rock, was encountered below the fill materials and/or existing asphalt. The residual soil was generally described as stiff sandy lean Clay (CL), loose to medium dense sandy clayey Sand (SC), and stiff sandy fat Clay (CH). Standard Penetration Test values ranged from 9 to 14 bpf.

## 3.2 GROUNDWATER CONDITIONS

No groundwater seepage was observed in the shallow bore holes advanced during our fieldwork activities.

## 3.3 LABORATORY TEST RESULTS

Laboratory testing was performed on select samples indicates that the natural moisture content ranged between 10.9 and 26.5 percent and that the moisture contents are likely near optimum for proper compaction.

Percentages of fine-grained soils was found to range from 35.1 to 58.5 percent. These types of soils are moisture sensitive and may be difficult to use as structural fill if the material becomes too wet. The fine-grained soils at the site could become unworkable and require reworking and drying for proper compaction during wetter portion of the year or after rain events.

Atterberg Limits testing was performed on a soil sample obtained at Borings C-2, C-4, C-6, and C-7. The tested soil samples had liquid limits (LL) of 50, 40, 65, and 43 percent, and a plasticity index (PI) of 23, 19, 34 and 20 percent, respectively.

The liquid limit of the tested samples was above the recommended liquid limit of less than 40 for structural fill. In addition, the plasticity indexes from 3 of the 4 tested samples, (Borings C-2, C-6, and C-7) were above the recommended plasticity index of less than 20 for structural fill. The soil sample from Boring C-6 is classified as fat Clay (CH).

California Bearing Ratio (CBR) testing and standard Proctor testing was performed on samples from Borings C-4, C-6, and C-7. Laboratory $CBR_{0.1''}$ values ranged from 3.4 to 5.7. Standard Proctor Moisture-Densities tests ranged with a maximum dry density of 105.1 to 113.4 pcf and optimum moisture at 14.5 to 19.2 percent. For additional information please refer to the attached boring logs, laboratory summary, and individual test reports.

## 3.4 SUMMARY OF PAVEMENT CONDITIONS

The approximate thickness of the asphalt pavement and graded aggregate base (GAB) is presented in Table 3. Please refer to the attached individual hand auger logs for more detailed information. The pavement structural number (SN) was determined for each test location. The following layer coefficients were obtained from GDOT guidelines and were used for our evaluation.

**Table 2 – Layer Coefficients**

| Material | Layer Coefficient |
|---|---|
| Asphalt (New, up to 4.5”) | 0.44 |
| Asphalt (New, > 4.5”) | 0.30 |
| Asphalt (aged, in-place) | 0.30 |
| GAB | 0.16 |

We understand the town requires a pavement section consisting of 3 inches of asphalt; comprised of 1 inch of a topping course (9.5mm asphalt) and 2 inches of binder course (19.0 mm asphalt), and 6 inches of GAB for residential roadways. This equates to a required structural number (SN) of 2.28 for residential roads.

For commercial roads, the Town of Tyrone requires a pavement section consisting of 4 ½ inches of asphalt comprised of 1½ inches of a topping course (9.5mm asphalt) and 3 inches of binder course (19.0 mm asphalt), and 8 inches of GAB. This equates to a required SN of 3.26 for commercial roads.

ECS reviewed available traffic data from GDOT Traffic Analysis and Data Application (TADA) and available at https://gdottrafficdata.drakewell.com/publicmultinodemap.asp. We examined data at Station 113-0174 located on Tyrone Road approximately 1 mile west of the intersection of Senoia Rd. This station documents an AADT of approximately 10,000 traffic counts for two-way traffic but without truck counts. We assumed an increase to 15,000 AADT in 20 years and included 5% combination of single-unit and multi-unit trucks in our analysis. The amount of traffic places Tyrone Road in the category of a GDOT Minor Pavement Project and following guidelines published in GDOT’s “Guidelines for Minor Pavement Project”, January 26, 2018, a D-12 pavement design is recommended. We have reviewed the D-12 pavement section and after accounting for a GDOT accepted 10% underdesign, we have designed the new pavement section for Tyrone Road with a structural number (SN) of 4.8.

Based on the recommended pavement section structural numbers (SN), the pavements appear to be either near our recommended SN or as much as 56 percent under designed. None of the GAB thicknesses meet recommended thicknesses of 8 inches for residential streets or 12 inches for the recommended D-12 pavement section along Tyrone Road. Pavements appear to be at least 15 years in use to more than 20 years in use. From our experience, pavements generally begin to require accelerated maintenance after 10 years of use. After 20 years of use, the cost of repairs generally warrants replacement.

**Table 3 – Summary of Existing Pavement and GAB Thicknesses**

| Boring No. | Street Names | Approx. Asphalt Thickness (inches) | Approx. GAB Thickness (Inches) | Recommended Structural Number (SN) | Existing Structural Number (SN) | Percent Under Designed (%) | Estimated Age of Road (Years) |
|---|---|---|---|---|---|---|---|
| C-1 | Foxford Run | 2 | 5 | 2.28 | 1.4 | 39 | 20+ |
| C-2 | Laurel Lake Road | 1.5 | 4 | 2.28 | 1.0 | 56 | 20+ |
| C-3 | Laurel Wood Drive | 4.25 | 6 | 2.28 | 2.24 | 2 | 20+ |
| C-4 | Laurel Wood Drive | 4 | 5 | 2.28 | 2.0 | 12 | 20+ |
| C-5 | Ridge Road | 4 | 6 | 2.28 | 2.16 | 5 | 20+ |
| C-6 | Strawberry Lane | 3 | 5 | 2.28 | 1.7 | 25 | 20+ |
| C-7 | Tyrone Road | 6.5 | 5 | 4.80 | 2.75 | 43 | 16 |

## 4.0 PAVEMENT DISTRESS OBSERVATIONS

### 4.1 PAVEMENT ASSESSMENT

The common types of pavement distresses we observed included longitudinal and transverse cracking, block cracking and load cracking. Some of the typical causes of pavement deterioration include traffic loading; environment or climate influences; drainage deficiencies; material quality problems; construction deficiencies; and external contributors such as utility cuts. These pavement distresses are defined below.

**Load cracking:** Load cracking is sometimes called alligator cracking due to the interconnected cracks which resemble an alligator skin. Load cracking is caused by load-related deterioration resulting from a weakened base course or subgrade, too little pavement thickness, overloading, or a combination of these factors.

**Block cracking:** Block cracking is a series of large (typically one foot or more), rectangular cracks on an asphalt pavement surface. This type of cracking typically covers large areas and may occur in areas where there is no traffic. Block cracking is typically caused by shrinkage of the asphalt pavement due to temperature cycles.

**Longitudinal cracking**: Longitudinal cracking occurs parallel to the centerline of the pavement. These types of cracks can be caused by a poorly constructed joint; shrinkage of the asphalt layer; cracks reflecting up from an underlying layer; and longitudinal segregation due to improper paver operation. These cracks are not load-related.

**Transverse cracking:** Transverse cracking occurs roughly perpendicular to the centerline of the pavement. They can be caused similarly as longitudinal cracking and are not load-related.

# 5.0 RECOMMENDATIONS

## 5.1 PAVEMENT REPAIR OPTIONS

Based on the results of our field observations and laboratory services as well as our experience with similar projects, the primary causes of the pavement distress within the subject study area appears to be underdesigned pavement sections (has an inadequate pavement section thickness) and/or the age of the existing asphalt.

The existing residential roadway pavement is underdesigned compared to town requirements in some locations and appears to have adequate thickness in other locations. However, the pavements are old and an extension of life with an overlay will likely induce increased long term maintenance costs. We note the pavements have been in place for more than 15 to 20 years and in our opinion have reached their useful life. Based on current traffic loading, Tyrone Road is severely underdesigned which is exhibited by the observed severe load distress.

For this evaluation, subgrade soils generally consist of clayey sands (SC) and sandy Clays (CL) with soaked laboratory $CBR_{0.1''}$ results that ranged from of 3.4 to 5.7. The two options we recommend for the rehabilitation of the pavements are Full Depth Reclamation (FDR) and Reconstruction.

FDR is a pavement rehabilitation technique in which the asphalt and underlying aggregate and subbase soils and milled and combined with cement to create a new and stiffer base layer to support a new asphalt. FDR is a predictable process, relatively quick and generally pavement placed with newly constructed FDR base will come with a warranty from the pavement contractor.

Reconstruction would require the removal of the existing asphalt, repair of an unknown quantity of subgrade and the addition of new asphalt. Repair of the subgrade may require stabilizing with a geogrid in some areas. Reconstruction is hard to predict costs, is generally constructed slower than FDR and is a messy process for the residents.

Based on the limited distress observed on Foxford Run, we are submitting and overlay option with some concessions for GAB thickness and age of asphalt.

These options are discussed in more detail in the following sections.

### 5.1.1 Full Depth Reclamation (FDR)

This option includes milling the existing pavement, GAB and subgrade soils and mixing the millings with cement and compacting the mixture to create a firm base to support the new asphalt pavement. The actual mix design for FDR is typically the responsibility of the contractor. However, we have historically observed cement quantities in the range of 3 to 7 percent by weight used in FDR base material, with a typical percentage of 5 to 6 percent. Laboratory testing is recommended to determine the proper cement dosage for FDR mixing. We recommend performing an FDR mix design to determine the amount of cement needed to create a stable pavement base.

The FDR typically requires a fine-grained material which usually comes from extending tilling below the existing GAB. The FDR method has been used on similar projects in lieu of the traditional remove and replace method to provide an adequate pavement section at a lower cost with improved construction times and less interference of ongoing operations during the pavement rehabilitation/repair. After the FDR is installed, the FDR base is topped with a new asphalt surface course. Table 4 represents the recommendations.

**Table 4 – Recommended Minimum FDR Flexible Pavement Section**

| Material Designation | Recommended Residential FDR Thickness (in.) | Recommended Tyrone Road FDR Thickness (in.) |
|---|---|---|
| Asphalt Surface Course<br>(9.5 mm Type II Superpave) | 2 | 2 |
| Asphalt Surface Course<br>(19 mm Type II Superpave) | N/A | 4 |
| Full Depth Reclamation (FDR) | 10 | 12 |

### 5.1.2 Reconstruction

This option includes the complete removal of the existing asphalt and reconstruction per the recommended thicknesses contained in Table 5. After removal, the base surface material should be observed to identify areas of instability. The evaluation should include proofrolling with a loaded dump truck having an axle weight of at least 10 tons or other similar equipment to identify soft or yielding areas. The GAB can stay in place if found to be stable. GAB thicknesses of 8 inches are recommended. Any unstable GAB and/or subgrade will require remediation.

The need for subgrade repair is best determined at the time of construction and could include the replacement of poor subgrade soils with new structural fill or use of a geogrid such as Tensar InterAx NX750 or similar product to stabilize the subgrade, where determined necessary. Stable GAB with insufficient thickness will need to be increased with additional compacted GAB to meet the recommended thickness.

The thickness of a pavement section depends on many factors, including the volume and type of traffic that the proposed pavement will experience, condition of the subgrade materials, desired design life and level of serviceability. The pavement design discussed in this section is based on GDOT guidelines, assuming the subgrades are repaired (as needed) or are unyielding during proofrolling.

We understand the town requires a pavement section consisting of 3 inches of asphalt; comprised of 1 inch of 9.5mm topping course and 2 inches of 19mm binder course including 6 inches of GAB for residential roadways. For residential streets we feel the GAB thickness required by the town is thin and should be increased to a total of 8 inches of GAB. This equates to a recommended SN of 2.88. Based on an assumed Annual Average Daily Traffic (AADT) of 1000 vehicles per day with 2% single unit trucks we agree these pavement sections will be sufficient for a pavement design life of 20 years with maintenance.

For Tyrone Road, a D-12 pavement section for GDOT Minor Pavement Projects is warranted as explained in Section 3.4. Utilizing a 10% underdesign allowance, a SN of 4.8 is needed. Recommended reconstructed pavement sections are described in Table 5.

**Table 5 – Recommended Minimum Flexible Pavement Section**

| Material Designation | Recommended Residential Street Reconstructed Thickness (in.) | Recommended Tyrone Road Reconstructed Thickness (in.) |
|---|---|---|
| Asphalt Surface Course<br>(9.5 mm Type II Superpave) | 1 | 1 ¼ |
| Asphalt Surface Course<br>(19 mm Type II Superpave) | 2 | 2 |
| Asphalt Surface Course<br>(25 mm Type II Superpave) | N/A | 4 ¼ |
| Graded Aggregate Base (GAB) | 8 | 12 |

Base course materials beneath pavements should be compacted to at least 98% of their standard Proctor maximum dry density (ASTM D698). The asphalt concrete and all crushed stone materials should conform to the GDOT Standard Specifications.

An important consideration with the design, construction, and performance of pavements is surface and subsurface drainage. Where standing water develops, either on the pavement surface or within the base course layer, softening of the subgrades and other problems related to weak subgrade can be expected. Furthermore, good drainage should help reduce the possibility of the subgrade materials becoming saturated during the normal service period of the pavement.

### 5.1.3 Foxford Run Overlay Option

Foxford Run is a residential street and exhibited the least distress of the streets we evaluated and appears generally to be in good condition. If the Town of Tyrone wants to accept the 5-inch GAB base and the age of the pavement, a possible solution would be to add a tack coat and 1½ inches of 9.5mm Type II asphalt as the topping course the developer left off. This option would increase the structural number (SN) to 2.06 and create a new pavement that would be about 10% under designed. In pursuing this option, it should be expected to evaluate and potentially patch any areas of subgrade below asphalt locations that exhibited alligator cracking.

## 5.2 Implications of fat Clay (CH)

Fat Clay (CH) soils were noted in boring location C-6. This type of material can occasionally exhibit shrinking and swelling during seasonal moisture fluctuation and typically have lower strength and result in increased maintenance over the life of the pavement.

During construction, these types of materials are difficult to work with if the soil is above the optimum moisture for proper compaction. Laboratory testing performed on the samples of the fat Clay (CH) indicated a moisture content of 21.5 percent. The severity of these potential problems depends to a great extent on the weather conditions during pavement repair. A concerted effort should be made to control construction traffic and surface water while subgrade soils are exposed. Depending on the rainfall conditions at the time of construction, fat Clay (CH) soils may become difficult to dry and potentially require replacement with drier material.

If reconstruction is selected, we would recommend providing a minimum 12-inch separation between any fat Clay (CH) soils and the bottom of pavement GAB base course. This would help mitigate the effect of the highly plastic material with high shrink/swell properties if encountered during construction. The separation material could consist of low plasticity structural fill or GAB material as discussed below.

### 5.3 Undercutting and Fill Placement

After subgrade evaluations during Reconstruction of pavements, selective undercutting to remove unstable subgrade or fat Clay (CH) soils, appears to be possible. A minimum undercut of 12 inches is recommended. The need for additional undercut should be determined by the onsite ECS representative at the time of construction. Once the excavation has achieved a firm subgrade, the exposed subgrade should be densified in place.

As needed for subgrade repairs, structural fill materials should consist of GAB or granular material with not more than 50 percent passing the No. 200 sieve, a Liquid Limit less than 40 and a Plasticity Index less than 20. Unacceptable fill materials include topsoil, cultivated soil, low density soils with a maximum unit weight less than 95 pcf, organic materials, and highly plastic silts and clays.

Grade control should be maintained throughout the fill placement operations. All fill operations should be observed on a full-time basis by a qualified soil technician from ECS to determine that minimum compaction requirements are being met. A minimum of one compaction test should be performed on every lift placed and per 2,500 square foot area. The elevation and location of the tests should be clearly identified and recorded at the time of fill placement.

Fill materials should be placed in lifts not exceeding 8 inches in loose thickness and moisture conditioned to within +/- 3 percentage points of the optimum moisture content to facilitate proper compaction. Controlled fill soils should be compacted to a minimum of 98% of the maximum dry density obtained in accordance with ASTM D698, standard Proctor method. Subgrades should be “nonyielding” as determined by proofroll inspection prior to construction. GAB base course materials should be compacted to at least 98% of their modified Proctor maximum dry density (ASTM D1557).

## 6.0 ADDITIONAL TESTING AND EVALUATION

As mentioned previously, two options are provided in the recommendations. If FDR is selected ECS would like to remain involved with the preliminary design of the FDR. Both recommendations will require field observation, monitoring, and quality assurance testing during earthwork and pavement installation. These services are an extension of and integral to the geotechnical design recommendation. We recommend that Pond & Company and the Town of Tyrone retain these quality assurance services and that ECS be allowed to continue our involvement throughout these critical phases to provide general consultation if any issues arise.

## 7.0 CLOSING

This letter report has been prepared in accordance with generally accepted geotechnical engineering practice. No warranty is expressed or implied. The findings presented in this letter are based on the available project information, as well as on the results of the exploration.

This report is provided for the exclusive use of Pond & Company and their project specific design team. This report is not intended to be used or relied upon in connection with other projects or by other third parties. ECS disclaims liability for any such third-party use or reliance without express written permission.

Sincerely,

**ECS SOUTHEAST, LLP represented by:**

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12-29-23

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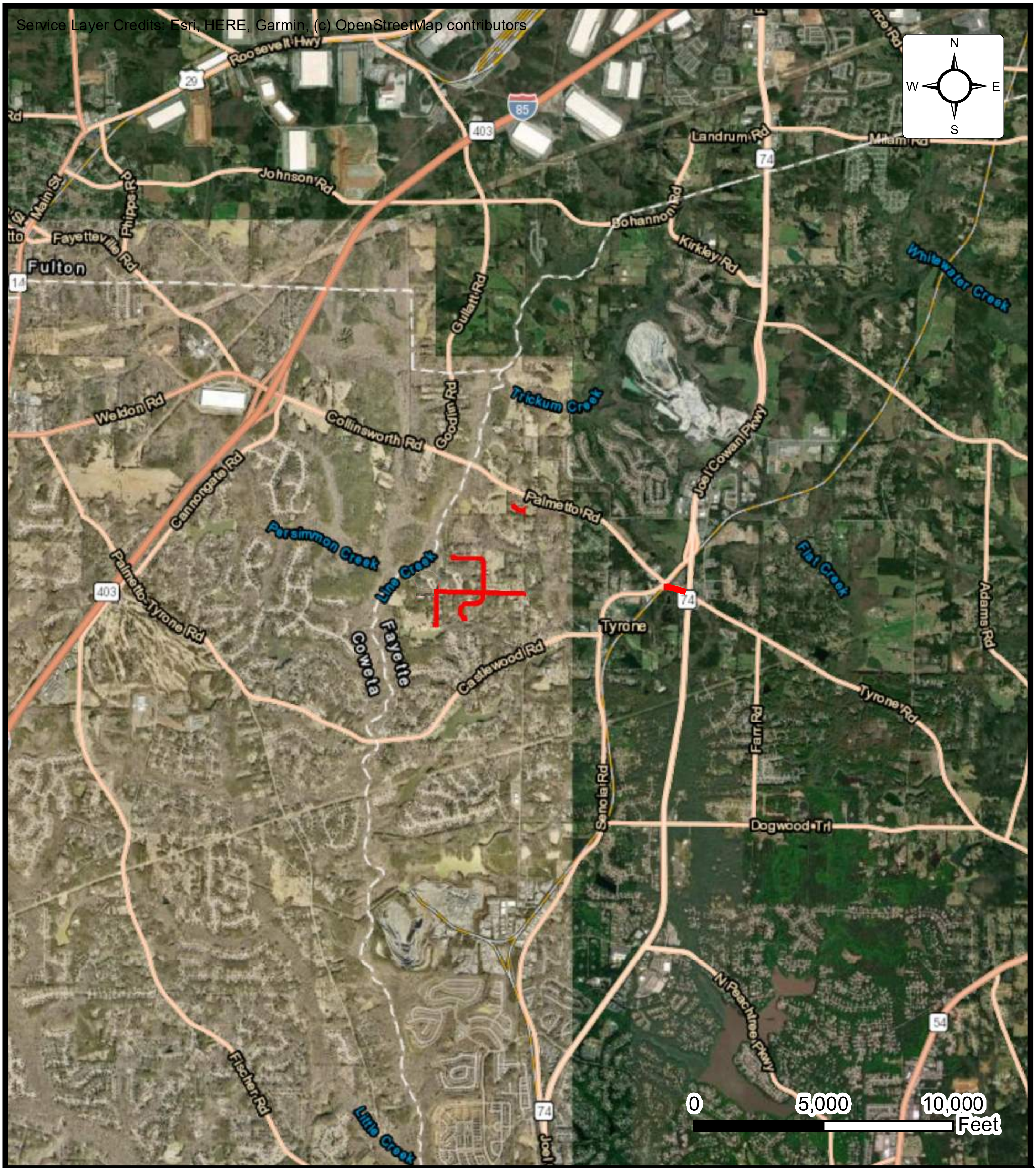
Attachments:

- Figure 1 – Site Location Diagram
- Figure 2 – Boring Location Plan
- Site Photo Log
- Reference Notes for Boring Logs
- Boring Logs
- Laboratory Testing Summary
- Particle Size Distribution Reports
- Liquid and Plastic Limits Test Reports
- CBR Test Results
- Moisture-Density Relationship Curves
- GBA Important Information About This Geotechnical-Engineering Report

# Attachments



Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors

# SITE LOCATION DIAGRAM

## TYRONE - 2024 PAVEMENT EVALUATION

TYRONE, GEORGIA

**POND & COMPANY**

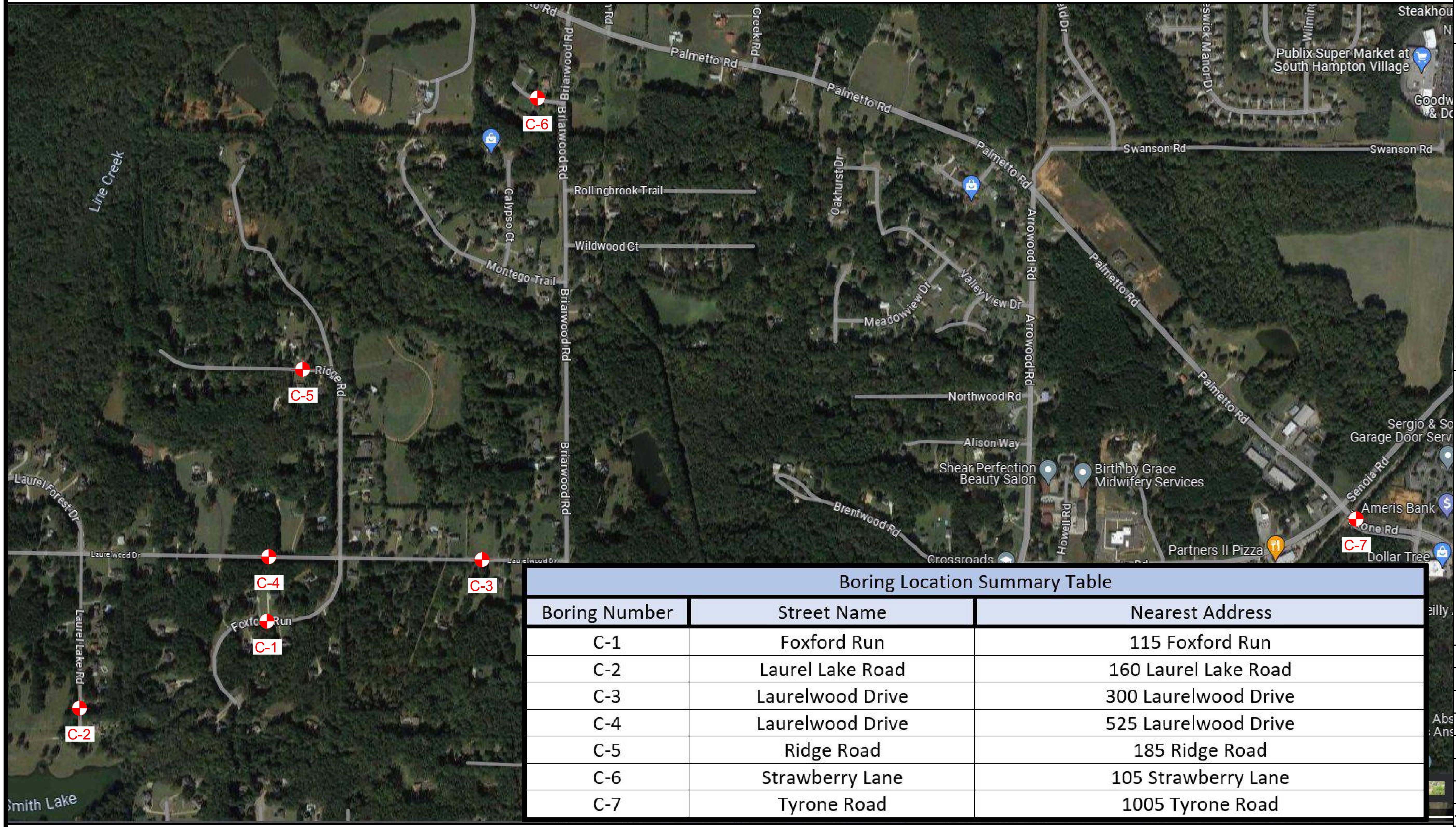
ENGINEER
JFP

SCALE
AS NOTED

PROJECT NO.
10:12117

FIGURE
1

DATE
12/20/2023



## Boring Location Summary Table

| Boring Number | Street Name | Nearest Address |
|---|---|---|
| C-1 | Foxford Run | 115 Foxford Run |
| C-2 | Laurel Lake Road | 160 Laurel Lake Road |
| C-3 | Laurelwood Drive | 300 Laurelwood Drive |
| C-4 | Laurelwood Drive | 525 Laurelwood Drive |
| C-5 | Ridge Road | 185 Ridge Road |
| C-6 | Strawberry Lane | 105 Strawberry Lane |
| C-7 | Tyrone Road | 1005 Tyrone Road |

LEGEND

| | |
|---|---|
| ⊕ | Approximate Boring Location |
| C-# | Boring Designation |

NORTH

ECS

*PROJECT:* Tyrone - 2024 Pavement Evaluation
Tyrone, GA

*PREPARED FOR:* Pond & Company

*FIGURE NAME:* BORING LOCATION DIAGRAM

*REFERENCE:* Google Maps Imagery

REVISIONS

| | | |
|---|---|---|
| *JOB NO.* | 10:12117 | |
| *SCALE* | NTS | |
| *DRAWN* | DTS | 12/2023 |
| *APPR.* | JFP | 12/2023 |

Figure No.: 2

Boring C-1

Boring C-1

| | |
|---|---|
| **PhotoLog** | **Tyrone – 2024 Pavement Evaluation**<br>Pond & Company<br>Tyrone, GA<br>ECS Project No. 10:12117 |

Boring C-2

Boring C-2

| **PhotoLog** | | Tyrone – 2024 Pavement Evaluation<br>Pond & Company<br>Tyrone, GA<br><br>ECS Project No. 10:12117 |
|---|---|---|

Boring C-3

Boring C-3

**PhotoLog**

**Tyrone – 2024 Pavement Evaluation**
**Pond & Company**
**Tyrone, GA**

**ECS Project No. 10:12117**

Boring C-4

Boring C-4

| | |
|---|---|
| **PhotoLog** | **Tyrone – 2024 Pavement Evaluation**<br>**Pond & Company**<br>**Tyrone, GA**<br>**ECS Project No. 10:12117** |

Boring C-5

Boring C-5

| | | |
|---|---|---|
| **PhotoLog** | ECS | **Tyrone – 2024 Pavement Evaluation**<br>**Pond & Company**<br>**Tyrone, GA**<br>**ECS Project No. 10:12117** |

Boring C-6

Boring C-6

Boring C-7

Boring C-7

**PhotoLog**

**Tyrone – 2024 Pavement Evaluation**
**Pond & Company**
**Tyrone, GA**

**ECS Project No. 10:12117**

# REFERENCE NOTES FOR BORING LOGS

| MATERIAL[1,2] | | |
|---|---|---|
| ■ | | **ASPHALT** |
| ░ | | **CONCRETE** |
| ⁘ | | **GRAVEL** |
| ▨ | | **TOPSOIL** |
| □ | | **VOID** |
| ▤ | | **BRICK** |
| ◌ | | **AGGREGATE BASE COURSE** |
| ▨ | **GW** | **WELL-GRADED GRAVEL**<br>gravel-sand mixtures, little or no fines |
| ▨ | **GP** | **POORLY-GRADED GRAVEL**<br>gravel-sand mixtures, little or no fines |
| ▨ | **GM** | **SILTY GRAVEL**<br>gravel-sand-silt mixtures |
| ▨ | **GC** | **CLAYEY GRAVEL**<br>gravel-sand-clay mixtures |
| ▨ | **SW** | **WELL-GRADED SAND**<br>gravelly sand, little or no fines |
| ▨ | **SP** | **POORLY-GRADED SAND**<br>gravelly sand, little or no fines |
| ▨ | **SM** | **SILTY SAND**<br>sand-silt mixtures |
| ▨ | **SC** | **CLAYEY SAND**<br>sand-clay mixtures |
| ▥ | **ML** | **SILT**<br>non-plastic to medium plasticity |
| ▥ | **MH** | **ELASTIC SILT**<br>high plasticity |
| ▧ | **CL** | **LEAN CLAY**<br>low to medium plasticity |
| ▧ | **CH** | **FAT CLAY**<br>high plasticity |
| ▨ | **OL** | **ORGANIC SILT or CLAY**<br>non-plastic to low plasticity |
| ▨ | **OH** | **ORGANIC SILT or CLAY**<br>high plasticity |
| ▨ | **PT** | **PEAT**<br>highly organic soils |

## DRILLING SAMPLING SYMBOLS & ABBREVIATIONS

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

## PARTICLE SIZE IDENTIFICATION

| DESIGNATION | | PARTICLE SIZES |
|---|---|---|
| Boulders | | 12 inches (300 mm) or larger |
| Cobbles | | 3 inches to 12 inches (75 mm to 300 mm) |
| Gravel: | Coarse | ¾ inch to 3 inches (19 mm to 75 mm) |
| | Fine | 4.75 mm to 19 mm (No. 4 sieve to ¾ inch) |
| Sand: | Coarse | 2.00 mm to 4.75 mm (No. 10 to No. 4 sieve) |
| | Medium | 0.425 mm to 2.00 mm (No. 40 to No. 10 sieve) |
| | Fine | 0.074 mm to 0.425 mm (No. 200 to No. 40 sieve) |
| Silt & Clay ("Fines") | | <0.074 mm (smaller than a No. 200 sieve) |

## COHESIVE SILTS & CLAYS

| UNCONFINED COMPRESSIVE STRENGTH, QP[4] | SPT[5] (BPF) | CONSISTENCY[7] (COHESIVE) |
|---|---|---|
| <0.25 | <2 | Very Soft |
| 0.25 - <0.50 | 2 - 4 | Soft |
| 0.50 - <1.00 | 5 - 8 | Firm |
| 1.00 - <2.00 | 9 - 15 | Stiff |
| 2.00 - <4.00 | 16 - 30 | Very Stiff |
| 4.00 - 8.00 | 31 - 50 | Hard |
| >8.00 | >50 | Very Hard |

| RELATIVE AMOUNT[7] | COARSE GRAINED (%)[8] | FINE GRAINED (%)[8] |
|---|---|---|
| Trace | ≤5 | ≤5 |
| With | 10 - 20 | 10 - 25 |
| Adjective<br>*(ex: "Silty")* | 25 - 45 | 30 - 45 |

## GRAVELS, SANDS & NON-COHESIVE SILTS

| SPT[5] | DENSITY |
|---|---|
| <5 | Very Loose |
| 5 - 10 | Loose |
| 11 - 30 | Medium Dense |
| 31 - 50 | Dense |
| >50 | Very Dense |

## WATER LEVELS[6]

| | |
|---|---|
| ▽ | WL (First Encountered) |
| ▼ | WL (Completion) |
| ▼ | WL (Seasonal High Water) |
| ▽ | WL (Stabilized) |

## FILL AND ROCK

| 🟥 | 🟪 | ▢ | 🟩 |
|---|---|---|---|
| FILL | POSSIBLE FILL | PROBABLE FILL | ROCK |

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[1] Classifications and symbols per ASTM D 2488-17 (Visual-Manual Procedure) unless noted otherwise.

[2] To be consistent with general practice, "POORLY GRADED" has been removed from GP, GP-GM, GP-GC, SP, SP-SM, SP-SC soil types on the boring logs.

[3] Non-ASTM designations are included in soil descriptions and symbols along with ASTM symbol [Ex: (SM-FILL)].

[4] Typically estimated via pocket penetrometer or Torvane shear test and expressed in tons per square foot (tsf).

[5] Standard Penetration Test (SPT) refers to the number of hammer blows (blow count) of a 140 lb. hammer falling 30 inches on a 2 inch OD split spoon sampler required to drive the sampler 12 inches (ASTM D 1586). "N-value" is another term for "blow count" and is expressed in blows per foot (bpf). SPT correlations per 7.4.2 Method B and need to be corrected if using an auto hammer.

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

[7] Minor deviation from ASTM D 2488-17 Note 14.

[8] Percentages are estimated to the nearest 5% per ASTM D 2488-17.

| | | | |
|---|---|---|---|
| CLIENT:<br>**Pond & Company** | PROJECT NO.:<br>**10:12117** | BORING NO.:<br>**C-1** | SHEET:<br>**1 of 1** |
| PROJECT NAME:<br>**Tyrone - 2024 Pavement Evaluation** | DRILLER/CONTRACTOR:<br>**Southeast Drilling Solutions, LLC** | | |
| SITE LOCATION:<br>**Various Streets, Tyrone, Georgia** | | LOSS OF CIRCULATION | 100% |
| LATITUDE: | LONGITUDE: | STATION: | SURFACE ELEVATION: |
| | | BOTTOM OF CASING | |

| DEPTH (FT) | SAMPLE NUMBER | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" (N - Value) |
|---|---|---|---|---|---|---|---|---|
| | | | | | Asphalt Thickness[2"] | | | |
| | | | | | Gravel Thickness[5"] | | | |
| | S-1 | SS | 18 | 18 | (SC) CLAYEY SAND, orangish brown and light brown, moist, loose to medium dense | | | 4-5-6<br>(11) |
| | S-2 | SS | 18 | 18 | | | | 4-6-3<br>(9) |
| 5 | | | | | **END OF BORING AT 5 FT** | | -5 | |
| 10 | | | | | | | -10 | |
| 15 | | | | | | | -15 | |
| 20 | | | | | | | -20 | |
| 25 | | | | | | | -25 | |
| 30 | | | | | | | -30 | |

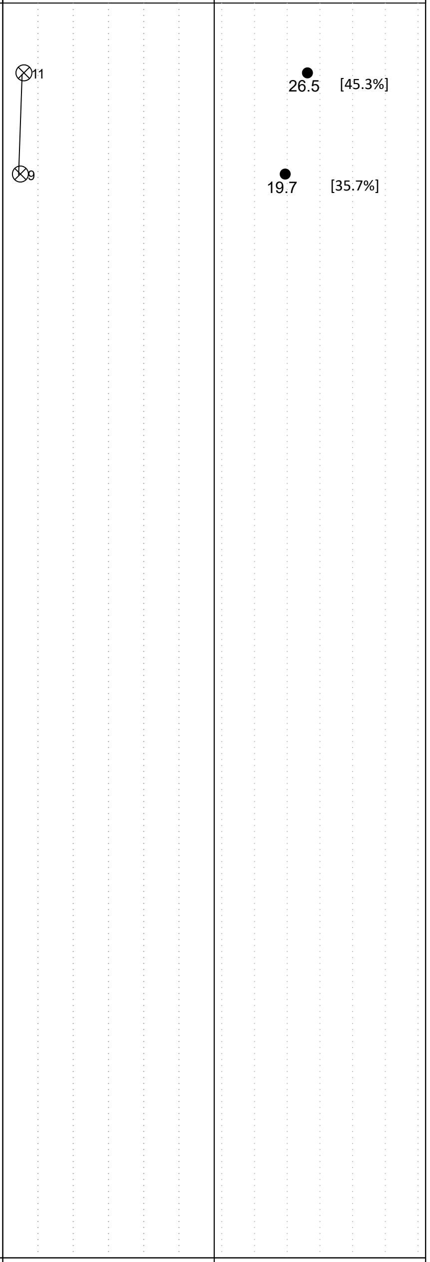
△ LIQUID LIMIT
╳ PLASTIC LIMIT

⊗ STANDARD PENETRATION BLOWS/FT
20 40 60 80 100

ROCK QUALITY DESIGNATION & RECOVERY
🟥 RQD
— REC

○ CALIBRATED PENETROMETER TSF
1 2 3 4 5

● WATER CONTENT %
[FINES CONTENT] %
10 20 30 40 50



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

| | | | | |
|---|---|---|---|---|
| ▽ WL (First Encountered) | | BORING STARTED: | **Nov 27 2023** | CAVE IN DEPTH: |
| ▼ WL (Completion) | **Dry** | BORING COMPLETED: | **Nov 27 2023** | HAMMER TYPE: **Auto** |
| ▼ WL (Seasonal High Water) | | EQUIPMENT:<br>**GeoProbe** | LOGGED BY:<br>**MG2** | DRILLING METHOD: **HSA** |
| ▽ WL (Stabilized) | | | | |

# GEOTECHNICAL BOREHOLE LOG

CLIENT:
**Pond & Company**

PROJECT NO.:
**10:12117**

BORING NO.:
**C-2**

SHEET:
**1 of 1**

PROJECT NAME:
**Tyrone - 2024 Pavement Evaluation**

DRILLER/CONTRACTOR:
**Southeast Drilling Solutions, LLC**

SITE LOCATION:
**Various Streets, Tyrone, Georgia**

LOSS OF CIRCULATION ⟩100%⟩

LATITUDE:

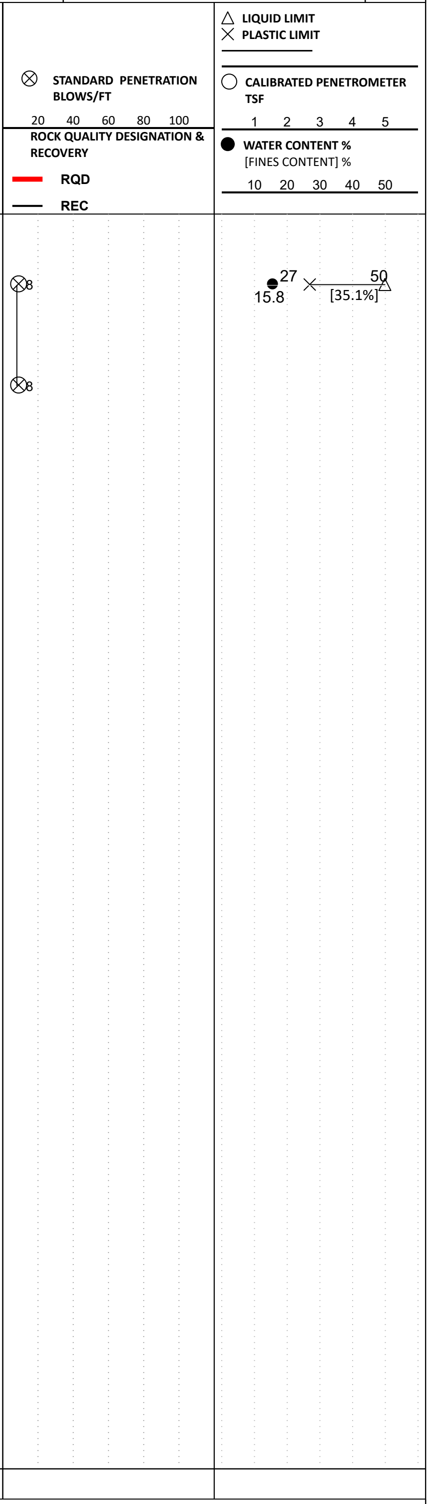
LONGITUDE:

STATION:

SURFACE ELEVATION:

BOTTOM OF CASING ➡

| DEPTH (FT) | SAMPLE NUMBER | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" (N - Value) |
|---|---|---|---|---|---|---|---|---|
| | | | | | Asphalt Thickness[1.5"] | | | |
| | | | | | Gravel Thickness[4"] | | | |
| | S-1 | SS | 18 | 18 | (SC FILL) CLAYEY SAND, reddish brown, moist, loose | | | 4-5-3<br>(8) |
| | S-2 | SS | 18 | 18 | (SC) CLAYEY SAND, contains mica, reddish brown, moist, loose | | | 3-3-5<br>(8) |
| 5 | | | | | **END OF BORING AT 5 FT** | | -5 | |
| 10 | | | | | | | -10 | |
| 15 | | | | | | | -15 | |
| 20 | | | | | | | -20 | |
| 25 | | | | | | | -25 | |
| 30 | | | | | | | -30 | |



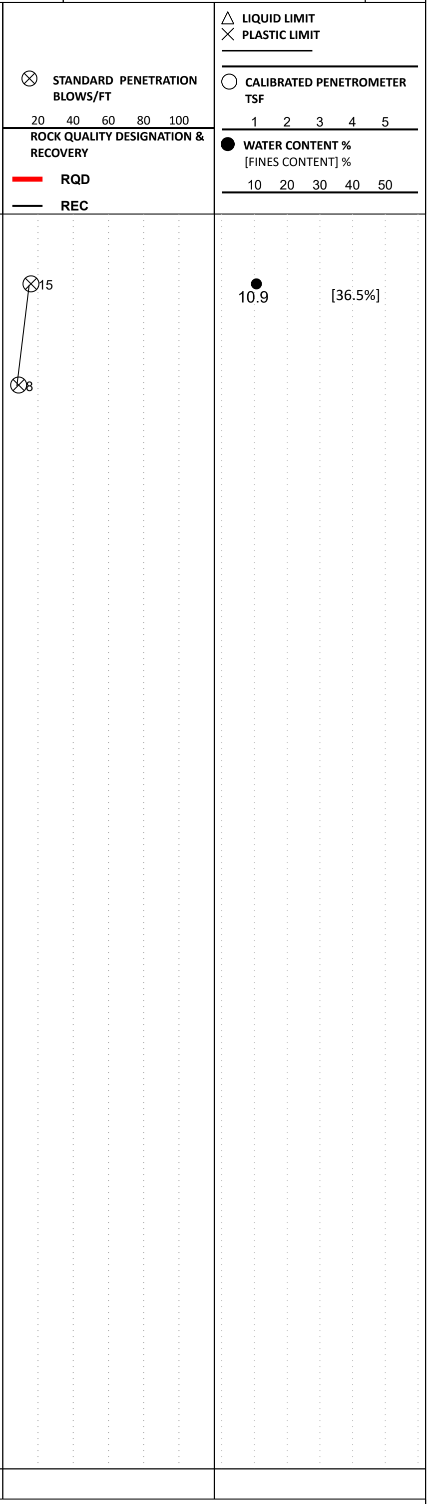
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

| | | | | | |
|---|---|---|---|---|---|
| ▽ WL (First Encountered) | | BORING STARTED: | Nov 27 2023 | CAVE IN DEPTH: | |
| ▼ WL (Completion) | **Dry** | BORING COMPLETED: | Nov 27 2023 | HAMMER TYPE: | **Auto** |
| ▼ WL (Seasonal High Water) | | EQUIPMENT:<br>**GeoProbe** | LOGGED BY:<br>**MG2** | DRILLING METHOD: | **HSA** |
| ▽ WL (Stabilized) | | | | | |

# GEOTECHNICAL BOREHOLE LOG

| | | | |
|---|---|---|---|
| CLIENT:<br>**Pond & Company** | PROJECT NO.:<br>**10:12117** | BORING NO.:<br>**C-3** | SHEET:<br>**1 of 1** |
| PROJECT NAME:<br>**Tyrone - 2024 Pavement Evaluation** | DRILLER/CONTRACTOR:<br>**Southeast Drilling Solutions, LLC** | | |
| SITE LOCATION:<br>**Various Streets, Tyrone, Georgia** | | LOSS OF CIRCULATION | 100% |
| LATITUDE: | LONGITUDE: | STATION: | SURFACE ELEVATION: |
| | | BOTTOM OF CASING | |

| DEPTH (FT) | SAMPLE NUMBER | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" (N - Value) | STANDARD PENETRATION BLOWS/FT | WATER CONTENT % [FINES CONTENT] % |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Asphalt Thickness[4.25"] | | | | | |
| | | | | | Gravel Thickness[6"] | | | | | |
| | S-1 | SS | 18 | 18 | (SC FILL) CLAYEY SAND, orangish brown, moist, medium dense | | | 5-6-9<br>(15) | 15 | 10.9 [36.5%] |
| | S-2 | SS | 18 | 18 | (SC) CLAYEY SAND, tannish brown, moist, loose | | | 4-5-3<br>(8) | 8 | |
| 5 | | | | | **END OF BORING AT 5 FT** | | -5 | | | |
| 10 | | | | | | | -10 | | | |
| 15 | | | | | | | -15 | | | |
| 20 | | | | | | | -20 | | | |
| 25 | | | | | | | -25 | | | |
| 30 | | | | | | | -30 | | | |



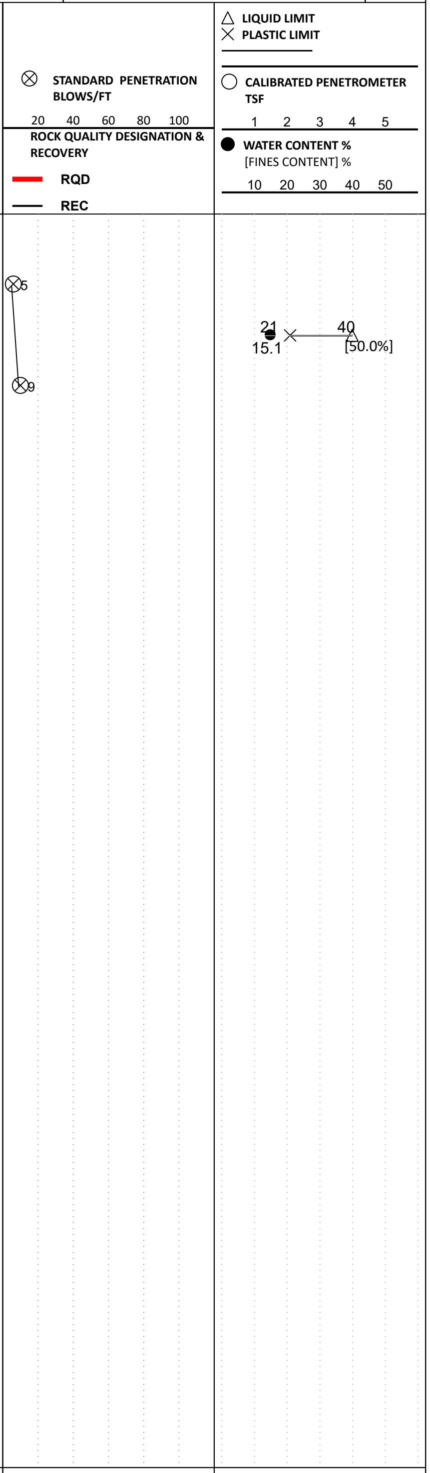
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

| | | | |
|---|---|---|---|
| ▽ WL (First Encountered) | | BORING STARTED: **Nov 27 2023** | CAVE IN DEPTH: |
| ▼ WL (Completion) | **Dry** | BORING COMPLETED: **Nov 27 2023** | HAMMER TYPE: **Auto** |
| ▼ WL (Seasonal High Water) | | EQUIPMENT: **GeoProbe** / LOGGED BY: **MG2** | DRILLING METHOD: **HSA** |
| ▽ WL (Stabilized) | | | |

# GEOTECHNICAL BOREHOLE LOG

| | | | |
|---|---|---|---|
| CLIENT:<br>**Pond & Company** | PROJECT NO.:<br>**10:12117** | BORING NO.:<br>**C-4** | SHEET:<br>**1 of 1** |
| PROJECT NAME:<br>**Tyrone - 2024 Pavement Evaluation** | DRILLER/CONTRACTOR:<br>**Southeast Drilling Solutions, LLC** | | |
| SITE LOCATION:<br>**Various Streets, Tyrone, Georgia, Tyrone, Georgia, 30290** | | LOSS OF CIRCULATION | 100% |
| LATITUDE: | LONGITUDE: | STATION: | SURFACE ELEVATION: |
| | | BOTTOM OF CASING | |

| DEPTH (FT) | SAMPLE NUMBER | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" (N - Value) |
|---|---|---|---|---|---|---|---|---|
| | | | | | Asphalt Thickness[4"] | | | |
| | | | | | Gravel Thickness[6"] | | | |
| | S-1 | SS | 18 | 18 | (CL FILL) SANDY LEAN CLAY, contains slight rock fragments, tannish brown, moist, firm | | | 5-3-2<br>(5) |
| 5 | S-2 | SS | 18 | 18 | (CL) SANDY LEAN CLAY, reddish brown, moist, stiff | | -5 | 3-4-5<br>(9) |
| | | | | | **END OF BORING AT 5 FT** | | | |
| 10 | | | | | | | -10 | |
| 15 | | | | | | | -15 | |
| 20 | | | | | | | -20 | |
| 25 | | | | | | | -25 | |
| 30 | | | | | | | -30 | |



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

| | | | |
|---|---|---|---|
| ▽ WL (First Encountered) | | BORING STARTED: **Nov 27 2023** | CAVE IN DEPTH: |
| ▼ WL (Completion) | **Dry** | BORING COMPLETED: **Nov 27 2023** | HAMMER TYPE: **Auto** |
| ▽ WL (Seasonal High Water) | | EQUIPMENT:<br>**GeoProbe** | LOGGED BY:<br>**MG2** |
| ▽ WL (Stabilized) | | | DRILLING METHOD: **HSA** |

# GEOTECHNICAL BOREHOLE LOG

| CLIENT: | PROJECT NO.: | BORING NO.: | SHEET: |
|---|---|---|---|
| **Pond & Company** | **10:12117** | **C-5** | **1 of 1** |

PROJECT NAME: **Tyrone - 2024 Pavement Evaluation**

DRILLER/CONTRACTOR: **Southeast Drilling Solutions, LLC**

SITE LOCATION: **Various Streets, Tyrone, Georgia, Tyrone, Georgia, 30290**

LOSS OF CIRCULATION 100%

LATITUDE:

LONGITUDE:

STATION:

SURFACE ELEVATION:

BOTTOM OF CASING

| DEPTH (FT) | SAMPLE NUMBER | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" (N - Value) |
|---|---|---|---|---|---|---|---|---|
| | | | | | Asphalt Thickness[4"] | | | |
| | | | | | Gravel Thickness[5"] | | | |
| | S-1 | SS | 18 | 18 | (CL) SANDY LEAN CLAY, dark brown, moist, stiff | | | 4-4-5<br>(9) |
| | S-2 | SS | 18 | 18 | | | | 3-4-5<br>(9) |
| 5 | | | | | **END OF BORING AT 5 FT** | | -5 | |
| 10 | | | | | | | -10 | |
| 15 | | | | | | | -15 | |
| 20 | | | | | | | -20 | |
| 25 | | | | | | | -25 | |
| 30 | | | | | | | -30 | |

⊗ STANDARD PENETRATION BLOWS/FT
20 40 60 80 100

ROCK QUALITY DESIGNATION & RECOVERY

🟥 RQD

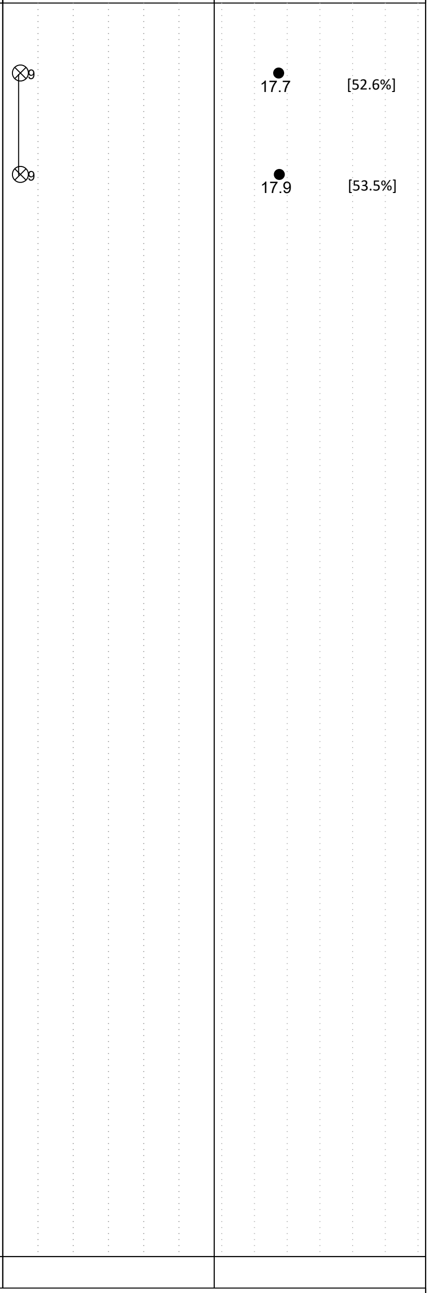
— REC

△ LIQUID LIMIT

✕ PLASTIC LIMIT

○ CALIBRATED PENETROMETER TSF
1 2 3 4 5

● WATER CONTENT %
[FINES CONTENT] %
10 20 30 40 50



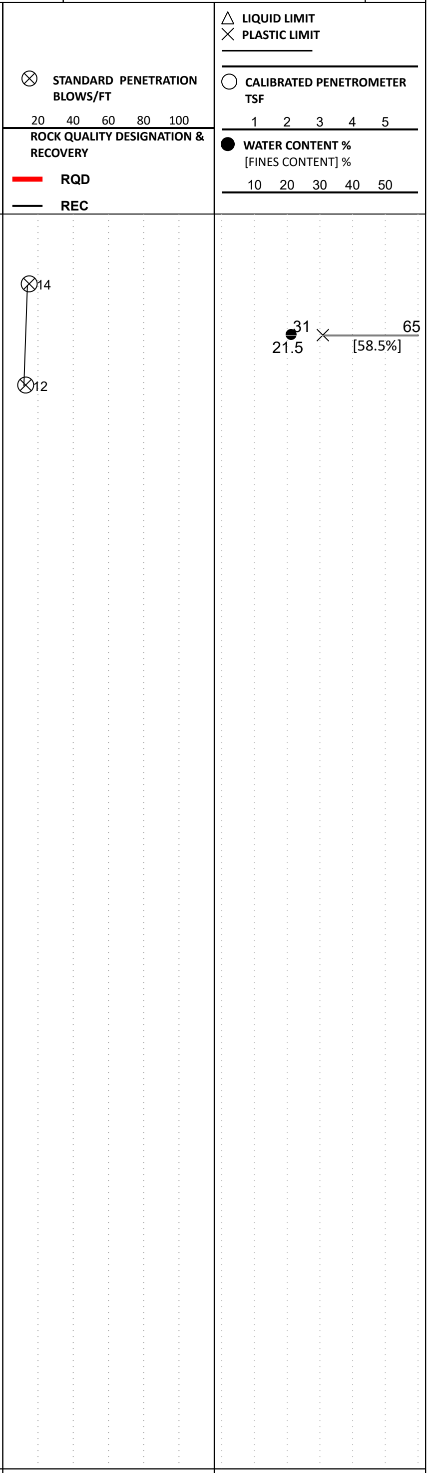
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

| | | | |
|---|---|---|---|
| ▽ WL (First Encountered) | | BORING STARTED: **Nov 27 2023** | CAVE IN DEPTH: |
| ▼ WL (Completion) | **Dry** | BORING COMPLETED: **Nov 27 2023** | HAMMER TYPE: **Auto** |
| ▼ WL (Seasonal High Water) | | EQUIPMENT: **GeoProbe** / LOGGED BY: **MG2** | DRILLING METHOD: **HSA** |
| ▽ WL (Stabilized) | | | |

# GEOTECHNICAL BOREHOLE LOG

| | | | |
|---|---|---|---|
| CLIENT:<br>**Pond & Company** | PROJECT NO.:<br>**10:12117** | BORING NO.:<br>**C-6** | SHEET:<br>**1 of 1** |
| PROJECT NAME:<br>**Tyrone - 2024 Pavement Evaluation** | DRILLER/CONTRACTOR:<br>**Southeast Drilling Solutions, LLC** | | |
| SITE LOCATION:<br>**Various Streets, Tyrone, Georgia** | | LOSS OF CIRCULATION | 100% |
| LATITUDE: | LONGITUDE: | STATION: | SURFACE ELEVATION: |
| | | BOTTOM OF CASING | ▶ |

| DEPTH (FT) | SAMPLE NUMBER | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" (N - Value) |
|---|---|---|---|---|---|---|---|---|
| | | | | | Asphalt Thickness[3"] | | | |
| | | | | | Gravel Thickness[5"] | | | |
| | S-1 | SS | 18 | 18 | (CH) SANDY FAT CLAY, orangish brown, moist, stiff | | | 5-6-8<br>(14) |
| | S-2 | SS | 18 | 18 | | | | 5-6-6<br>(12) |
| 5 | | | | | **END OF BORING AT 5 FT** | | -5 | |
| 10 | | | | | | | -10 | |
| 15 | | | | | | | -15 | |
| 20 | | | | | | | -20 | |
| 25 | | | | | | | -25 | |
| 30 | | | | | | | -30 | |



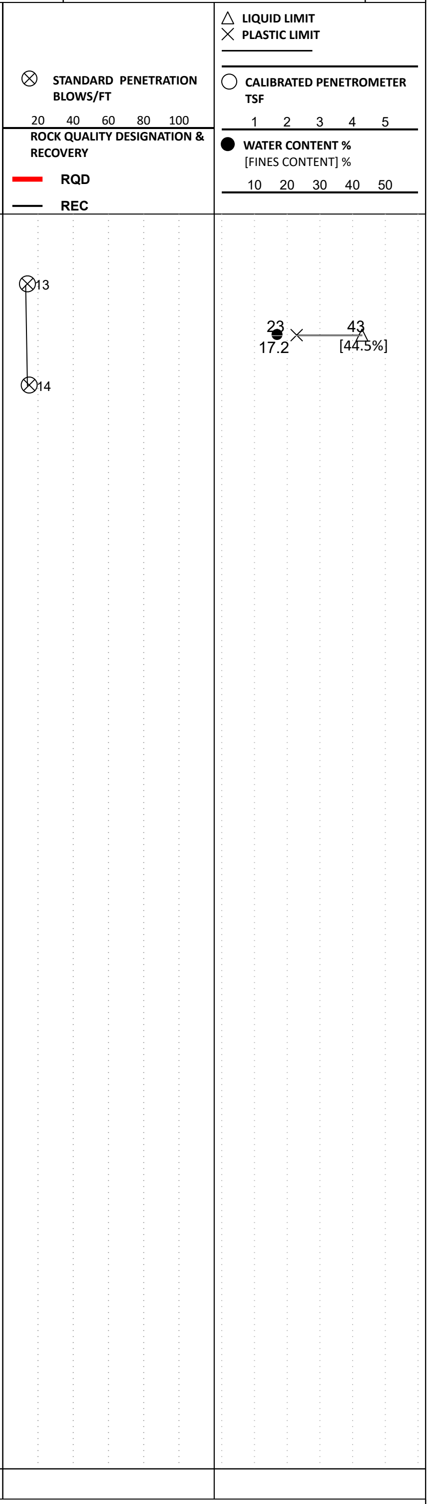
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

| | | | |
|---|---|---|---|
| ▽ WL (First Encountered) | | BORING STARTED: **Nov 27 2023** | CAVE IN DEPTH: |
| ▼ WL (Completion) | **Dry** | BORING COMPLETED: **Nov 27 2023** | HAMMER TYPE: **Auto** |
| ▼ WL (Seasonal High Water) | | EQUIPMENT: **GeoProbe** | LOGGED BY: **MG2** |
| ▽ WL (Stabilized) | | | DRILLING METHOD: **HSA** |

# GEOTECHNICAL BOREHOLE LOG

| | | | |
|---|---|---|---|
| CLIENT:<br>**Pond & Company** | PROJECT NO.:<br>**10:12117** | BORING NO.:<br>**C-7** | SHEET:<br>**1 of 1** |
| PROJECT NAME:<br>**Tyrone - 2024 Pavement Evaluation** | DRILLER/CONTRACTOR:<br>**Southeast Drilling Solutions, LLC** | | |
| SITE LOCATION:<br>**Various Streets, Tyrone, Georgia** | LOSS OF CIRCULATION | | |
| LATITUDE: LONGITUDE: STATION: | SURFACE ELEVATION: | BOTTOM OF CASING | |

| DEPTH (FT) | SAMPLE NUMBER | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" (N - Value) |
|---|---|---|---|---|---|---|---|---|
| | | | | | Asphalt Thickness[6.5"] | | | |
| | | | | | Gravel Thickness[5"] | | | |
| | S-1 | SS | 18 | 18 | (SC) CLAYEY SAND, reddish brown, moist, medium dense | | | 3-5-8<br>(13) |
| | S-2 | SS | 18 | 18 | | | | 5-5-9<br>(14) |
| 5 | | | | | **END OF BORING AT 5 FT** | | -5 | |
| 10 | | | | | | | -10 | |
| 15 | | | | | | | -15 | |
| 20 | | | | | | | -20 | |
| 25 | | | | | | | -25 | |
| 30 | | | | | | | -30 | |



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

| | | | |
|---|---|---|---|
| WL (First Encountered) | | BORING STARTED: **Nov 27 2023** | CAVE IN DEPTH: |
| WL (Completion) | **Dry** | BORING COMPLETED: **Nov 27 2023** | HAMMER TYPE: **Auto** |
| WL (Seasonal High Water) | | EQUIPMENT: **GeoProbe**<br>LOGGED BY: **MG2** | DRILLING METHOD: **HSA** |
| WL (Stabilized) | | | |

## GEOTECHNICAL BOREHOLE LOG

# Laboratory Testing Summary

| Sample Location | Sample Number | Depth (ft) | ^MC (%) | Soil Type | Atterberg Limits | | | **Percent Passing No. 200 Sieve | Moisture - Density | | CBR (%) | | #Organic Content (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | LL | PL | PI | | <Maximum Density (pcf) | <Optimum Moisture (%) | 0.1 in. | 0.2 in. | |
| C-04 | D3S-15 | 1.0-5.0 | 15.1 | CL | 40 | 21 | 19 | 50.0 | 113.4 | 14.5 | 3.4 | 3.9 | |
| C-06 | D3S-16 | 1.0-5.0 | 21.5 | CH | 65 | 31 | 34 | 58.5 | 105.1 | 19.2 | 5.7 | 5.2 | |
| C-07 | D3S-17 | 1.0-5.0 | 17.2 | SC | 43 | 23 | 20 | 44.5 | 110.5 | 16.9 | 3.4 | 3.3 | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

**Notes:** See test reports for test method, ^ASTM D2216-19, *ASTM D2488, **ASTM D1140-17, #ASTM D2974-20e1 < See test report for D4718 corrected values

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

Project: Tyrone - 2024 Pavement Evaluation
Client: Pond & Company

Project No.: 10:12117
Date Reported: 12/13/2023

| Office / Lab | Address | Office Number / Fax |
|---|---|---|
| ECS Southeast LLC - Marietta | 1281 Kennestone Circle NE<br>Suite 200<br>Marietta, GA 30066 | (770)590-1971<br>(770)590-1975 |

| Tested by | Checked by | Approved by | Date Received |
|---|---|---|---|
| KShah | KShah | KShah | 12/4/2023 |

# Laboratory Testing Summary

| Sample Location | Sample Number | Depth (ft) | ^MC (%) | Soil Type | Atterberg Limits | | | **Percent Passing No. 200 Sieve | Moisture - Density | | CBR (%) | | #Organic Content (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | LL | PL | PI | | <Maximum Density (pcf) | <Optimum Moisture (%) | 0.1 in. | 0.2 in. | |
| C-01 | S-1 | 1.0-2.5 | 26.5 | SC | | | | 45.3 | | | | | |
| C-01 | S-2 | 3.5-5.0 | 19.7 | SC | | | | 35.7 | | | | | |
| C-02 | S-1 | 1.0-2.5 | 15.8 | SC | 50 | 27 | 23 | 35.1 | | | | | |
| C-03 | S-1 | 1.0-2.5 | 10.9 | SC | | | | 36.5 | | | | | |
| C-05 | S-1 | 1.0-2.5 | 17.7 | CL | | | | 52.6 | | | | | |
| C-05 | S-2 | 3.5-5.0 | 17.9 | CL | | | | 53.5 | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

**Notes:** See test reports for test method, ^ASTM D2216-19, *ASTM D2488, **ASTM D1140-17, #ASTM D2974-20e1 < See test report for D4718 corrected values

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

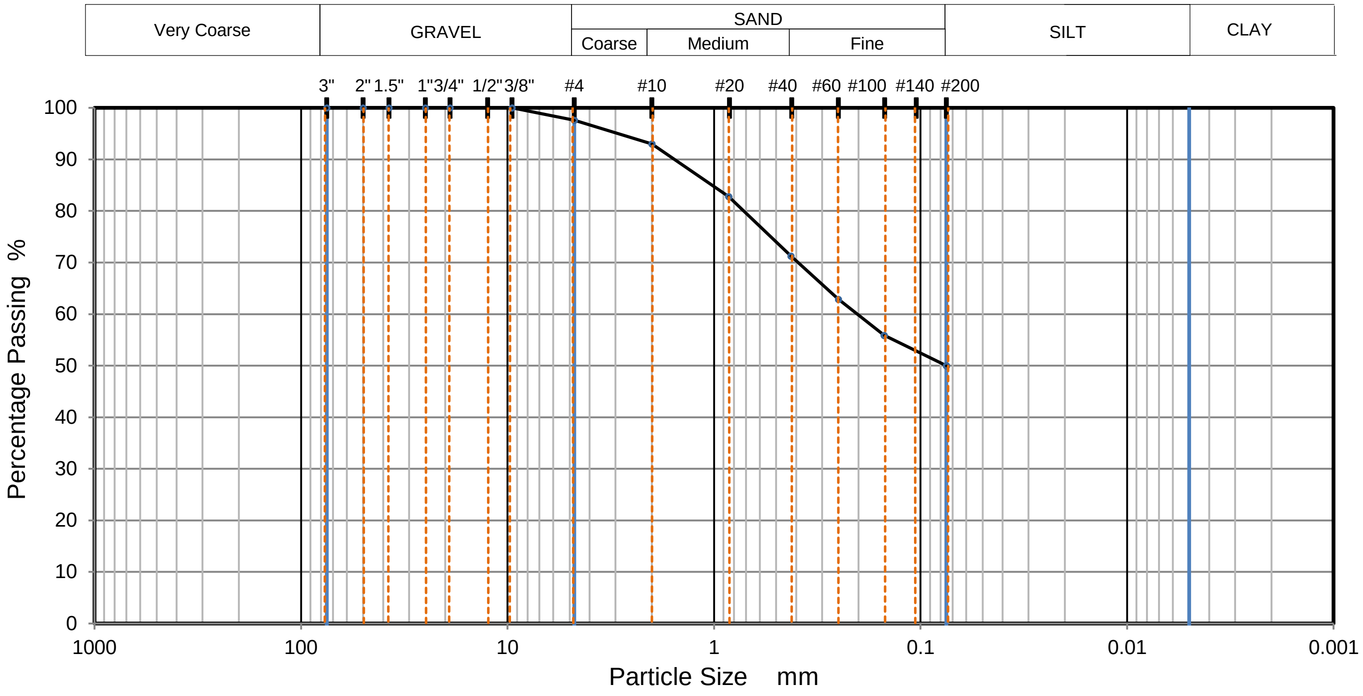
Project: Tyrone - 2024 Pavement Evaluation
Client: Pond & Company

Project No.: 10:12117
Date Reported: 12/7/2023

| Office / Lab | Address | Office Number / Fax |
|---|---|---|
| ECS Southeast LLC - Marietta | 1281 Kennestone Circle NE<br>Suite 200<br>Marietta, GA 30066 | (770)590-1971<br>(770)590-1975 |

| Tested by | Checked by | Approved by | Date Received |
|---|---|---|---|
| KShah | KShah | KShah | 12/4/2023 |

# PARTICLE SIZE DISTRIBUTION



## TEST RESULTS (ASTM C136M - 19)

| Sieving | | Hydrometer Sedimentation | |
|---|---|---|---|
| Particle Size | % Passing | Particle Size mm | % Passing |
| 3" | 100.0 | | |
| 2" | 100.0 | | |
| 1 1/2" | 100.0 | | |
| 1" | 100.0 | | |
| 3/4" | 100.0 | | |
| 3/8" | 100.0 | | |
| #4 | 97.6 | | |
| #10 | 93.0 | | |
| #20 | 82.8 | | |
| #40 | 71.3 | | |
| #60 | 62.9 | | |
| #100 | 55.9 | | |
| #200 | 50.0 | | |
| | | | |
| | | | |

| | |
|---|---|
| Dry Mass of sample, g | 164.7 |

| **Sample Proportions** | % dry mass |
|---|---|
| Very coarse, >3" sieve | 0.0 |
| Gravel, 3" to # 4 sieve | 2.4 |
| Coarse Sand, #4 to #10 sieve | 4.6 |
| Medium Sand, #10 to #40 | 21.7 |
| Fine Sand, #40 to #200 | 21.3 |
| Fines <#200 | 50.0 |
| | |

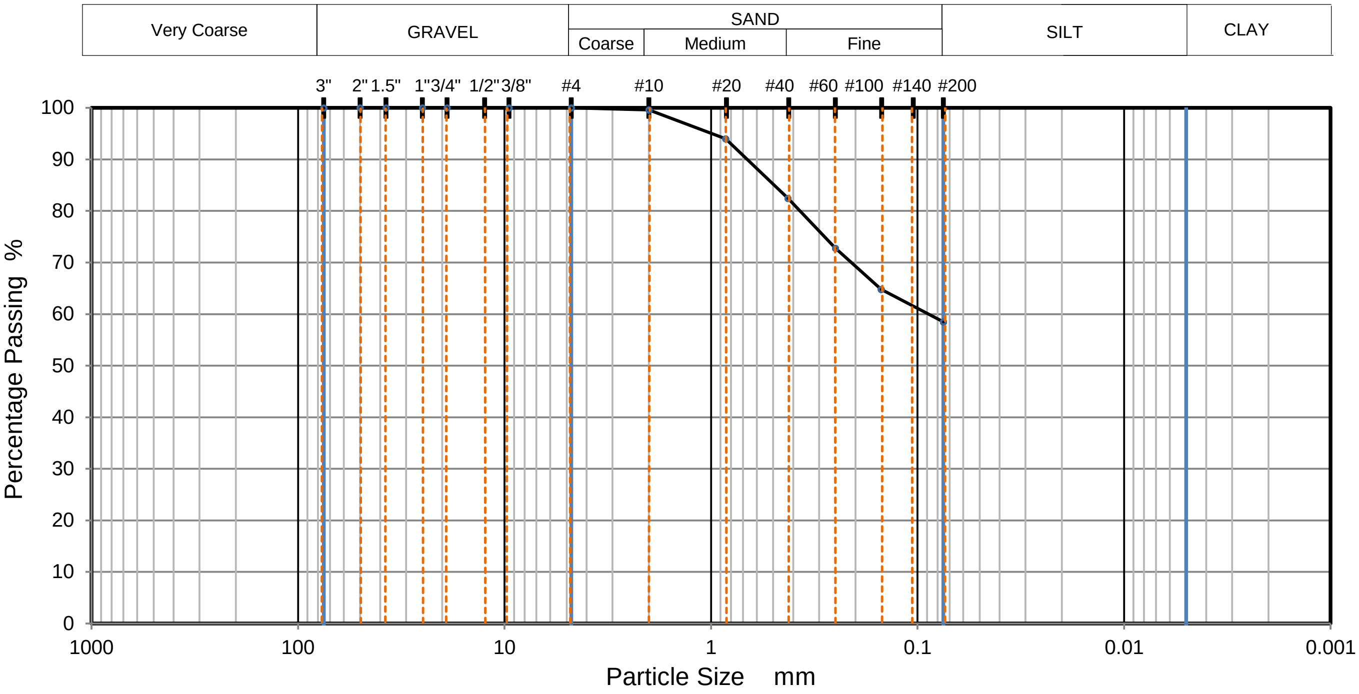
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| USCS | CL | Liquid Limit | 40 | D90 | 1.555 | D50 | 0.075 | D10 | |
| AASHTO | A-6 | Plastic Limit | 21 | D85 | 1.022 | D30 | | Cu | |
| USCS Group Name | Sandy lean clay | Plasticity Index | 19 | D60 | 0.202 | D15 | | Cc | |

| | | | |
|---|---|---|---|
| Project: | Tyrone - 2024 Pavement Evaluation | Project No.: | 10:12117 |
| Client: | Pond & Company | Depth (ft): | 1.0 - 5.0 |
| Sample Description: | BULK | Sample No.: | D3S-15 |
| Sample Source: | C-04 | Date Reported: | 12/13/2023 |

| Office / Lab | Address | Office Number / Fax |
|---|---|---|
| ECS Southeast LLC - Marietta | 1281 Kennestone Circle NE<br>Suite 200<br>Marietta, GA 30066 | (770)590-1971<br>(770)590-1975 |

| Tested by | Checked by | Approved by | Date Received | Remarks |
|---|---|---|---|---|
| KShah | KShah | KShah | 12/4/2023 | |

# PARTICLE SIZE DISTRIBUTION



## TEST RESULTS (ASTM C136M - 19)

| Sieving | | Hydrometer Sedimentation | |
|---|---|---|---|
| Particle Size | % Passing | Particle Size mm | % Passing |
| 3" | 100.0 | | |
| 2" | 100.0 | | |
| 1 1/2" | 100.0 | | |
| 1" | 100.0 | | |
| 3/4" | 100.0 | | |
| 3/8" | 100.0 | | |
| #4 | 100.0 | | |
| #10 | 99.6 | | |
| #20 | 94.0 | | |
| #40 | 82.5 | | |
| #60 | 72.8 | | |
| #100 | 64.8 | | |
| #200 | 58.5 | | |
| | | | |
| | | | |

Dry Mass of sample, g: 119.1

| Sample Proportions | % dry mass |
|---|---|
| Very coarse, >3" sieve | 0.0 |
| Gravel, 3" to # 4 sieve | 0.0 |
| Coarse Sand, #4 to #10 sieve | 0.4 |
| Medium Sand, #10 to #40 | 17.1 |
| Fine Sand, #40 to #200 | 24.0 |
| Fines <#200 | 58.5 |
| | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| USCS | CH | Liquid Limit | 65 | D90 | 0.668 | D50 | | D10 | |
| AASHTO | A-7-5 | Plastic Limit | 31 | D85 | 0.494 | D30 | | Cu | |
| USCS Group Name | Sandy fat clay | Plasticity Index | 34 | D60 | 0.088 | D15 | | Cc | |

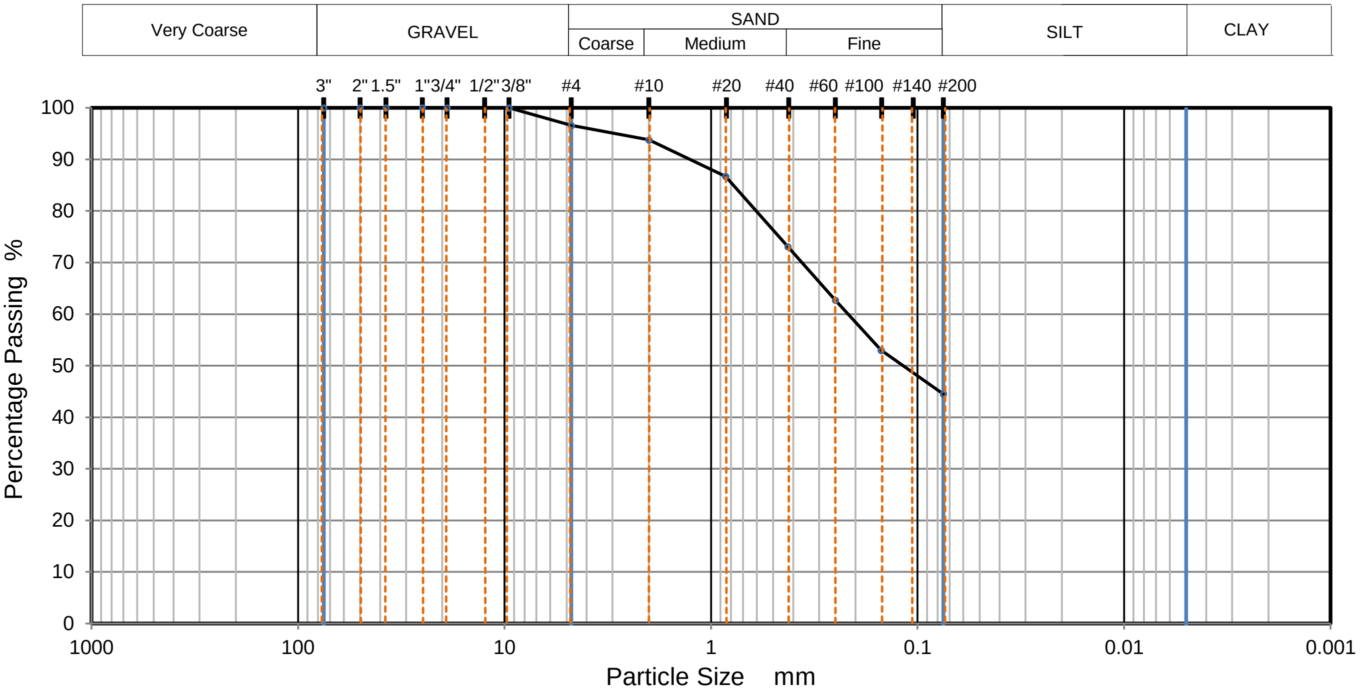
Project: Tyrone - 2024 Pavement Evaluation
Client: Pond & Company
Sample Description: BULK
Sample Source: C-06

Project No.: 10:12117
Depth (ft): 1.0 - 5.0
Sample No.: D3S-16
Date Reported: 12/13/2023

| Office / Lab | Address | Office Number / Fax |
|---|---|---|
| ECS Southeast LLC - Marietta | 1281 Kennestone Circle NE<br>Suite 200<br>Marietta, GA 30066 | (770)590-1971<br>(770)590-1975 |

| Tested by | Checked by | Approved by | Date Received | Remarks |
|---|---|---|---|---|
| KShah | KShah | KShah | 12/4/2023 | |

# PARTICLE SIZE DISTRIBUTION



## TEST RESULTS (ASTM C136M - 19)

| Sieving | | Hydrometer Sedimentation | |
|---|---|---|---|
| Particle Size | % Passing | Particle Size mm | % Passing |
| 3" | 100.0 | | |
| 2" | 100.0 | | |
| 1 1/2" | 100.0 | | |
| 1" | 100.0 | | |
| 3/4" | 100.0 | | |
| 3/8" | 100.0 | | |
| #4 | 96.6 | | |
| #10 | 93.8 | | |
| #20 | 86.7 | | |
| #40 | 73.1 | | |
| #60 | 62.7 | | |
| #100 | 53.0 | | |
| #200 | 44.5 | | |
| | | | |
| | | | |

| Dry Mass of sample, g | 120.3 |
|---|---|

| **Sample Proportions** | % dry mass |
|---|---|
| Very coarse, >3" sieve | 0.0 |
| Gravel, 3" to # 4 sieve | 3.4 |
| Coarse Sand, #4 to #10 sieve | 2.8 |
| Medium Sand, #10 to #40 | 20.7 |
| Fine Sand, #40 to #200 | 28.6 |
| Fines <#200 | 44.5 |
| | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| USCS | SC | Liquid Limit | 43 | D90 | 1.265 | D50 | 0.117 | D10 | |
| AASHTO | A-7-6 | Plastic Limit | 23 | D85 | 0.780 | D30 | | Cu | |
| USCS Group Name | Clayey sand | Plasticity Index | 20 | D60 | 0.217 | D15 | | Cc | |

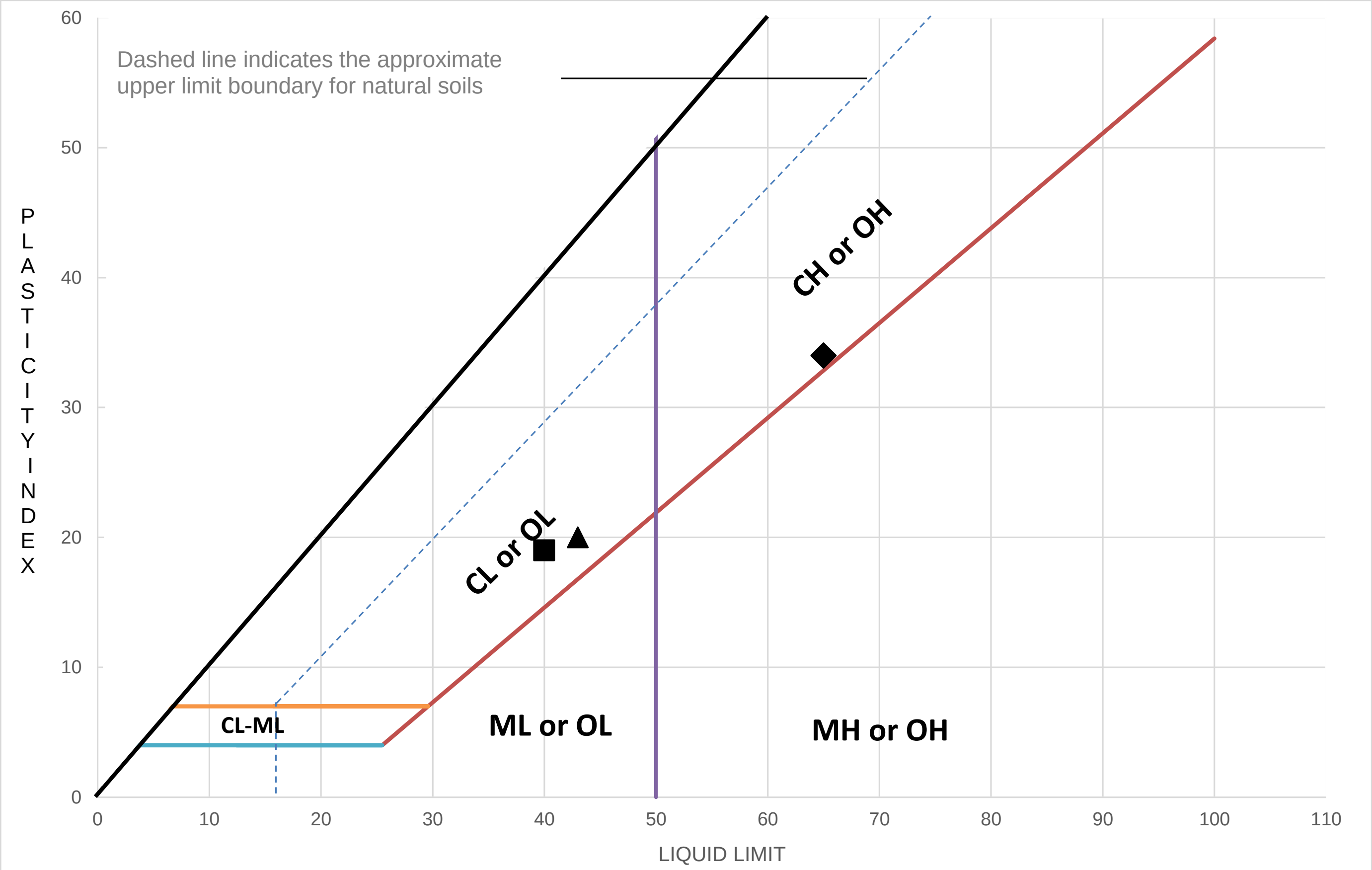
Project: Tyrone - 2024 Pavement Evaluation
Client: Pond & Company
Sample Description: BULK
Sample Source: C-07

Project No.: 10:12117
Depth (ft): 1.0 - 5.0
Sample No.: D3S-17
Date Reported: 12/13/2023

| Office / Lab | Address | Office Number / Fax |
|---|---|---|
| ECS Southeast LLC - Marietta | 1281 Kennestone Circle NE<br>Suite 200<br>Marietta, GA 30066 | (770)590-1971<br>(770)590-1975 |

| Tested by | Checked by | Approved by | Date Received | Remarks |
|---|---|---|---|---|
| KShah | KShah | KShah | 12/4/2023 | |

# LIQUID AND PLASTIC LIMITS TEST REPORT



## TEST RESULTS (ASTM D4318-10 (SINGLE POINT TEST))

| | Sample Location | Sample Number | Sample Depth (ft) | LL | PL | PI | %<#40 | %<#200 | AASHTO | USCS | Material Description |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ■ | C-04 | D3S-15 | 1.00-5.00 | 40 | 21 | 19 | 71.3 | 50.0 | A-6 | CL | BULK |
| ◆ | C-06 | D3S-16 | 1.00-5.00 | 65 | 31 | 34 | 82.5 | 58.5 | A-7-5 | CH | BULK |
| ▲ | C-07 | D3S-17 | 1.00-5.00 | 43 | 23 | 20 | 73.1 | 44.5 | A-7-6 | SC | BULK |
| | | | | | | | | | | | |
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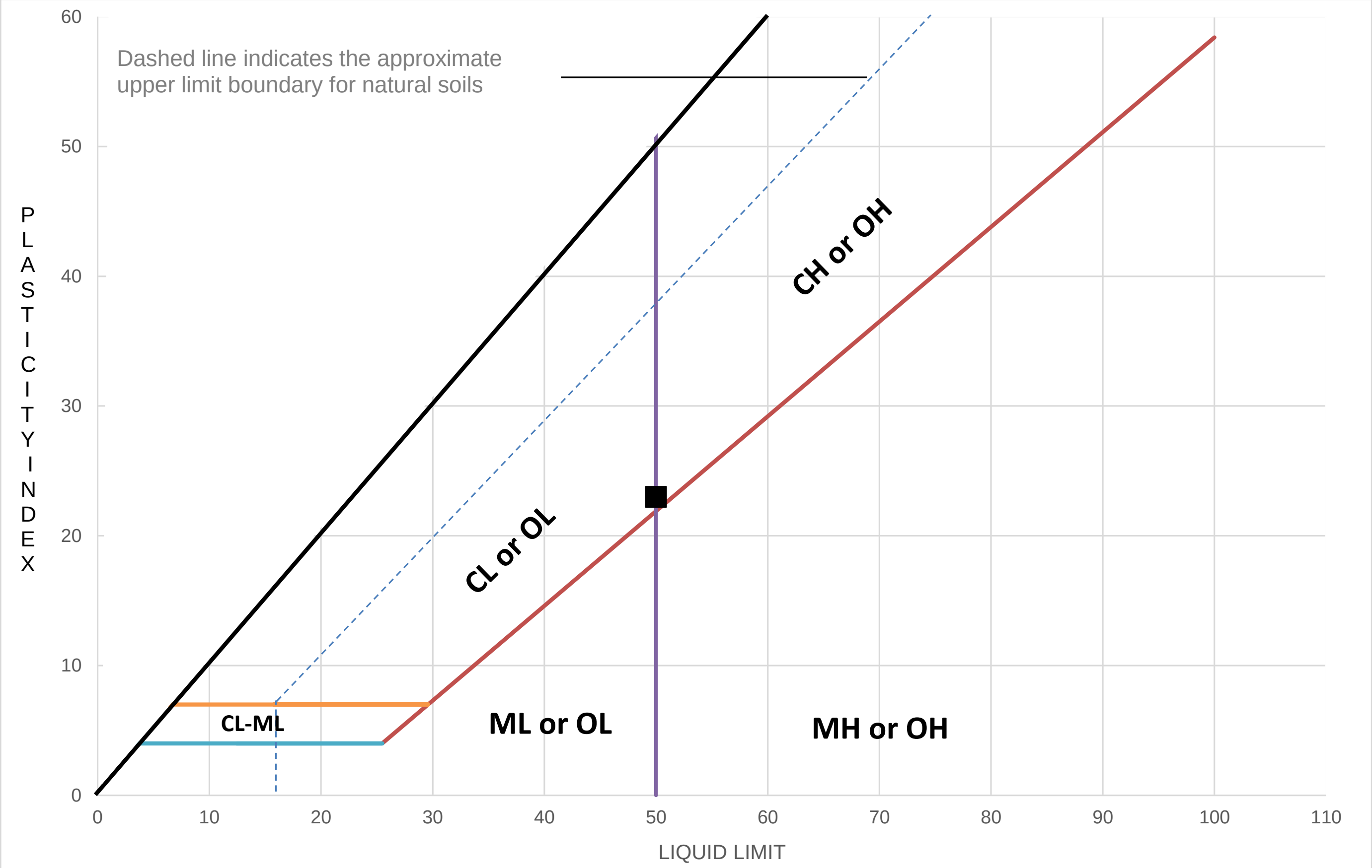
Project: Tyrone - 2024 Pavement Evaluation
Client: Pond & Company

Project No.: 10:12117
Date Reported: 12/13/2023

| Office / Lab | Address | Office Number / Fax |
|---|---|---|
| ECS Southeast LLC - Marietta | 1281 Kennestone Circle NE<br>Suite 200<br>Marietta, GA 30066 | (770)590-1971<br>(770)590-1975 |

| Tested by | Checked by | Approved by | Date Received |
|---|---|---|---|
| KShah | KShah | KShah | 12/4/2023 |

# LIQUID AND PLASTIC LIMITS TEST REPORT



## TEST RESULTS (ASTM D4318-10 (SINGLE POINT TEST))

| | Sample Location | Sample Number | Sample Depth (ft) | LL | PL | PI | %<#40 | %<#200 | AASHTO | USCS | Material Description |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ■ | C-02 | S-1 | 1.00-2.50 | 50 | 27 | 23 | | 35.1 | | SC | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
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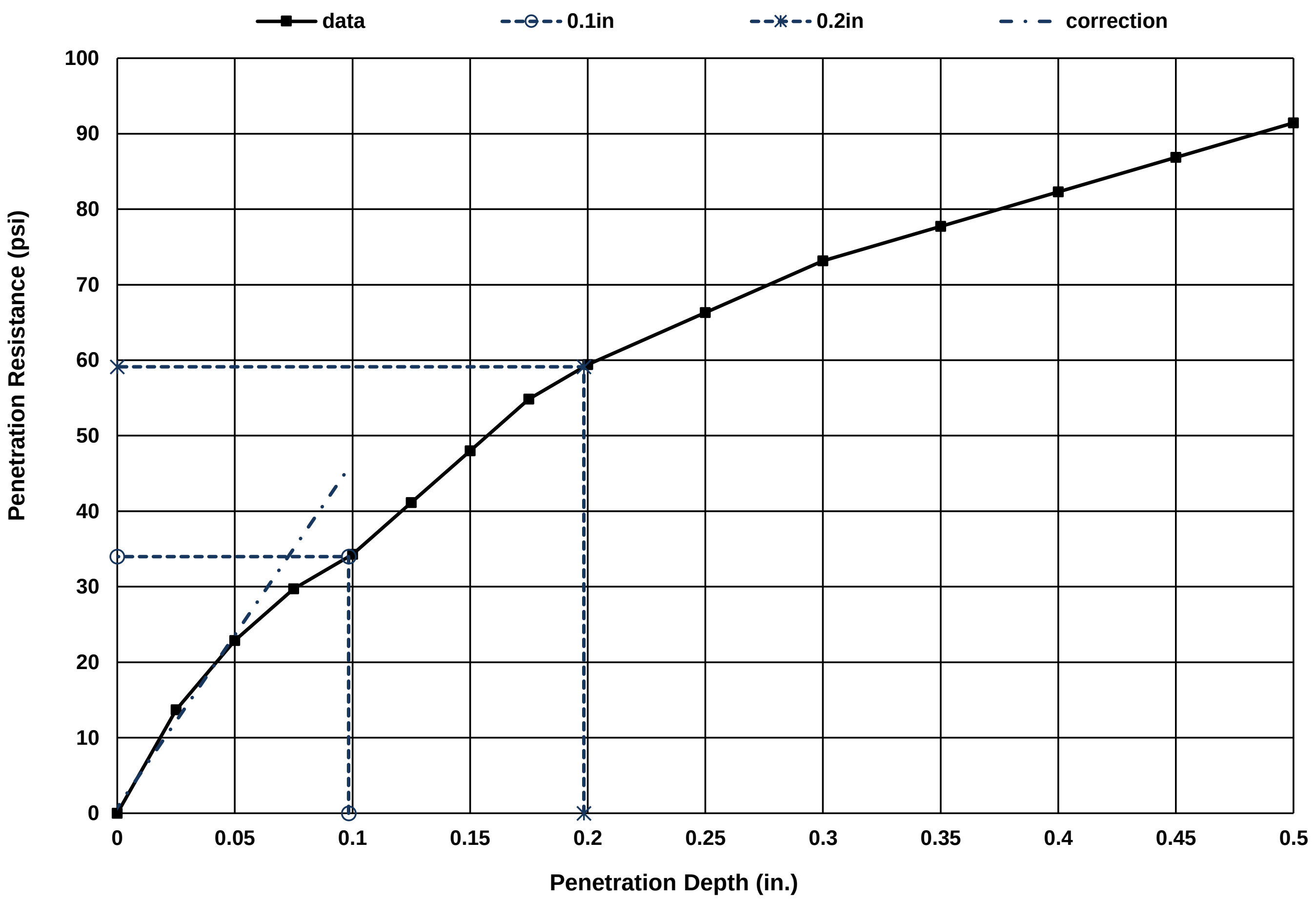
Project: Tyrone - 2024 Pavement Evaluation
Client: Pond & Company

Project No.: 10:12117
Date Reported: 12/7/2023

| Office / Lab | Address | Office Number / Fax |
|---|---|---|
| ECS Southeast LLC - Marietta | 1281 Kennestone Circle NE<br>Suite 200<br>Marietta, GA 30066 | (770)590-1971<br>(770)590-1975 |

| Tested by | Checked by | Approved by | Date Received |
|---|---|---|---|
| KShah | KShah | KShah | 12/4/2023 |

# California Bearing Ratios (CBR) of Laboratory-Compacted Soils



## TEST RESULTS ()

| Molded | | | Soaked | | | CBR (%) | | Linearty Correction (in.) | Surcharge (lbs.) | Swell (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| Density (pcf) | Percent of Max. Dens. | Moisture (%) | Density (pcf) | Percent of Max. Dens. | Moisture (%) | 0.1 in. | 0.2 in. | | | |
| 107.8 | 95.1 | 16.5 | 104.2 | 91.9 | 19.2 | 3.4 | 3.9 | 0.00 | 10 | 1.09 |

| Material Description | AASHTO | USCS | MAX. Dens. (pcf) | Optimum Moisture (%) | LL | PI | % Fines | % Gravel |
|---|---|---|---|---|---|---|---|---|
| BULK | A-6 | CL | 113.4 | 14.5 | 40 | 19 | 50.0 | 2.4 |

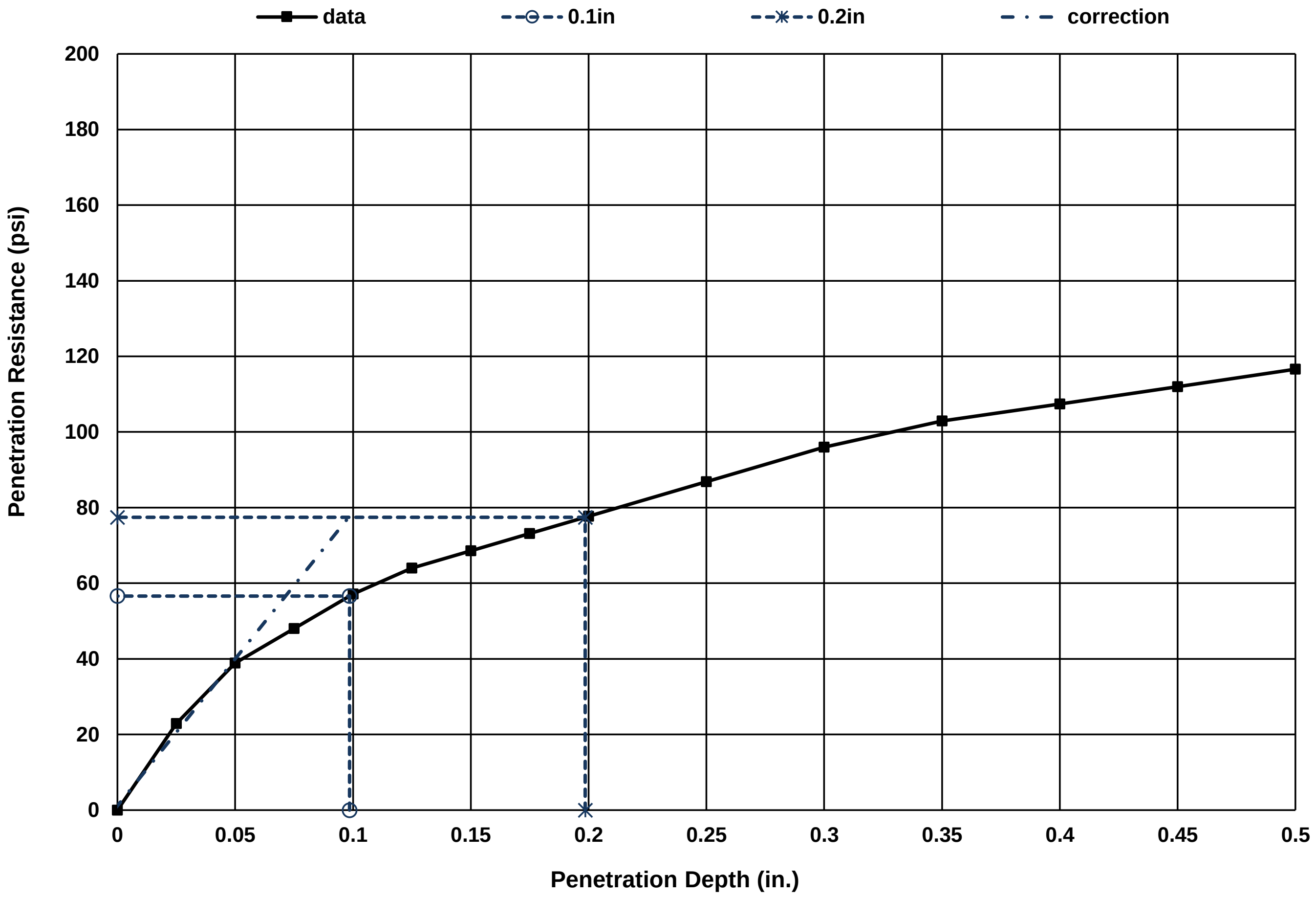
Project: Tyrone - 2024 Pavement Evaluation
Client: Pond & Company
Sample / Source C-04
Test Reference/No.: 1

Project No.: 10:12117
Depth (ft.): 1 - 5
Sample No.: D3S-15
Date Reported: 12/13/2023

| Office / Lab | Address | Office Number / Fax |
|---|---|---|
| ECS Southeast LLC - Marietta | 1281 Kennestone Circle NE<br>Suite 200<br>Marietta, GA 30066 | (770)590-1971<br>(770)590-1975 |

| Tested by | Checked by | Approved by | Date Received | Remarks |
|---|---|---|---|---|
| KShah | KShah | KShah | 12/4/2023 | |

# California Bearing Ratios (CBR) of Laboratory-Compacted Soils



## TEST RESULTS ()

| Molded | | | Soaked | | | CBR (%) | | Linearty Correction (in.) | Surcharge (lbs.) | Swell (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| Density (pcf) | Percent of Max. Dens. | Moisture (%) | Density (pcf) | Percent of Max. Dens. | Moisture (%) | 0.1 in. | 0.2 in. | | | |
| 99.9 | 95.1 | 21.2 | 96.0 | 91.3 | 25.6 | 5.7 | 5.2 | 0.00 | 10 | 0.35 |

| Material Description | AASHTO | USCS | MAX. Dens. (pcf) | Optimum Moisture (%) | LL | PI | % Fines | % Gravel |
|---|---|---|---|---|---|---|---|---|
| BULK | A-7-5 | CH | 105.1 | 19.2 | 65 | 34 | 58.5 | 0.0 |

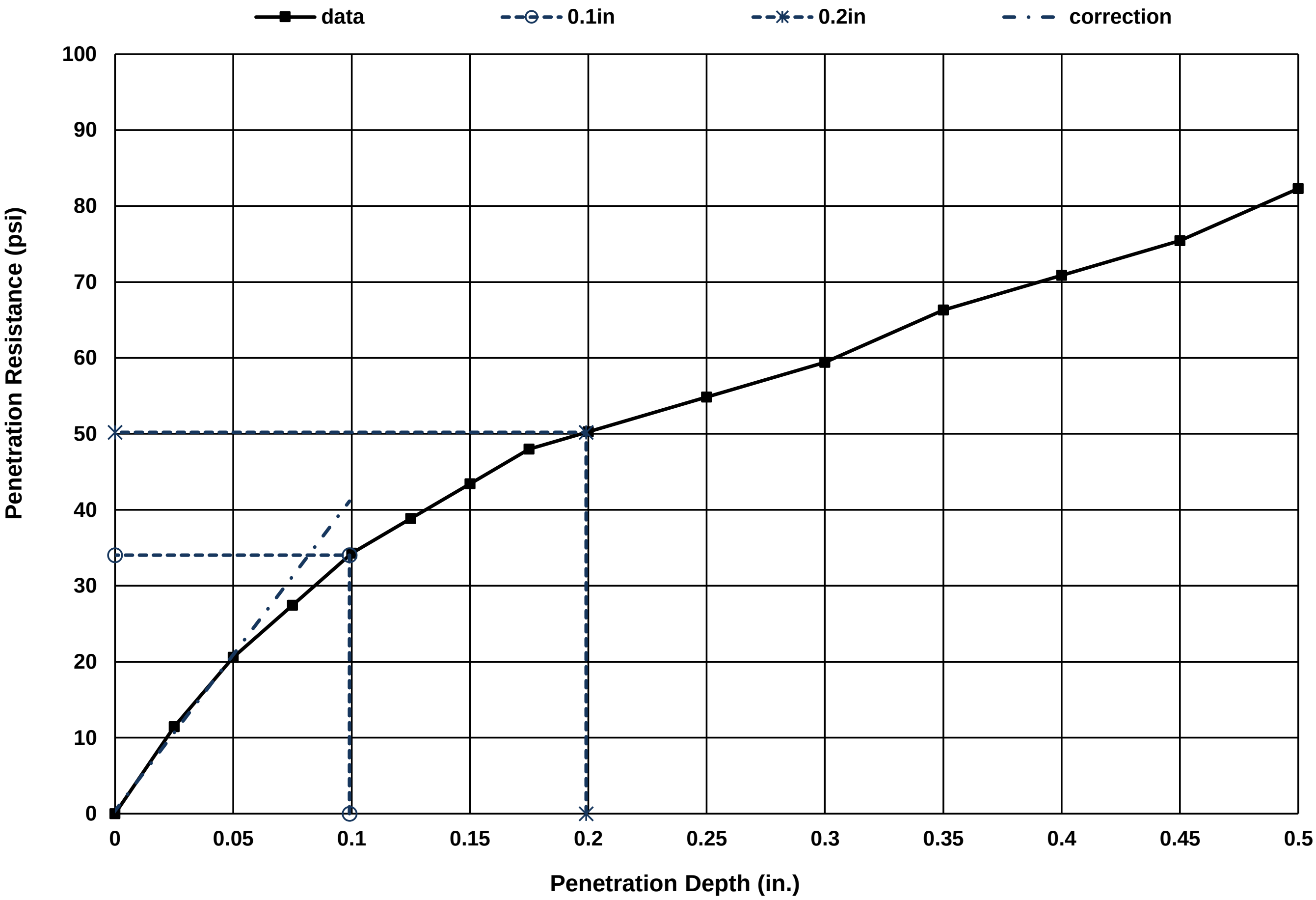
Project: Tyrone - 2024 Pavement Evaluation
Client: Pond & Company
Sample / Source C-06
Test Reference/No.: 1

Project No.: 10:12117
Depth (ft.): 1 - 5
Sample No.: D3S-16
Date Reported: 12/13/2023

| Office / Lab | Address | Office Number / Fax |
|---|---|---|
| ECS Southeast LLC - Marietta | 1281 Kennestone Circle NE<br>Suite 200<br>Marietta, GA 30066 | (770)590-1971<br>(770)590-1975 |

| Tested by | Checked by | Approved by | Date Received | Remarks |
|---|---|---|---|---|
| KShah | KShah | KShah | 12/4/2023 | |

# California Bearing Ratios (CBR) of Laboratory-Compacted Soils



## TEST RESULTS (ASTM D1883-16)

| Molded | | | Soaked | | | CBR (%) | | Linearty Correction (in.) | Surcharge (lbs.) | Swell (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| Density (pcf) | Percent of Max. Dens. | Moisture (%) | Density (pcf) | Percent of Max. Dens. | Moisture (%) | 0.1 in. | 0.2 in. | | | |
| 105.0 | 95.0 | 18.9 | 102.6 | 92.9 | 21.0 | 3.4 | 3.3 | 0.00 | 10 | 0.57 |

| Material Description | AASHTO | USCS | MAX. Dens. (pcf) | Optimum Moisture (%) | LL | PI | % Fines | % Gravel |
|---|---|---|---|---|---|---|---|---|
| BULK | A-7-6 | SC | 110.5 | 16.9 | 43 | 20 | 44.5 | 3.4 |

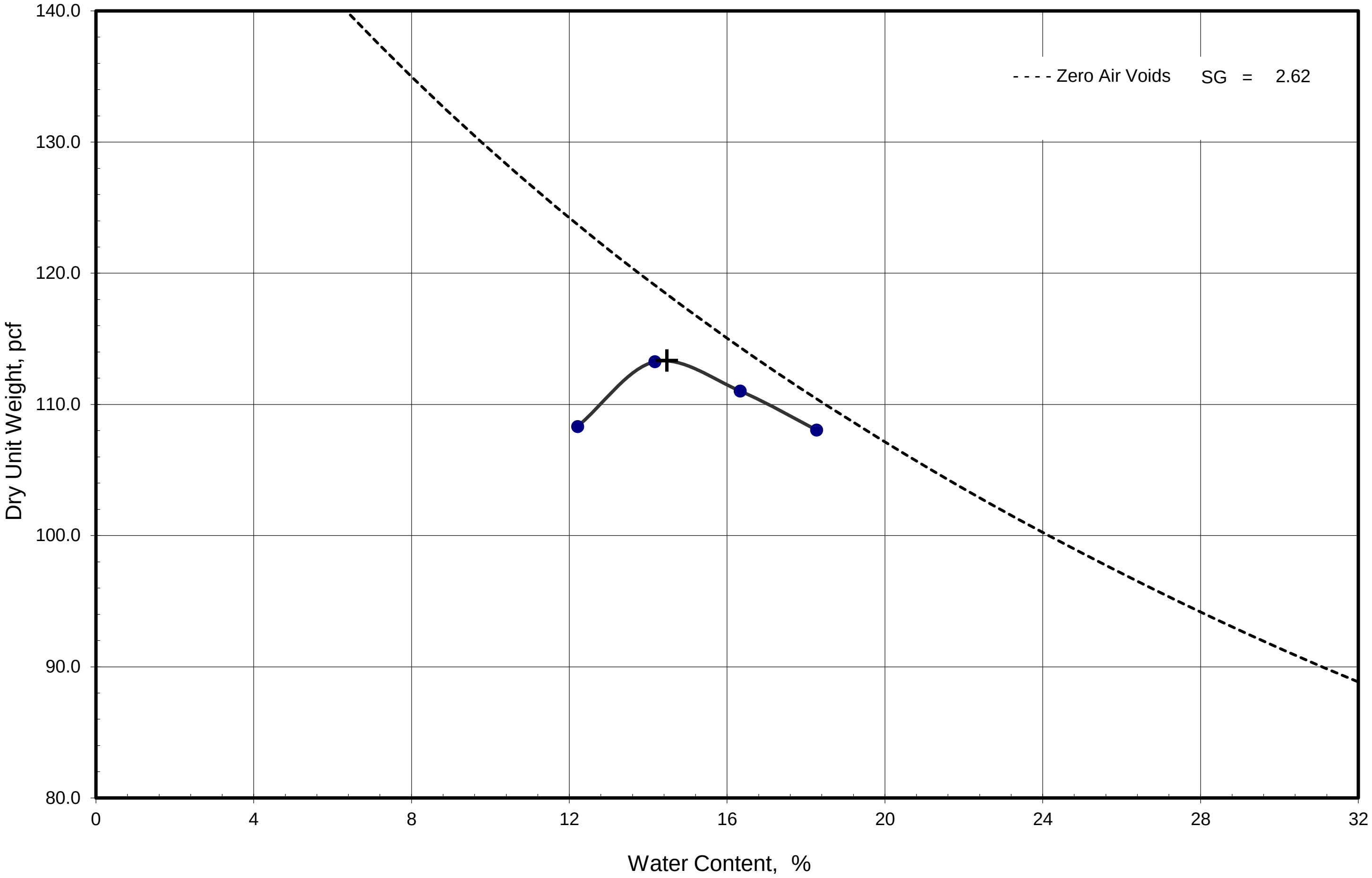
Project: Tyrone - 2024 Pavement Evaluation
Client: Pond & Company
Sample / Source C-07
Test Reference/No.: 1

Project No.: 10:12117
Depth (ft.): 1 - 5
Sample No.: D3S-17
Date Reported: 12/13/2023

| Office / Lab | Address | Office Number / Fax |
|---|---|---|
| ECS Southeast LLC - Marietta | 1281 Kennestone Circle NE<br>Suite 200<br>Marietta, GA 30066 | (770)590-1971<br>(770)590-1975 |

| Tested by | Checked by | Approved by | Date Received | Remarks |
|---|---|---|---|---|
| KShah | KShah | KShah | 12/4/2023 | |

# Laboratory Compaction Characteristics of Soil
# Using Standard Effort



| | | |
|---|---|---|
| **Optimum Moisture Content** | **14.5** | % |
| **Maximum Dry Unit Weight** | **113.4** | pcf |

| | | | |
|---|---|---|---|
| Cumulative material retained on: | 3/4 in. sieve | 0.0 | % |
| | 3/8 in. sieve | | % |
| | #4 sieve | | % |

| | | |
|---|---|---|
| Preparation | ASTM dry preparation method | |
| Type of rammer | Manual - 5.5lbf (24.5N) | |
| Test Specfication / Method | ASTM D698-12e2-method A | |
| Specific gravity - D854 water pycnometer | 2.62 | Historical |
| Coarse Aggregate Specific Gravity - | | |

| Soil Description | Nat. Moist. % | Liquid Limit | Plasticity Index | %< #200 | USCS | AASHTO |
|---|---|---|---|---|---|---|
| BULK | 15.1 | 40 | 19 | 50.0 | CL | A-6 |

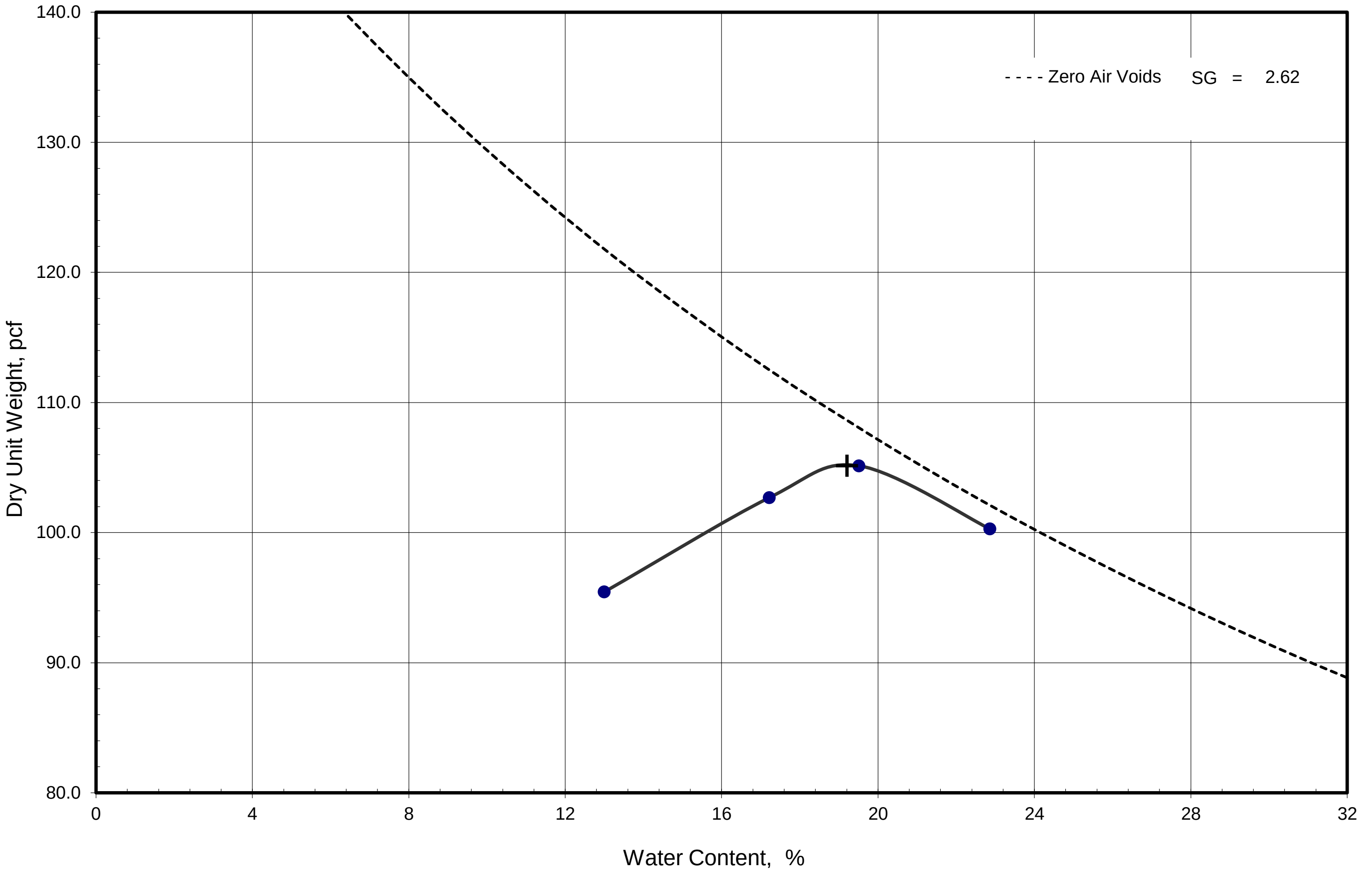
Project: Tyrone - 2024 Pavement Evaluation
Client: Pond & Company
Sample / Source C-04
Test Reference/No.:

Project No.: 10:12117
Depth (ft.): 1 - 5
Sample No.: D3S-15
Date Reported: 12/13/2023

| Office / Lab | Address | Office Number / Fax |
|---|---|---|
| ECS Southeast LLC - Marietta | 1281 Kennestone Circle NE<br>Suite 200<br>Marietta, GA 30066 | (770)590-1971<br>(770)590-1975 |

| Tested by | Checked by | Approved by | Date Received | Remarks |
|---|---|---|---|---|
| KShah | KShah | KShah | 12/4/2023 | |

# Laboratory Compaction Characteristics of Soil
# Using Standard Effort



| | | | |
|---|---|---|---|
| **Optimum Moisture Content** | | **19.2** | % |
| **Maximum Dry Unit Weight** | | **105.1** | pcf |
| Cumulative material retained on: | 3/4 in. sieve | 0.0 | % |
| | 3/8 in. sieve | | % |
| | #4 sieve | | % |

| | | |
|---|---|---|
| Preparation | ASTM dry preparation method | |
| Type of rammer | Manual - 5.5lbf (24.5N) | |
| Test Specfication / Method | ASTM D698-12e2-method A | |
| Specific gravity - D854 water pycnometer | 2.62 | Historical |
| Coarse Aggregate Specific Gravity - | | |

| Soil Description | Nat. Moist. % | Liquid Limit | Plasticity Index | %< #200 | USCS | AASHTO |
|---|---|---|---|---|---|---|
| BULK | 21.5 | 65 | 34 | 58.5 | CH | A-7-5 |

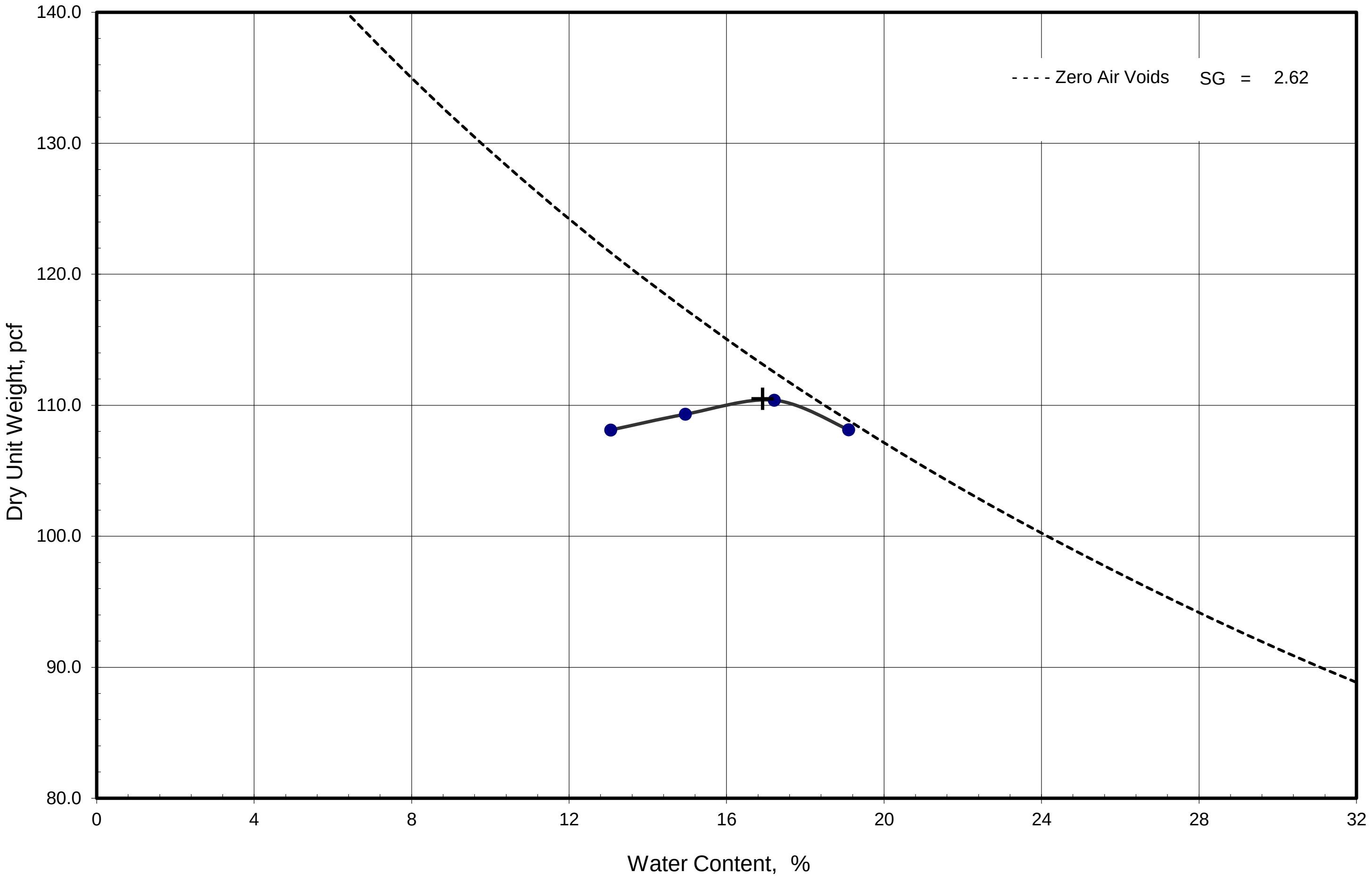
Project: Tyrone - 2024 Pavement Evaluation
Client: Pond & Company
Sample / Source C-06
Test Reference/No.:

Project No.: 10:12117
Depth (ft.): 1 - 5
Sample No.: D3S-16
Date Reported: 12/13/2023

| Office / Lab | Address | Office Number / Fax |
|---|---|---|
| ECS Southeast LLC - Marietta | 1281 Kennestone Circle NE<br>Suite 200<br>Marietta, GA 30066 | (770)590-1971<br>(770)590-1975 |

| Tested by | Checked by | Approved by | Date Received | Remarks |
|---|---|---|---|---|
| KShah | KShah | KShah | 12/4/2023 | |

# Laboratory Compaction Characteristics of Soil
## Using Standard Effort



| | | | | | |
|---|---|---|---|---|---|
| **Optimum Moisture Content** | | **16.9** | % | Preparation | ASTM dry preparation method |
| **Maximum Dry Unit Weight** | | **110.5** | pcf | Type of rammer | Manual - 5.5lbf (24.5N) |
| | | | | Test Specfication / Method | ASTM D698-12e2-method A |
| | | | | Specific gravity - D854 water pycnometer | 2.62 Historical |
| Cumulative material retained on: | 3/4 in. sieve | 0.0 | % | Coarse Aggregate Specific Gravity - | |
| | 3/8 in. sieve | | % | | |
| | #4 sieve | | % | | |

| Soil Description | Nat. Moist. % | Liquid Limit | Plasticity Index | %< #200 | USCS | AASHTO |
|---|---|---|---|---|---|---|
| BULK | 17.2 | 43 | 20 | 44.5 | SC | A-7-6 |

Project: Tyrone - 2024 Pavement Evaluation
Client: Pond & Company
Sample / Source C-07
Test Reference/No.:

Project No.: 10:12117
Depth (ft.): 1 - 5
Sample No.: D3S-17
Date Reported: 12/13/2023

| Office / Lab | Address | Office Number / Fax |
|---|---|---|
| ECS Southeast LLC - Marietta | 1281 Kennestone Circle NE<br>Suite 200<br>Marietta, GA 30066 | (770)590-1971<br>(770)590-1975 |

| Tested by | Checked by | Approved by | Date Received | Remarks |
|---|---|---|---|---|
| KShah | KShah | KShah | 12/4/2023 | |

# Important Information about This

# Geotechnical-Engineering Report

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

**While you cannot eliminate all such risks, you can manage them. The following information is provided to help.**

**The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.**

## Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

## Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

*Do not rely on this report* if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

## Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

## You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept* *responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

### Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

### This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

### This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

### Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

### Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include 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 personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

### Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

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