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August 11, 2025

Tim Parker, P.E.
Engineering Service
115 Aerosmith Drive
Richland, Mississippi 39218

Report No. 250450

Geotechnical Exploration
Proposed Tax Collector/Assessor Office
Flowood, Mississippi

Dear Mr. Parker:

Submitted here is the report of our geotechnical exploration for the above-captioned project. This exploration was authorized by your execution of our contract agreement on July 20, 2025, and was generally performed in accordance with our Proposal No. 25001P-197 dated July 18, 2025.

We appreciate the opportunity to be of service. If you should have any questions concerning this report, please do not hesitate to call us.

Very truly yours,

BURNS COOLEY DENNIS, INC.

Amber Templeton Reeb

Amber Templeton Reeb, P.E.

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20284

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Copies Submitted: (via-email)

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1.0 INTRODUCTION

1.1 Project Description

Plans are being made for the construction a new tax collector/assessor office facility on a site located just north of East Pineview Drive in Flowood, Mississippi. The proposed facility will consist of a building and parking lots. Construction and structural details have not been provided at this time, but we anticipate the building will consist of a lightly loaded, one-story structure encompassing 4,090 sq ft. For a lightly loaded structure, we expect that column loads will be less than 150 kips and wall loads will not exceed 7 kips per ft. Based on a topography survey provided, the existing ground surface elevations within the proposed construction areas range from about 345 ft to 353 ft. Details regarding grading plans have not been provided; however, we anticipate only nominal cutting and/or filling (+/- 2 ft) will be required within the site to construct a level pad to provide drainage away from the building and across the pavement area. The proposed construction area is open and covered with grass. A site plan showing the proposed facility is presented on Figure 1 of this report.

1.2 Purposes

The specific purposes of this exploration were:

1) to make exploratory soil borings within the area planned for construction of the facility;
2) to verify field classifications and to evaluate pertinent physical properties of the soils encountered in the borings by means of visual examination of the soil samples in the laboratory and routine tests performed on the samples; and
3) after analysis of the soil boring and laboratory test data, to provide recommendations for site preparation, earthwork construction, and building foundation design and construction, and to also provide guideline recommendations for pavement design and construction.

Our current scope of work does not include: environmental study; detailed slope and trench stability analyses; dewatering analyses; detailed pavement design; structural foundation design; retaining wall design and recommendations; review of plans and specifications; responses to contractor requests for information (RFIs); and construction phase services.

2.0 FIELD EXPLORATION

2.1 General

Subsurface soil conditions within the area planned for construction of the facility were explored by means of seven (7) soil borings. The approximate locations of the borings are shown on Figure 1. The borings were staked by a representative of Engineering Service prior to our field exploration.

All soils were classified in general accordance with the Unified Soil Classification System. A synopsis of the Unified Soil Classification System is presented on Figure 2 along with symbols and terminology typically utilized on graphical soil boring logs. Graphical logs of the borings are presented on Figures 3 through 9. The graphical logs illustrate the types of soil and stratification encountered with depth below the existing ground surface at the individual boring locations. Approximate GPS coordinates for the boring locations are shown at the bottom of the graphical logs within the "Comments" section. Surface elevations included on the graphic boring logs were estimated from ground elevation contours shown on the furnished topographic survey map; therefore, the elevations at the borings should be considered very approximate.

2.2 Drilling Methods and Groundwater Observations

Borings 1, 2, and 3 were made to an exploration depth of 15 ft within the planned construction area for the building. Borings 4 through 7 were made to a depth of 6 ft within the planned pavement areas. The borings were advanced full depth by dry augering. Observations were made continuously during auger drilling to detect free water entering the open boreholes. Notes pertaining to groundwater observations are included at the bottom right corner of the graphic boring logs.

2.3 Sampling Methods

Relatively undisturbed samples were obtained in Borings 1, 2, and 3 by pushing a 3-in. OD Shelby tube sampler approximately 2 ft into the soil within the depth intervals illustrated as shaded portions of the "Samples" column of the graphic boring logs. Disturbed samples of the soils encountered in Borings 1, 2, and 3 were obtained by driving a standard 2-in. OD split-spoon sampler 18 in. into the soil with a 140-lb hammer falling freely a distance of 30 in. The depths at which the split-spoon samples were taken are indicated by crossed-slashed symbols under the "Samples" column of the graphic logs for Borings 1, 2, and 3. The number of blows required to drive the split-spoon sampler each 6-in. increment (total of 18 in. of penetration) is recorded under the "Field SPT Data" column of the graphic logs for Borings 1, 2, and 3. An automatic hammer was used for SPT testing. The standard penetration test (SPT) blows required to penetrate the last foot (sum of the second and third blow count values) is considered the N_{60} value after applying a correction factor for hammer energy. The N_{60} values are plotted as small circled “x’s” in the data section of the graphic logs for Borings 1, 2, and 3. The Shelby tube and split-spoon samples were obtained at approximate 3-ft to 5-ft intervals of depth in Borings 1, 2, and 3.

Disturbed samples of the soils encountered in Borings 4 through 7 were obtained directly from the auger cuttings at approximate 2-ft and 3-ft depth intervals. Disturbed auger cutting samples were also taken near the ground surface in Borings 1, 2, and 3. The depths at which the auger cutting samples were obtained are illustrated as small I-shaped symbols under the "Samples" column of the graphic boring logs.

2.4 Field Classification, Sample Preservation, and Borehole Abandonment

All soils encountered during drilling were examined and classified in the field by a geotechnical engineering technician. The Shelby tube samples were extruded from the sampling tube in the field. An approximate 6-in. long portion of each Shelby tube sample was sealed with melted paraffin in a cylindrical cardboard container to prevent moisture loss and structural disturbance. An additional portion of each Shelby tube sample, representative portions of the split-spoon samples and auger cutting samples were sealed in jars to provide material for visual examination and testing in the laboratory. Unless other disposition is requested, we routinely discard soil samples after about six months of storage. The boreholes were plugged with soil cuttings after completion of drilling and sampling.

3.0 LABORATORY TESTING

3.1 General

All of the soil samples were examined in the laboratory by a geotechnical engineer and tests were performed on selected samples to verify field classifications and to assist in evaluating the strengths and volume change properties of the soils encountered. The types of laboratory tests performed are described in the following paragraphs.

3.2 Strength Tests

The undrained shear strength characteristics of the fine-grained soils encountered in the borings were investigated by means of visual estimates of consistency, from the results of field standard penetration tests and from the results of unconfined compression (UC) and unconsolidated undrained (UU) triaxial compression tests performed on selected undisturbed Shelby tube samples. The cohesions resulting from the UC and UU triaxial compression tests are plotted as small open circles and triangles, respectively, in the data section of the graphic logs for Borings 1, 2, and 3. The water content and dry density were also determined for the compression test specimens. The water contents are plotted as small shaded circles in the data section of the graphic logs. The dry densities are tabulated to the nearest lb per cu ft under the “Dry Density” column of the graphic logs for Borings 1, 2, and 3.

3.2 Classification Tests

The classifications and volume change properties of the fine-grained soils encountered in the borings were investigated by means of Atterberg liquid and plastic limit tests performed on selected representative samples. The results of the liquid and plastic limit tests are plotted as small crosses interconnected by dashed lines in the data section of the graphic boring logs. In accordance with the Unified Soil Classification System, fine-grained soils are classified as either clays or silts of low or high plasticity based on the results of Atterberg limit tests. The numerical difference between the liquid limit and plastic limit is defined as the plasticity index (PI). The magnitudes of the liquid limit and plasticity index and the proximity of the natural water content to the plastic limit are indicators of the potential for a fine-grained soil to shrink or swell upon changes in moisture content or to consolidate under loading. The proximity of the natural water content to the plastic limit is also an indicator of soil strength.

The classifications of soils consisting predominantly of sand were investigated by means of minus No. 200 sieve tests performed on selected samples. The percentages of fines resulting from the minus No. 200 sieve tests are tabulated at the appropriate depths under the “% Passing No. 200 Sieve” column of the graphic boring logs.

3.3 Water Content Tests

Water content tests were performed on all samples upon which strength tests were not conducted to corroborate field classifications and to extend the usefulness of the strength, plasticity and SPT blow count data. The results of the water content tests are plotted as small shaded circles in the data section of the graphic boring logs. The water content data have been interconnected on the logs to illustrate a continuous profile with depth.

4.0 GENERAL SUBSURFACE CONDITIONS

4.1 General

A general description of subsurface soil and groundwater conditions revealed by the borings made for this exploration is provided in the following paragraphs. The graphical logs shown on Figures 3 through 9 should be referred to for specific soil and groundwater conditions encountered at each boring location. Stick logs of the borings are shown in profile on Figure 10 to aid in visualizing subsurface soil conditions. Tabulated adjacent to the stick logs are Atterberg liquid and plastic limits, water contents, percentages of fines passing the No. 200 sieve, dry densities, cohesions, and corrected SPT blow counts.

The soils encountered at the boring locations appear to be fill materials. However, we are not aware if any fill materials were placed at the site, or the possible methods used for placement and compaction. If there is fill at the site, it is possible that the fill was placed in an uncontrolled manner without observation and testing by a geotechnical engineering firm. It should be understood that it is difficult to distinguish fill from natural soils, so no distinction has been made on the logs. These apparent fill materials were found to contain roots and organic matter. The borings are only representative of the conditions at the boring locations. There could be relatively weak and compressible fill materials or large concentrations of wood fragments and organic matter at locations not explored during this exploration. It is not practical to fully characterize old fill materials by means of borings.

4.2 Soil Stratification

Borings 1, 2, and 3 were made within the planned construction area for the building, and Borings 4 through 7 were made within the pavement areas.

Subsurface soils encountered within the 15-ft maximum completion depth of the borings made for this exploration generally consist of clays (CH), sandy clays (CL), and silty clays (CL) and sands (SC and SM).

Medium stiff clays (CH) that are considered to have low-moderate strength and moderate-high compressibility were encountered within the approximate depth interval of 8 ft to 12 ft at Boring 3, and from a depth of about 13 ft to the 15-ft termination depth of Boring 1. The remaining subsurface soils are considered to be strong with moderate to high strength and low to moderate compressibility. The sandy clays (CL) are considered to have low shrink/swell potential. The sands (SC and SM) have no potential for shrinking and swelling.

Clays (CH) that are considered to be expansive with moderate to high shrink/swell potential were encountered within the following approximate depth intervals:

- 0 ft to 15 ft at Boring 1
- 0 ft to 1 ft and 4 ft to 7 ft at Boring 2
- 1.5 ft to 12 ft at Boring 3
- 0 ft to 6 ft at Borings 4 and 5

4.3 Groundwater

Free water was initially encountered during auger drilling at an approximate depth of 13.5 ft at Borings 1 and 3. After an observation period of about 15 minutes, the water levels in Borings 1 and 3 were measured at approximate depths of 12.2 ft and 10.7 ft, respectively. In our opinion, groundwater conditions at the site will primarily be influenced by rainfall, surface drainage, and by the rise and fall of water levels in nearby ditches, creeks, ponds or other bodies of water. Groundwater conditions at the site can also be influenced by man-made changes. Soils which did not exhibit free water during the short time period of drilling may exhibit water seepage at other times during construction and within excavations that remain open for an extended period of time or that are permanent. Surficial soils can become saturated and weak to relatively shallow depths during periods of prolonged and heavy rainfall.

5.0 DISCUSSION

5.1 General Soil Conditions

Subsurface soils encountered within the 15-ft maximum completion depth of the borings made for this exploration generally consist of the clays (CH), sandy clays (CL), and sands (SC and SM). With the exception of the medium stiff clays (CH) encountered within the approximate depth interval of 8 ft to 12 ft at Boring 3, and from a depth of about 13 ft to the 15-ft termination depth of Boring 1, the subsurface soils are generally considered to have moderate to high strength and low to moderate compressibility. The medium stiff clays (CH) are considered to have low-moderate strength and moderate-high compressibility. The sandy clays (CL) are considered to have low shrink/swell potential. The sands (SC and SM) have no potential for shrinking and swelling.

Clays (CH) that are considered to be expansive with moderate to high shrink/swell potential were encountered at or near the ground surface in Borings 1 through 5.

As previously mentioned, the soils encountered at the boring locations appear to be fill materials. No information is available regarding the placement and compaction of the existing fill materials. It is possible that the fill was placed in an uncontrolled manner without observation and testing by a geotechnical engineering firm. Organic matter was encountered at some of the boring locations. It should be understood that it is difficult to distinguish fill from natural soils where organic material is not observed. The borings are only representative of the conditions at the boring locations. There could be relatively weak and compressible fill materials or larger concentrations of wood fragments, organic matter or debris at locations not explored during this exploration. It is not practical to fully characterize old fill materials by means of borings. Our concern is that these materials could contain significant amounts of deleterious matter in some locations, and there is a possibility of worse fill conditions not discovered by the borings. Buried debris from past activities at the site may also be present. Efforts should be made to identify the fill materials prior to construction. Any unstable soils and organics or debris should be addressed as discussed later in this report.

The risk of unforeseen conditions cannot be eliminated without completely removing the existing questionable soil material or using ground improvement efforts. These questionable soil materials may extend deeper than we observed in our soil borings at locations not explored during this exploration. If the owner is willing to accept the risk that the building and pavements will not perform as designed, the stability of these questionable soil materials can be evaluated and removed and replaced, if necessary, with compacted select fill material as recommended in this report.

5.2 Expansive Clay Considerations

The expansive clay (CH) soils can experience significant shrink/swell movements associated with seasonal moisture content fluctuations. Cover materials overlying expansive clay (CH) soils act as a buffer against seasonal moisture content changes caused by rainy weather, droughts and evapotranspiration. Thus, the potential magnitude of moisture content changes and associated shrink/swell movements within expansive clay (CH) soils is proportionate to the thickness of overlying cover materials. Seasonal moisture content changes and shrink/swell movements within expansive clay (CH) soils decrease as the thickness of cover materials increases. There is a general trend for expansive clay (CH) soils under structures to swell due to an increase in water content caused by capillary and vapor phase movement of moisture within the clays (CH). Expansive clay (CH) soils will also experience considerable swelling if directly supplied with water from rainfall, sprinkler systems, broken underground water and sewer pipes, or any other source. Trees growing adjacent to a structure can extract a considerable amount of moisture from the ground, resulting in localized shrinkage of expansive clay (CH) soils accompanied by vertical and lateral movements. Overburden removal associated with the establishment of finished grades lower than existing ground elevations will cause stress relief in expansive clay (CH) soils resulting in long-term rebound. Expansive clay (CH) soils will also experience long-term downhill creep movements, depending on slope steepness.

5.3 Design Considerations

From a geotechnical standpoint, the primary factors relevant to foundation design and construction are bearing capacity, settlement due to soil consolidation/compression from fill and structural loadings, the presence of "uncontrolled" soil materials and the potential shrinking and swelling of the expansive clays (CH). The questionable soil materials encountered in the proposed building area would provide a low bearing capacity for a shallow foundation and would compress/consolidate under fill and structural loadings, possibly resulting in excessive and unacceptable differential settlement within the building. The expansive clays (CH) can experience significant shrink/swell movements associated with seasonal moisture content fluctuations.

A foundation should be utilized for the building that will accommodate the anticipated structural loadings and also minimize future differential vertical movements resulting from either settlement due to fill and soil consolidation/compression under fill and structural loads or unpredictable shrinking and swelling of the expansive clay (CH) soils.

For the soil conditions revealed by the borings, it is our opinion that a slab-on-grade foundation made relatively stiff by means of perimeter and interior grade beams could be used for support of the building provided: 1) column loads are less than 150 kips and wall loads do not exceed 7 kips per ft; 2) a minimum 7-ft thick buffer of low permeability and low shrink/swell potential soil is provided over the expansive clays (CH); and 3) our recommendations for site preparation and earthwork construction are implemented. The recommended buffer thickness should be measured from either the bottom of the slab or finished outside grades, whichever results in the lower elevation. The buffer of low permeability and low shrink/swell potential soil is intended to **minimize, not eliminate**, differential shrink/swell movements resulting from ordinary seasonal moisture content fluctuations within the expansive clays (CH).

Within the planned construction areas for the building, expansive clays (CH) were encountered at or near the ground surface in Borings 1, 2 and 3. Therefore, undercutting will be required within the proposed construction area for the building to create the recommended minimum buffer of low permeability and low shrink/swell potential soils over the expansive clays (CH).

It is our opinion that either flexible asphalt concrete or rigid Portland cement concrete pavement can be utilized for the pavement areas, provided not less than 3 ft of low permeability and low shrink/swell potential buffer soils directly underlie the pavement structure. Within the planned construction areas for the new pavement, expansive clays (CH) were encountered at the ground surface in Borings 4 and 5. Therefore, undercutting will be required within the proposed construction area for the new pavements to create the recommended minimum buffer of low permeability and low shrink/swell potential soils over the expansive clays (CH).

Details of our recommendations for site preparation, earthwork construction, and foundation design and construction are included in the following subsections of this report. Guideline recommendations for pavement design and construction are also provided.

6.0 RECOMMENDATIONS

6.1 Site Preparation and Earthwork Construction

Unless otherwise noted, our recommendations for earthwork construction are the same for the building and pavement areas. As an initial step of site preparation within the planned construction areas, stripping should be performed throughout the construction areas to remove organic-laden surficial soils, vegetation, debris, topsoil, and any weak or high moisture content surficial soils. Next, excavation should be performed to remove any obviously weak or high moisture content soils exposed after stripping. The soils exposed after stripping and/or excavation should also be inspected for the presence of organic matter and other deleterious material and any evidence of poor compaction of previously placed fill. Additional excavation should be performed in any areas containing significant quantities of organic matter and deleterious material. The actual lateral and vertical extent of excavation required to remove weak, poorly compacted fill soils and fill soils containing significant quantities of organic matter and deleterious material must be determined in the field during earthwork construction. Excavation of these soils should extend laterally not less than 7 ft beyond the perimeter of the building and not less than 3 ft beyond the edges of pavements.

The limits of the existing fill materials should also be determined during site preparation to verify the fill materials are stable and do not contain deleterious materials that would adversely affect foundation performance. It should also be verified that the existing fill material does not extend into the pavement areas.

Undercutting should then be performed within the building area to create the recommended minimum 7-ft thick buffer of low permeability and low shrink/swell potential soils over the expansive clays (CH). As previously mentioned, expansive clays (CH) were encountered at or near the ground surface in building Borings 1, 2, and 3. Undercutting should also be performed throughout the pavement areas, as needed, to create the recommended minimum buffer of low permeability and low shrink/swell potential soils. Expansive clays (CH) were encountered at ground surface in Borings 4 and 5. The actual vertical and lateral extent of undercutting required to remove expansive clays (CH) must be determined in the field during earthwork construction. Undercutting to remove expansive clays (CH) should extend laterally not less than 7 ft beyond the building perimeters and not less than 3 ft beyond the edge of pavements.

In order to minimize the amount of any excavation and undercutting, we recommend that a representative of Burns Cooley Dennis, Inc. be present to observe excavation/undercutting operations and assist in evaluating the depth and lateral extent of any excavation and undercutting required.

After an observation period of about 15 minutes, the water levels in Borings 1 and 3 were measured at approximate depths of 12.2 ft and 10.7 ft, respectively. It could present itself as slow seepage which would accumulate into excavations that are left open for an extended period of time. Groundwater levels at the site can fluctuate seasonally, and will be influenced by rainfall and surface drainage. Groundwater control requirements will be dependent on the required depth of excavation, the season in which construction is performed and on rainfall preceding and during construction. Construction planning should account for the possibility of encountering saturated soils and water seepage. The means and methods for intercepting, collecting and removing groundwater entering the excavation should be the sole responsibility of the earthwork contractor.

Prior to the placement of any fill materials, the soils exposed after stripping, any excavation and undercutting should be scarified to a minimum depth of 6 in. and compacted to not less than 95 percent of standard Proctor maximum dry density (ASTM D 698) with stability present. Alternatively, the exposed soils could be proofrolled with loaded dump trucks to demonstrate stability. Stability is defined as the absence of significant pumping, rutting or yielding of soils during compaction or proofrolling. If stability is not evident in some areas, either additional excavation, drying by processing, treatment of the in-situ soils with an admixture, or a combination of these approaches, might be required to achieve stable conditions.

The effort required to mitigate unstable soils will be influenced by the season of the year when earthwork is performed. The subsurface soils would likely be drier during the hot late summer and could weaken during heavy rainfall events. We recommend that earthwork be performed during a dry summer or fall season, if the schedule permits. It should be recognized that soils which are demonstrated to be adequately stable during stripping, any excavation, undercutting, scarification/compaction and/or proofrolling can become unstable if they are disturbed by construction traffic or if they are exposed to rainfall prior to filling.

The on-site fine-grained soils are susceptible to pumping when wet. The construction techniques, types of equipment utilized and site drainage provided during construction will have a great effect on the performance of the fine-grained soils. The routing of heavy, rubber-tired equipment should be controlled to minimize, as much as possible, traffic in the construction areas. All traffic should be discouraged during periods of inclement weather. It should be noted that soils which initially demonstrate adequate stability can become unstable if they are disturbed by construction traffic. If pumping is initiated in the fine-grained soils, as a construction expedient the pumping can be counteracted by treating these materials with hydrated lime. It is estimated that about 4 to 6 percent hydrated lime by dry weight of soil could be required for the sandy clays (CL) and about 6 to 8 percent hydrated lime by dry weight of soil could be required for clays (CH).

We recommend that backfilling and filling to achieve planned grades follow immediately after stripping, any excavation, undercutting, scarification/compaction and/or proofrolling. Imported fill materials should consist of select, nonorganic and debris-free silty clays (CL) having a plasticity index (PI) within the range of 10 to 24 and a liquid limit less than 45, and not less than 70 percent fines passing the No. 200 sieve. The fill soils should be compacted from lifts not exceeding 9 in. in loose thickness to not less than 95 percent of standard Proctor maximum dry density (ASTM D 698) at moisture contents within 3 percentage points of the optimum water content. All backfill in confined areas and over utilities, storm drains, etc., should be placed in accordance with the preceding recommendations, except the lift thickness should be reduced to about 4 in. to 5 in. where hand-operated compaction equipment is used. Stability must be evident during compaction of each lift before any subsequent lifts of fill material are added. Fill materials should extend laterally not less than 7 ft beyond the perimeter of the building and not less than 3 ft beyond pavement edges and then slope down to natural ground at an inclination not steeper than 3H:1V. Finished site grades should be sloped to promote quick runoff of storm water and provide positive drainage away from the building and across the pavement areas.

Laboratory classification tests, including Atterberg limit determinations and grain-size analyses, should be performed on the fill soils initially and routinely during earthwork operations to check for compliance with the recommendations provided herein. Field moisture/density tests should be performed frequently in the scarified and compacted on-site soils and in each compacted lift of fill material to assist in evaluating whether the recommended moisture contents and dry densities are being achieved. As a guide for building earthwork construction, we suggest a minimum of one test per lift per 2,500 sq ft of surface area or portion thereof. A frequency of testing considered to be appropriate for the pavement areas is one test per lift for each 5,000 sq ft of surface area or portion thereof.

6.2 Foundation Design Recommendations

6.2.1 Stiffened Slab-on-Grade Foundation. The new building could be supported by a foundation system consisting of a slab-on-grade stiffened with perimeter grade beams, or turned-down edges, and interior grade or tie beams. Grade beams should be utilized to support all exterior walls and all interior load-bearing and partition walls, or otherwise they should be spaced in a grid pattern on not greater than about 10-ft to 15-ft centers in each direction, or as otherwise directed by the project structural engineer. Any columns should be supported by widened portions of the grade beams. We recommend that grade beams or turned-down edges around the perimeter of the building be brought to bear at a depth not less than 24 in. below finished outside grade. Interior tie or grade beams should be brought to bear at a depth not less than 18 in. below the bottom of the slab. We recommend that grade beams be proportioned for critical combinations of dead, live and wind loads utilizing a net allowable soil bearing pressure of 1,500 lbs per sq ft. A net allowable soil bearing pressure of 2,000 lbs per sq ft should be utilized to dimension widened portions of grade beams used to support column loads. We recommend a minimum base width of 12 in. for the grade beams. The grade beams should be reinforced for both positive and negative bending. The floor slab should be reinforced for anticipated loading conditions and deflections and to minimize slab cracking. We recommend that the slab be reinforced with a grid of relatively closely spaced reinforcing bars in lieu of welded wire fabric.

We recommend that foundation excavations be left open for the shortest possible duration to minimize exposure of the bearing soils to rainfall. Drainage should be maintained away from the foundation excavations during construction. Soils exposed in the bottom of the excavations should be observed prior to concrete placement. If these materials are found to be weak or loose, overexcavation and backfilling will be required to provide strong soils immediately beneath foundation elements.

6.2.2 Potential Movement. With proper earthwork as recommended herein, and the building with column loads less than 150 kips and wall loads not greater than 7 kips per ft supported on a stiffened slab-on-grade foundation, total settlements under compressive structural loading are expected to be on the order of about 1 in. Differential vertical movements of the foundation resulting from potential long-term volumetric changes within the expansive clays (CH) cannot be predicted with any degree of accuracy; however, if proper drainage is maintained and no other unexpected sources of water develop, they are estimated to be within normally tolerable structural limits. The potential long-term differential movements due to normal seasonal fluctuations in water content within the clays (CH) are generally expected to be on the order of about 3/4 in. over a horizontal distance of about 25 ft to 30 ft, provided that proper drainage is maintained and any leaks that develop in pipes are promptly repaired. It should be noted that differential movements of the magnitude stated in the preceding sentence could result in minor cracking of the foundation, walls and floor slab. The actual magnitude of the differential shrink/swell movements can be influenced by any number of events or circumstances that occur during the life of the structures. For example, surface drainage conditions, broken water pipes, trees and shrubs, etc., can influence the actual shrink/swell movements which develop. We emphasize that poor drainage, groundwater or other excess water in the structure area could result in significant differential movement, up to several inches over a spacing of about 25 ft to 30 ft, and major cracking of the foundation, walls and floor slab, even with the minimum recommended buffer thickness.

6.3 Guideline Pavement Recommendations

Exact loadings have not been indicated, but we expect both light and heavy loading conditions for the site pavements. The client may have pavement standards they wish to utilize for the pavement structures for the light and heavy loadings. The following are provided for added guidance in lieu of client-provided pavement details. In areas to be paved, there is often some delay between completion of earthwork operations and placement of the pavement structure materials, possibly resulting in deterioration of subgrade conditions. Therefore, we recommend that density and stability of the subgrade soils be confirmed or re-established immediately prior to construction of the pavement.

In our opinion, either flexible asphalt concrete or rigid Portland cement concrete (PCC) pavement can be utilized for the pavement areas. Site preparation and earthwork construction should be performed for the areas to be paved in accordance with the recommendations given in the "Site Preparation and Earthwork Construction" section of this report. Guideline pavement recommendations are given in the following paragraphs that represent typical construction practice. However, we recommend that pavement thicknesses be verified for the actual expected traffic volumes and loadings using appropriate design parameters for the subgrade soils and pavement structure materials. If the subgrade soils are prepared and select fill materials are placed within the areas to be paved in accordance with recommendations provided in this report, it is our opinion that a CBR of 5 would be appropriate to use as the subgrade support value for flexible asphalt concrete pavement. For PCC pavements, it is our opinion that a modulus of subgrade reaction (k) of 150 lbs per cu in. would be appropriate for the subgrade support value. Where a 6-in. thick granular subbase is utilized under PCC pavements as described in this report, the modulus of subgrade reaction can be increased up to 325 lbs per cu in.

It is our opinion that chemical treatment of the subgrade soils with hydrated lime will provide the best performing pavement system during construction and will extend the service life of the pavement. We recommend lime treatment for the top 12 in. of the subgrade utilizing 6 percent hydrated lime by dry weight of soil. The lime-treated subgrade soils should be compacted to not less than **98 percent** of standard Proctor maximum dry density (ASTM D 698). The lime treatment should be in accordance with Section 307 of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction using the Class C lime treatment procedure. The lime treatment should extend not less than 2 ft beyond the back of curb or edge of pavement.

For light automobile and pickup truck traffic, the flexible pavement structure could consist of a 2-in. thick asphalt surface course and a 4-in. thick asphalt base course on the prepared subgrade soils. A thicker asphalt concrete pavement section should be utilized if the flexible pavement will be subjected to heavy truck traffic. For the heavier loading, the flexible pavement structure could consist of a 2-in. thick asphalt surface course and a 6-in. thick asphalt base course on the prepared subgrade soils. The asphalt concrete surface course materials should conform with all applicable specifications for SC-1, Type 8 presented in the 1990 Edition of the Mississippi Standard Specifications for Road and Bridge Construction. The asphalt concrete base course materials should conform with all applicable specifications for BB-1, Type 6.

For rigid pavement, jointed plain (unreinforced) PCC pavement can be utilized with limited use of steel reinforcement such as described herein. The minimum compressive strength of the concrete mixture should be 4,000 lbs per sq in. It is our opinion that a 5-in. thick PCC pavement cast directly upon the prepared subgrade soils would be appropriate for light automobile and pickup truck traffic. For heavy truck traffic, a 7-in. thick PCC pavement directly underlain and separated from the prepared subgrade soils by a granular subbase would likely be required. We recommend the use of 8-in. thick PCC pavement directly underlain and separated from the prepared subgrade soils by a granular subbase immediately in front of any garbage dumpsters to provide support for the wheels of a garbage truck during loading.

We recommend the use of a 6-in. thick granular subbase directly under PCC pavements that support heavy truck traffic. This granular subbase is part of the pavement structure and prevents subgrade soils from pumping up through joints. We recommend that the granular subbase materials consist of No. 610 crushed limestone. The portion of the crushed limestone passing the No. 40 sieve should have a liquid limit not greater than 25 and a plasticity index not greater than 5. The crushed limestone should be compacted to not less than **100 percent** of standard Proctor maximum dry density (ASTM D 698) at moisture contents within 2 percentage points of the optimum water content. The pavement surface should be sufficiently elevated to allow drainage of the granular subbase.

General guidance for the design and construction of PCC pavements is presented in ACI 330 “Guide for the Design and Construction of Concrete Parking Lots,” including proper jointing, thickened edges that receive heavy truck traffic, thickened edges or load transfer devices at construction joints, tie-bars, and steel reinforcement in irregular shaped slabs or panels. Joints should form panels that are approximately square with the longest panel dimension no more than 1.25 times the shortest panel dimension. The maximum joint spacing should be 10 ft for 5-in. thick and 15 ft for the 7-in. or 8-in. thick PCC pavements. The pavement joints should be properly sealed and maintained. We recommend that a jointing plan and details be developed for construction of the PCC pavements. Burns Cooley Dennis, Inc. can be contracted to provide this additional service if we are provided with a CAD file of the proposed site. As an alternative, BCD can be contracted to review and approve jointing layouts and details that are generated by others. The surface of the pavement should be crowned and sloped to promote quick runoff of storm water.

6.4 Other Design and Construction Considerations

It should be noted that utility trench and foundation excavations made through on-site low-to-nonplastic sands could slough. The contractor should be made aware of this issue. Nonplastic sands will also be susceptible to erosion and surface protection will need to be provided. The best method for protecting the surface is plating the sands with about 12 in. to 18 in. of silty clays (CL) or sandy clays (CL). This plating material along with some topsoil will also be necessary to facilitate growth of grass.

If flower and shrub beds including sprinkler systems are placed adjacent to the building, the beds should be prepared such that they do not trap water, and sprinklers should be operated only enough to satisfy the water demands of the plants and shrubs. Excessive watering and ponding within the flower and shrub beds could result in downward percolation of water into the underlying foundation soils causing them to lose strength and causing expansive clays (CH) to swell. Rainwater falling on the roof of the building should be collected and prevented from reaching the ground immediately adjacent to the building. Downspouts extending from roof gutters should be equipped with extensions at ground level that are sloped to emit collected rainwater not less than 7 ft away from the building. The downspouts could be connected to solid discharge pipes buried beneath the ground. We caution that these pipes should be flexible enough to accommodate some differential movement and all pipe connections must be leak free.

Trees remove water from the ground by transpiration causing vertical and horizontal shrinkage of fine-grained soils. To minimize these effects, we recommend that any trees planted for landscaping purposes be located at least one-half of their anticipated mature height away from the building. If the risk of more movement is acceptable to the owner, a less strict building-to-tree spacing of about 25 ft for hardwoods and 15 ft for pines could be utilized.

Final grades around the building should provide rapid and effective drainage of rainwater and downspout water away from the building, with no areas allowed for water to pond. Underground sources of water such as leaking water lines, sewer lines, etc., should be prevented as much as possible in the initial construction, and any leaks that develop should be promptly repaired.

The site for the new tax collector/assessor office facility in Rankin County, Mississippi lies within a relatively low seismic activity region according to the seismic zone mapping referenced in the International Building Code. Given the site soil profile as revealed by the borings and anticipated for the area based on our experience, a site class D could be used in a seismic load evaluation.

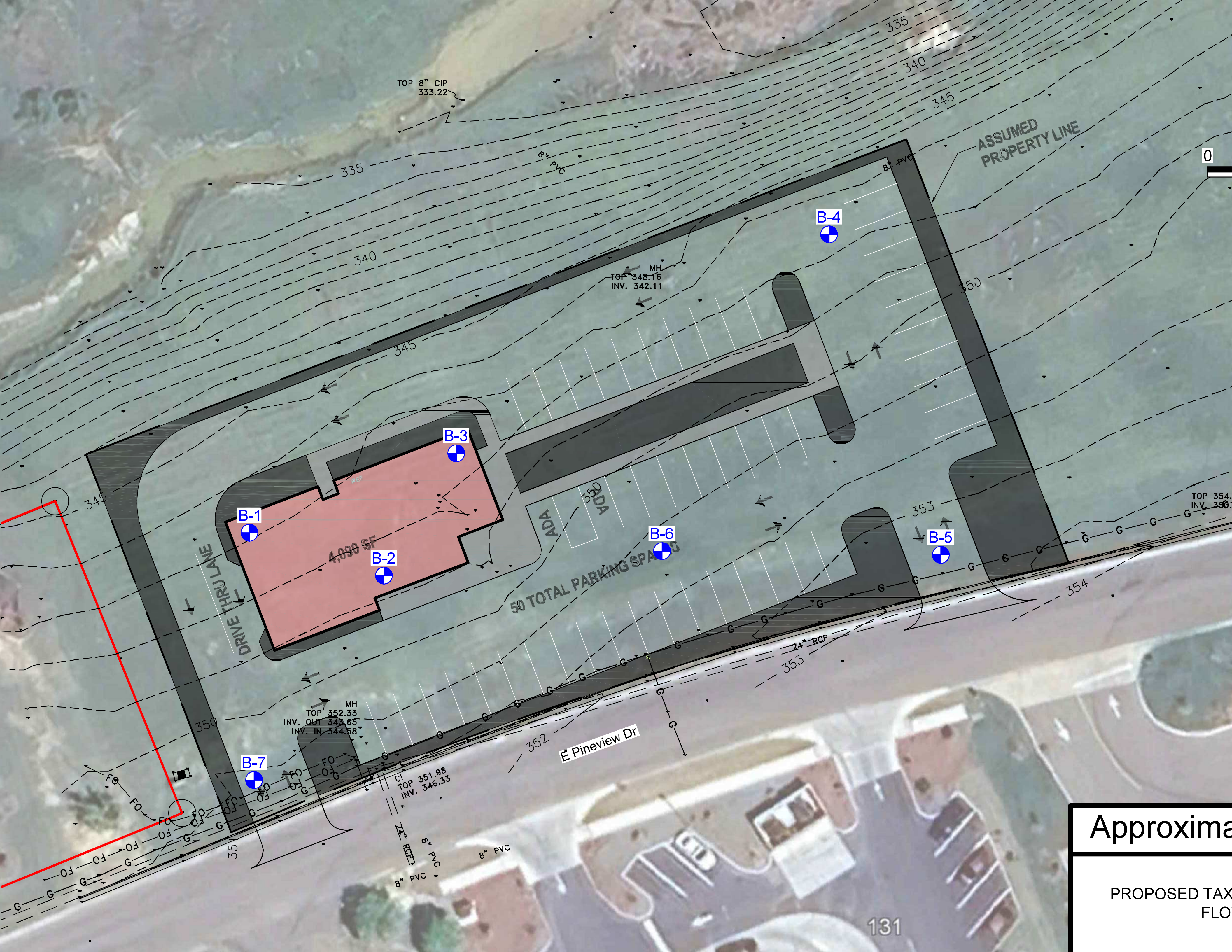
7.0 REPORT LIMITATIONS

The analyses, conclusions, and recommendations discussed in this report are based on conditions as they existed at the time of our field exploration and further on the assumption that the exploratory borings are representative of subsurface conditions throughout the areas explored. It should be noted that actual subsurface conditions between and beyond the borings might differ from those encountered at the boring locations. If subsurface conditions are encountered during construction that vary from those discussed in this report, Burns Cooley Dennis, Inc. should be notified immediately in order that we may evaluate the effects, if any, on earthwork, foundation and pavement design and construction.

Burns Cooley Dennis, Inc. should be retained for a general review of final design drawings and specifications. It is advised that we be retained to observe earthwork, foundation and pavement construction for the project in order to help confirm that our recommendations are valid or to modify them accordingly. Burns Cooley Dennis, Inc. cannot assume responsibility or liability for the adequacy of recommendations if we do not observe construction.

This report has been prepared for the exclusive use of the Engineering Service for specific application to the geotechnical-related aspects of design and construction for new tax collector/assessor office facility on a site located just north of East Pineview Drive in Flowood, Mississippi. The only warranty made by us in connection with the services provided is we have used that degree of care and skill ordinarily exercised under similar conditions by reputable members of our profession practicing in the same or similar locality. No other warranty, express or implied, is made or intended.

FIGURES



ASSUMED PROPERTY LINE
0
B-1
B-2
B-3
B-4
B-5
B-6
B-7
4,000 SF
DRIVE THRU LANE
50 TOTAL PARKING SPACES
ADA
ADA
E Pineview Dr
TOP 8" CIP
333.22
8" PVC
MH
TOP 348.16
INV. 342.11
MH
TOP 352.33
INV. OUT 343.65
INV. IN 344.58
CI
TOP 351.98
INV. 346.33
24" RCP
8" PVC
8" PVC
8" PVC
24" RCP
TOP 354.
INV. 350.
335
340
345
350
351
352
353
354
131
G
FO
Approxima
PROPOSED TAX
FLO

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			SYMBOL & LETTER	DESCRIPTION
COARSE-GRAINED SOILS More than half of material larger than No. 200 sieve size	GRAVELS More than half of coarse fraction larger than No.4 sieve size	Clean Gravels (Little or no fines)	GW	WELL GRADED GRAVEL, GRAVEL-SAND MIXTURE
			GP	POORLY GRADED GRAVEL, GRAVEL-SAND MIXTURE
		Gravels with fines (Appreciable amount of fines)	GM	SILTY GRAVEL, GRAVEL-SAND-SILT MIXTURE
			GC	CLAYEY GRAVEL, GRAVEL-SAND-CLAY MIXTURE
	SANDS More than half of coarse fraction smaller than No.4 sieve size	Clean Sands (Little or no fines)	SW	WELL GRADED SAND, GRAVELLY SAND
			SP	POORLY GRADED SAND, GRAVELLY SAND
		Sands with fines (Appreciable amount of fines)	SM	SILTY SAND, SAND-SILT MIXTURE
			SP-SM	SLIGHTLY SILTY SAND
			SC	CLAYEY SAND, SAND-CLAY MIXTURE
FINE-GRAINED SOILS More than half of material smaller than No. 200 sieve size	SILTS AND CLAYS	Liquid limit less than 50	ML	SILT WITH LITTLE OR NO PLASTICITY
			ML	CLAYEY SILT, SILT WITH SLIGHT TO MEDIUM PLASTICITY
			ML	SANDY SILT
			CL	SILTY CLAY, LOW TO MEDIUM PLASTICITY
			CL	SANDY CLAY, LOW TO MEDIUM PLASTICITY (30% TO 50% SAND)
	SILTS AND CLAYS	Liquid limit greater than 50	MH	SILT, FINE SANDY OR SILTY SOIL WITH HIGH PLASTICITY
			CH	CLAY, HIGH PLASTICITY
			OH	ORGANIC CLAY OR SILT OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOIL
SEDEMENTARY ROCK TYPES:			LS	LIMESTONE
			MARL	MARL

TERMS CHARACTERIZING SOIL STRUCTURE

Slickensided - Clays with polished and striated planes created as a result of volume changes related to shrinking, swelling and/or changes in overburden pressure.

Fissured - Clays with a blocky or jointed structure generally created by seasonal shrinking and swelling.

Laminated - Composed of thin alternating layers of varying color and texture.

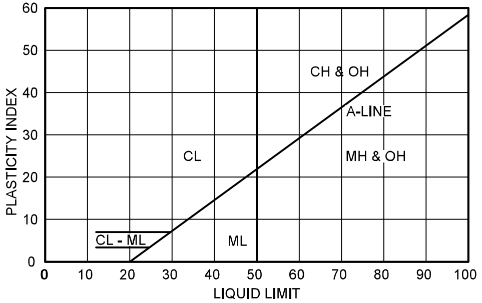
Calcareous - Containing appreciable quantities of calcium carbonate.

Parting - Paper thin (less than 1/8 inch).

Seam - 1/8 inch to 3 inch thickness.

Layer - Greater than 3 inches in thickness.

PLASTICITY CHART



FOR CLASSIFICATION OF FINE GRAINED SOILS

DENSITY AND CONSISTENCY

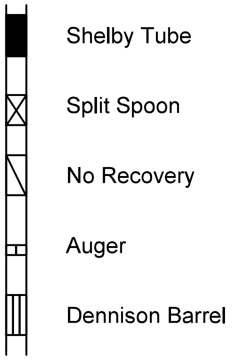
COARSE-GRAINED SOILS

DENSITY	PENETRATION RESISTANCE, N Blows per Foot
Very Loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	>50

FINE-GRAINED SOILS

CONSISTENCY	COHESION Kips/Sq. Ft	PENETRATION RESISTANCE, N Blows per Foot
Very Soft	<0.25	0 - 1
Soft	0.25 - 0.50	2 - 4
Medium Stiff	0.50 - 1.00	5 - 8
Stiff	1.00 - 2.00	9 - 15
Very Stiff	2.00 - 4.00	16 - 30
Hard	>4.00	>30

SAMPLE TYPES
(Shown in Sample Column)



PARTICLE SIZE IDENTIFICATION

Cobbles - Greater than 3 inches
Gravel - Coarse - 3/4 inch to 3 inches
Fine - 4.76 mm to 3/4 inch
Sand - Coarse - 2 mm to 4.76 mm
Medium - 0.42 mm to 2 mm
Fine - 0.074 mm to 0.42 mm
Silt & Clay - Less than 0.074 mm

RELATIVE COMPOSITION

Slightly	5 - 15%
With	16 - 29%
Sandy (or Gravelly)	30 - 50%

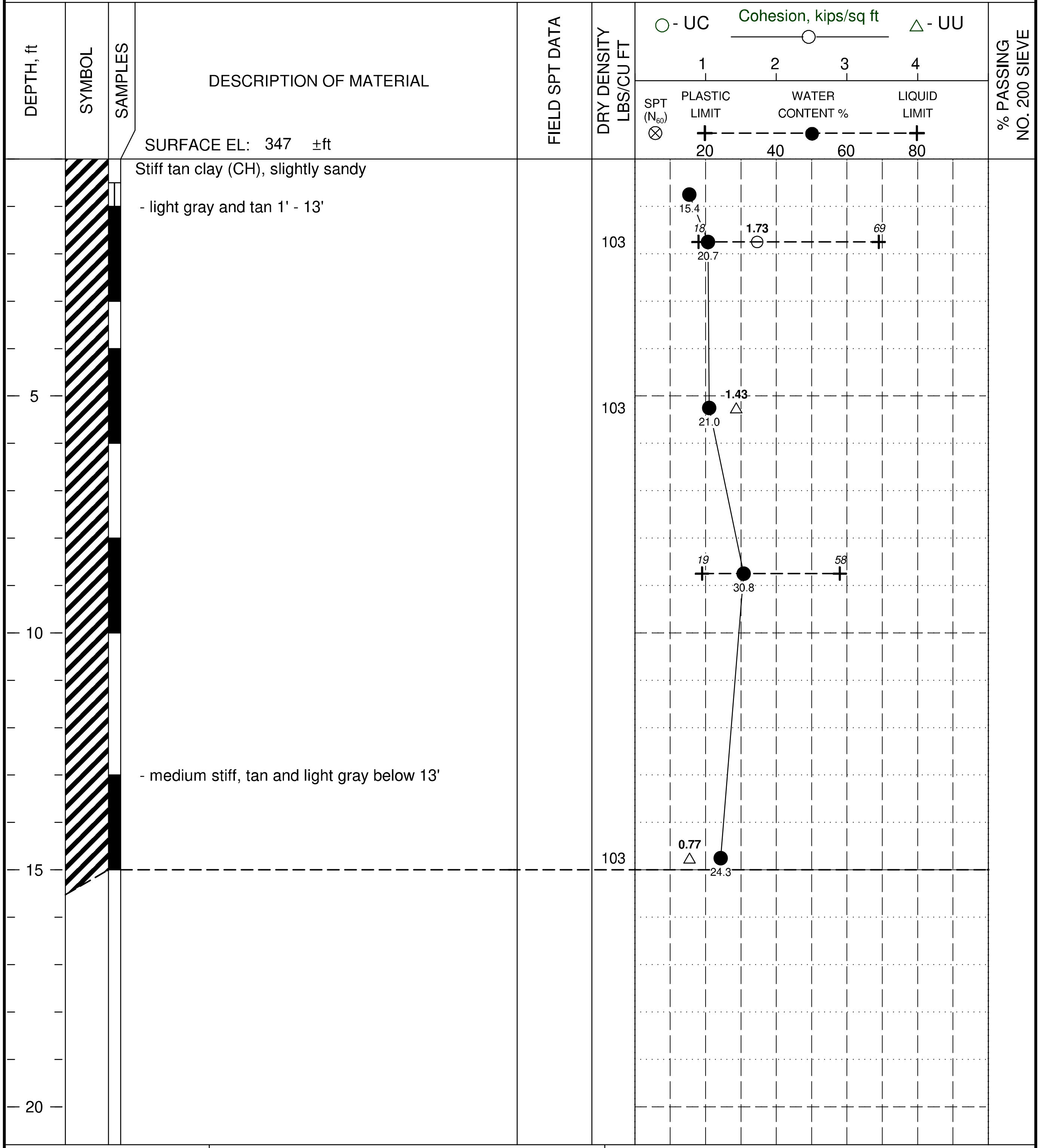
CLASSIFICATION, SYMBOLS AND TERMS USED ON GRAPHICAL BORING LOGS

LOG OF BORING NO. 1

PROPOSED TAX COLLECTOR/ASSESSOR OFFICE
FLOWOOD, MISSISSIPPI

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1



Stiff tan clay (CH), slightly sandy

- light gray and tan 1' - 13'

- medium stiff, tan and light gray below 13'

BORING DEPTH: 15 ft

DATE: 07/25/25

COMMENTS:
GPS Coordinates
N 32° 21' 20.6"
W 90° 1' 27.3"

GROUNDWATER DATA: Free water encountered at an approximate depth of 13.5' during auger drilling. Water level at an approximate depth of 12.2' after about 15 minutes.

250450.GPJ

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FIGURE 3

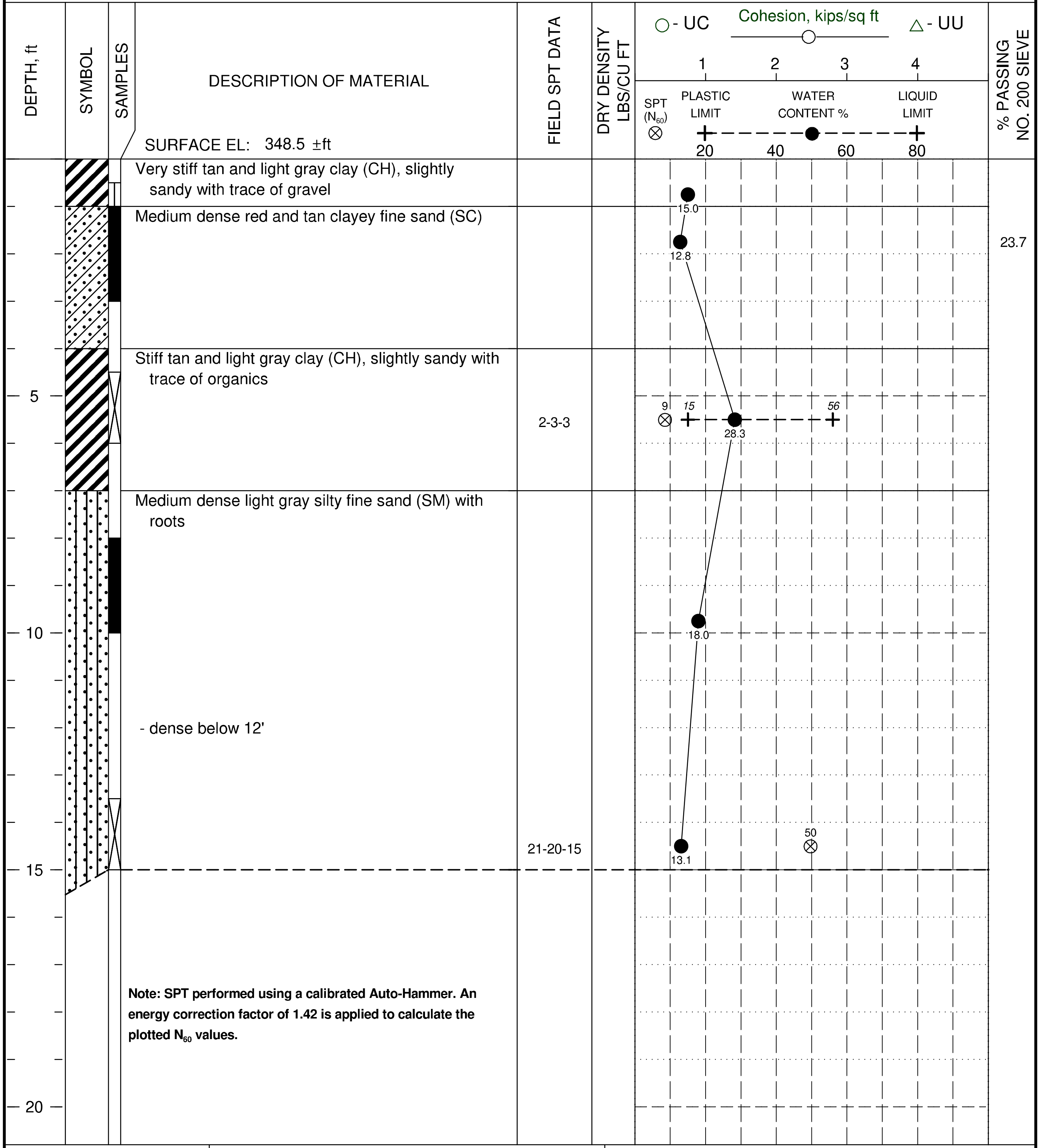
LOG OF BORING NO. 2

PROPOSED TAX COLLECTOR/ASSESSOR OFFICE
FLOWOOD, MISSISSIPPI

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1

SURFACE EL: 348.5 ±ft



DESCRIPTION OF MATERIAL	FIELD SPT DATA	% PASSING NO. 200 SIEVE
Very stiff tan and light gray clay (CH), slightly sandy with trace of gravel		
Medium dense red and tan clayey fine sand (SC)		23.7
Stiff tan and light gray clay (CH), slightly sandy with trace of organics	2-3-3	
Medium dense light gray silty fine sand (SM) with roots		
- dense below 12'	21-20-15	

Note: SPT performed using a calibrated Auto-Hammer. An energy correction factor of 1.42 is applied to calculate the plotted N_{60} values.

BORING DEPTH: 15 ft

DATE: 07/25/25

COMMENTS:
GPS Coordinates
N 32° 21' 20.4"
W 90° 1' 26.5"

GROUNDWATER DATA: No free water encountered during auger drilling.

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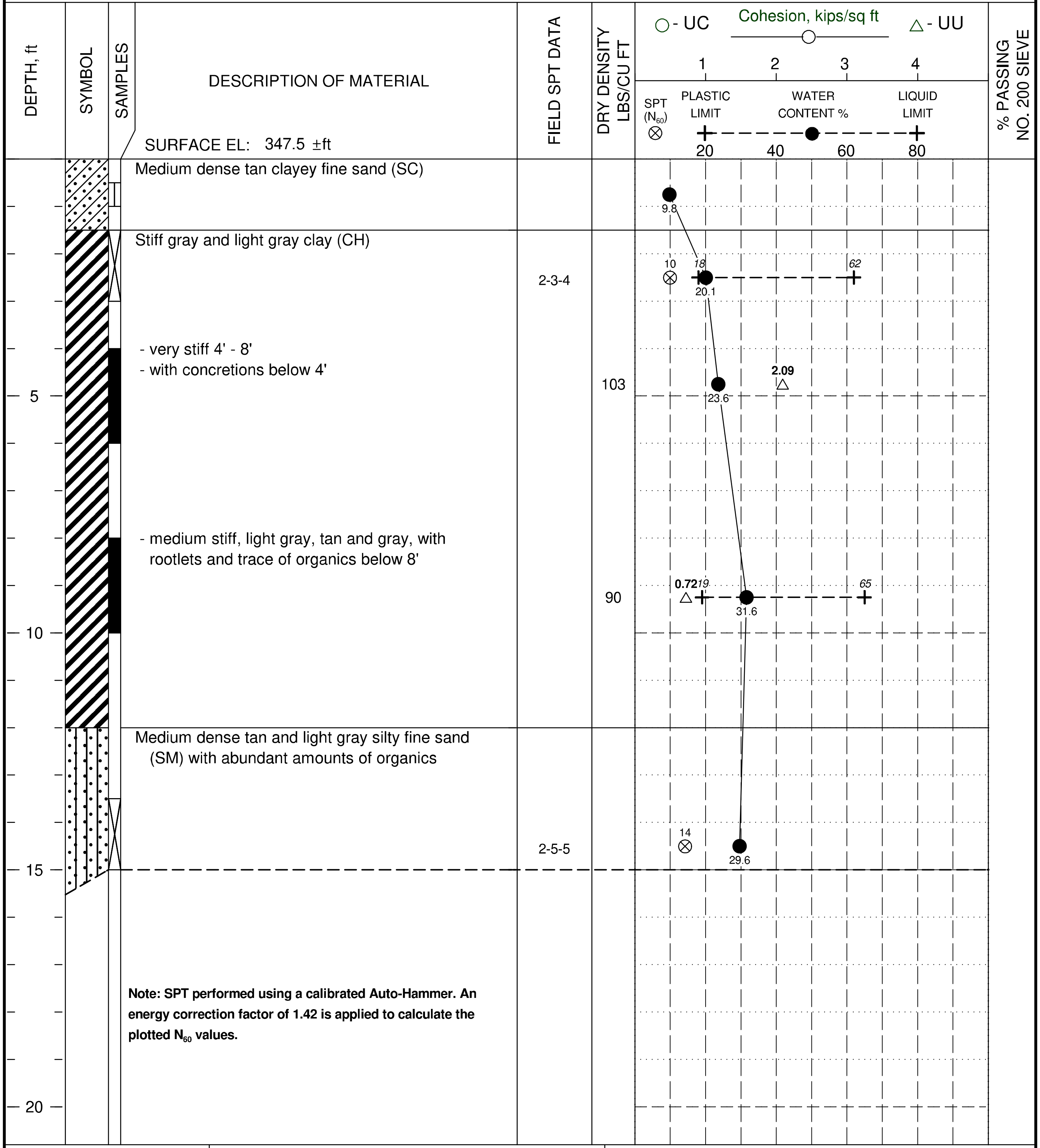
FIGURE 4

LOG OF BORING NO. 3

PROPOSED TAX COLLECTOR/ASSESSOR OFFICE
FLOWOOD, MISSISSIPPI

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1



BORING DEPTH: 15 ft

DATE: 07/25/25

COMMENTS:
GPS Coordinates
N 32° 21' 21.0"
W 90° 1' 26.2"

GROUNDWATER DATA: Free water encountered at an approximate depth of 13.5' during auger drilling. Water level at an approximate depth of 10.7' after about 15 minutes.

250450.GPJ

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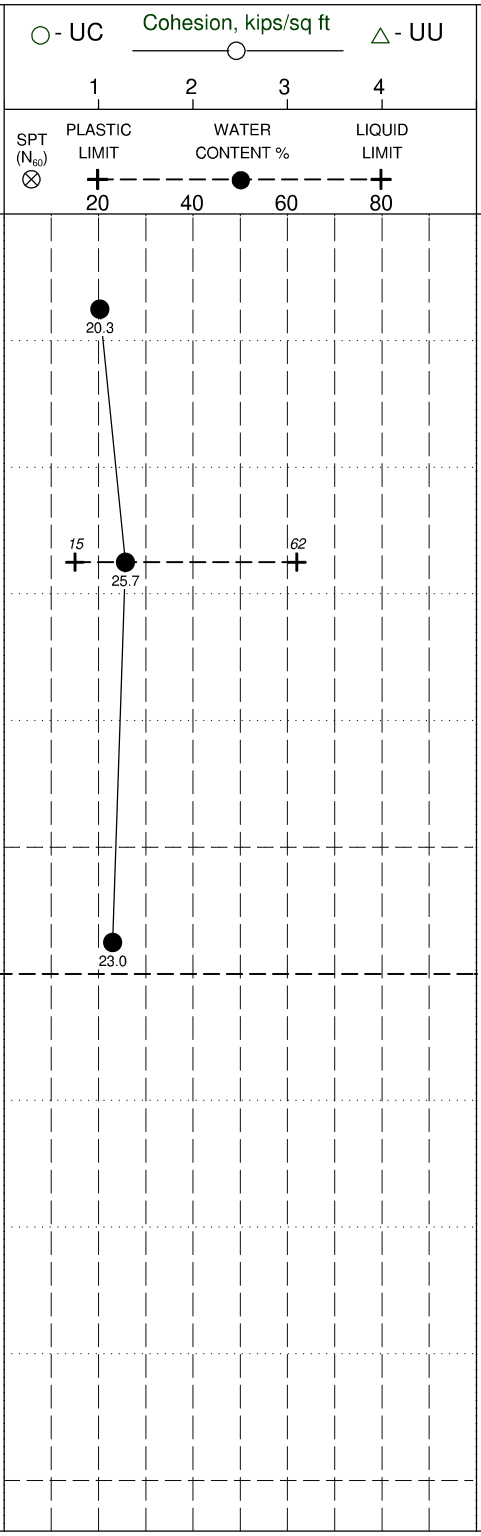
LOG OF BORING NO. 4

PROPOSED TAX COLLECTOR/ASSESSOR OFFICE
FLOWOOD, MISSISSIPPI

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1

DEPTH, ft	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE EL: 347.5 ±ft	FIELD SPT DATA	DRY DENSITY LBS/CU FT	% PASSING NO. 200 SIEVE
5 10	▨		Stiff tan and light gray clay (CH) - with trace of organics to 1'			



BORING DEPTH: 6 ft

DATE: 07/25/25

COMMENTS:
GPS Coordinates
N 32° 21' 21.7"
W 90° 1' 24.7"

GROUNDWATER DATA: No free water encountered during auger drilling.

FIGURE 6

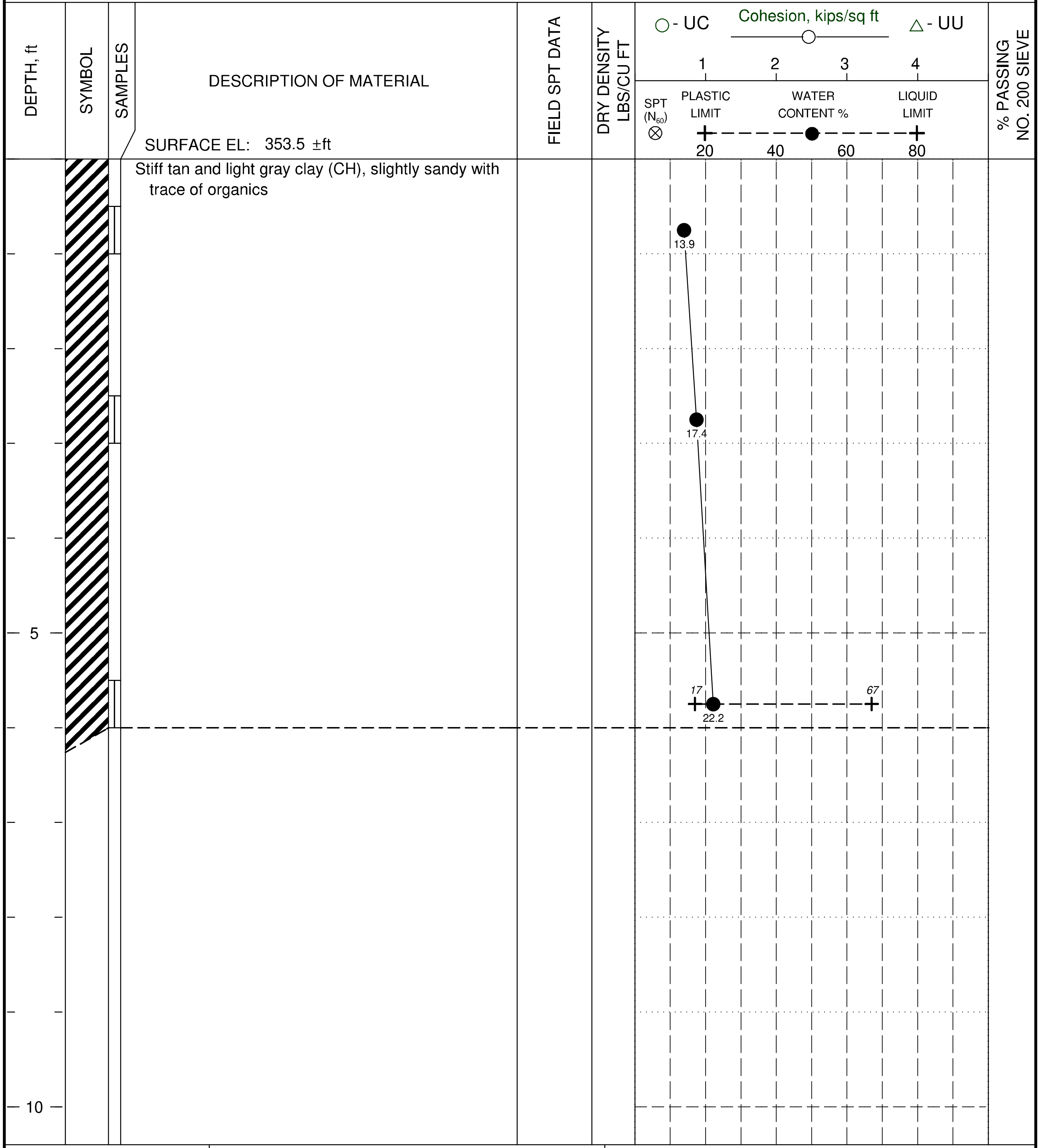
LOG OF BORING NO. 5

PROPOSED TAX COLLECTOR/ASSESSOR OFFICE
FLOWOOD, MISSISSIPPI

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1

SURFACE EL: 353.5 ±ft



Stiff tan and light gray clay (CH), slightly sandy with trace of organics

BORING DEPTH: 6 ft

DATE: 07/25/25

COMMENTS:
GPS Coordinates
N 32° 21' 20.8"
W 90° 1' 24.3"

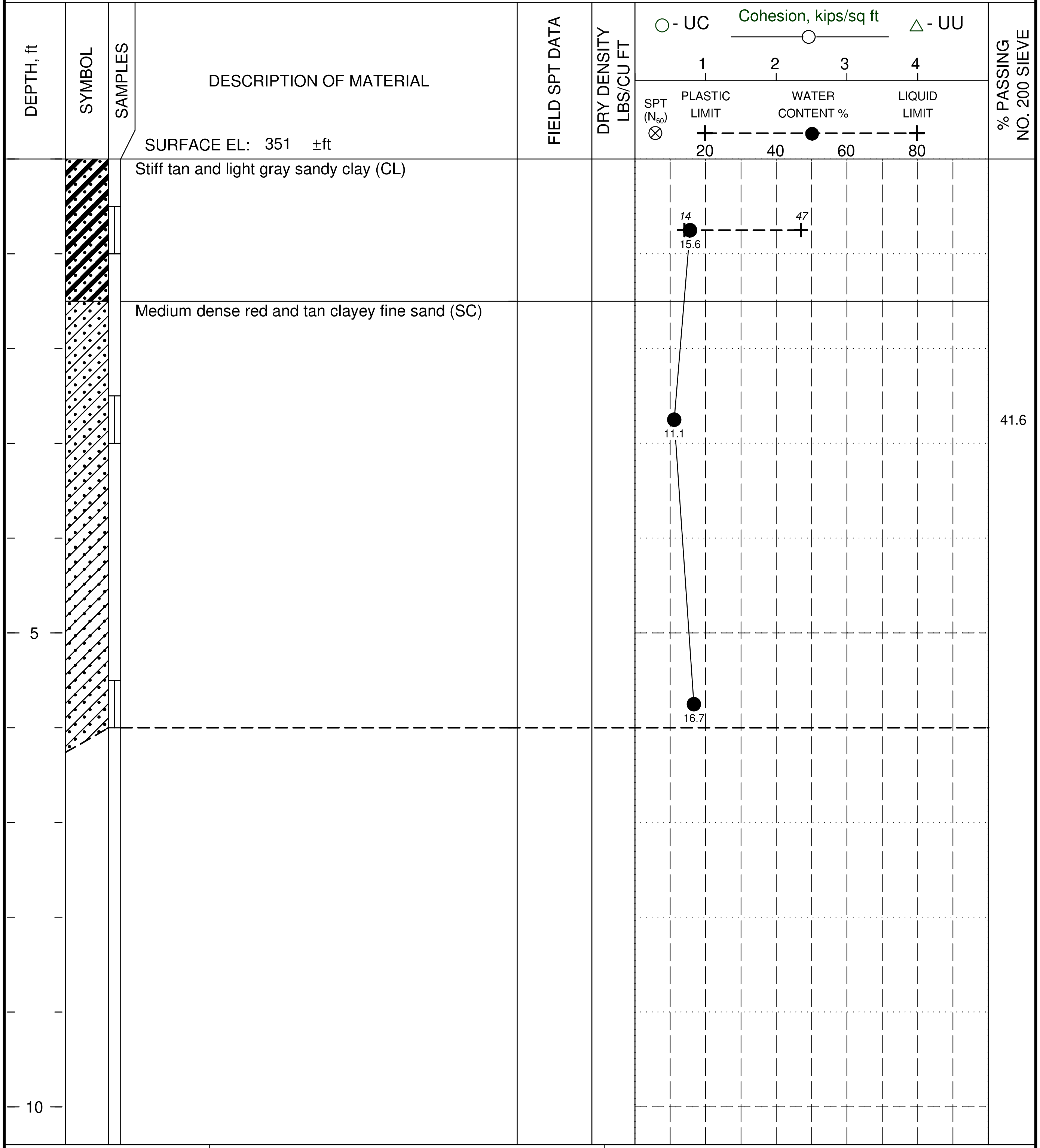
GROUNDWATER DATA: No free water encountered during auger drilling.

LOG OF BORING NO. 6

PROPOSED TAX COLLECTOR/ASSESSOR OFFICE
FLOWOOD, MISSISSIPPI

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1



Stiff tan and light gray sandy clay (CL)

Medium dense red and tan clayey fine sand (SC)

BORING DEPTH: 6 ft

DATE: 07/25/25

COMMENTS:
GPS Coordinates
N 32° 21' 20.6"
W 90° 1' 25.4"

GROUNDWATER DATA: No free water encountered during auger drilling.

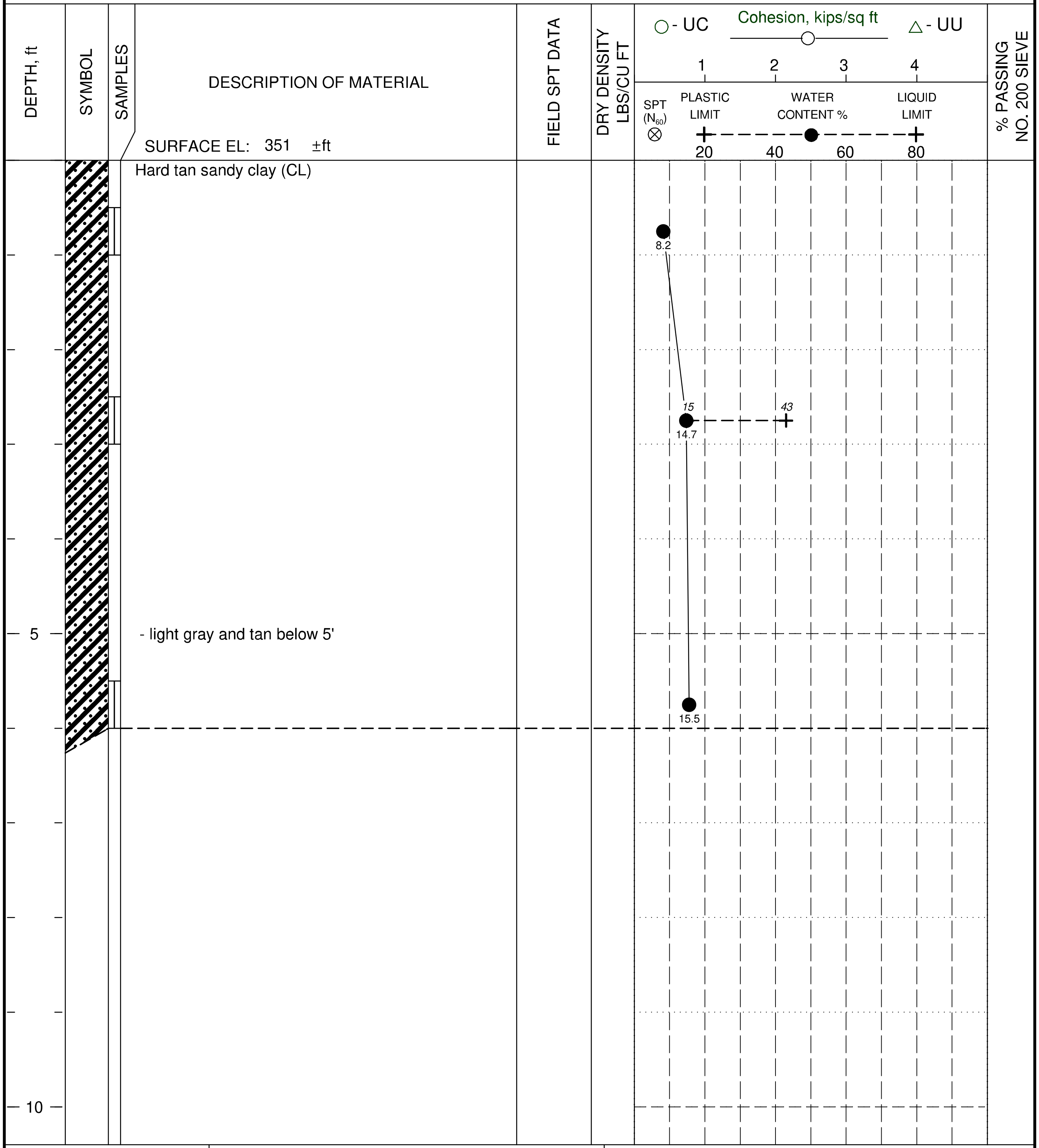
LOG OF BORING NO. 7

PROPOSED TAX COLLECTOR/ASSESSOR OFFICE
FLOWOOD, MISSISSIPPI

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1

SURFACE EL: 351 ±ft



Hard tan sandy clay (CL)

- light gray and tan below 5'

BORING DEPTH: 6 ft

DATE: 07/25/25

COMMENTS:
GPS Coordinates
N 32° 21' 19.9"
W 90° 1' 27.1"

GROUNDWATER DATA: No free water encountered during auger drilling.

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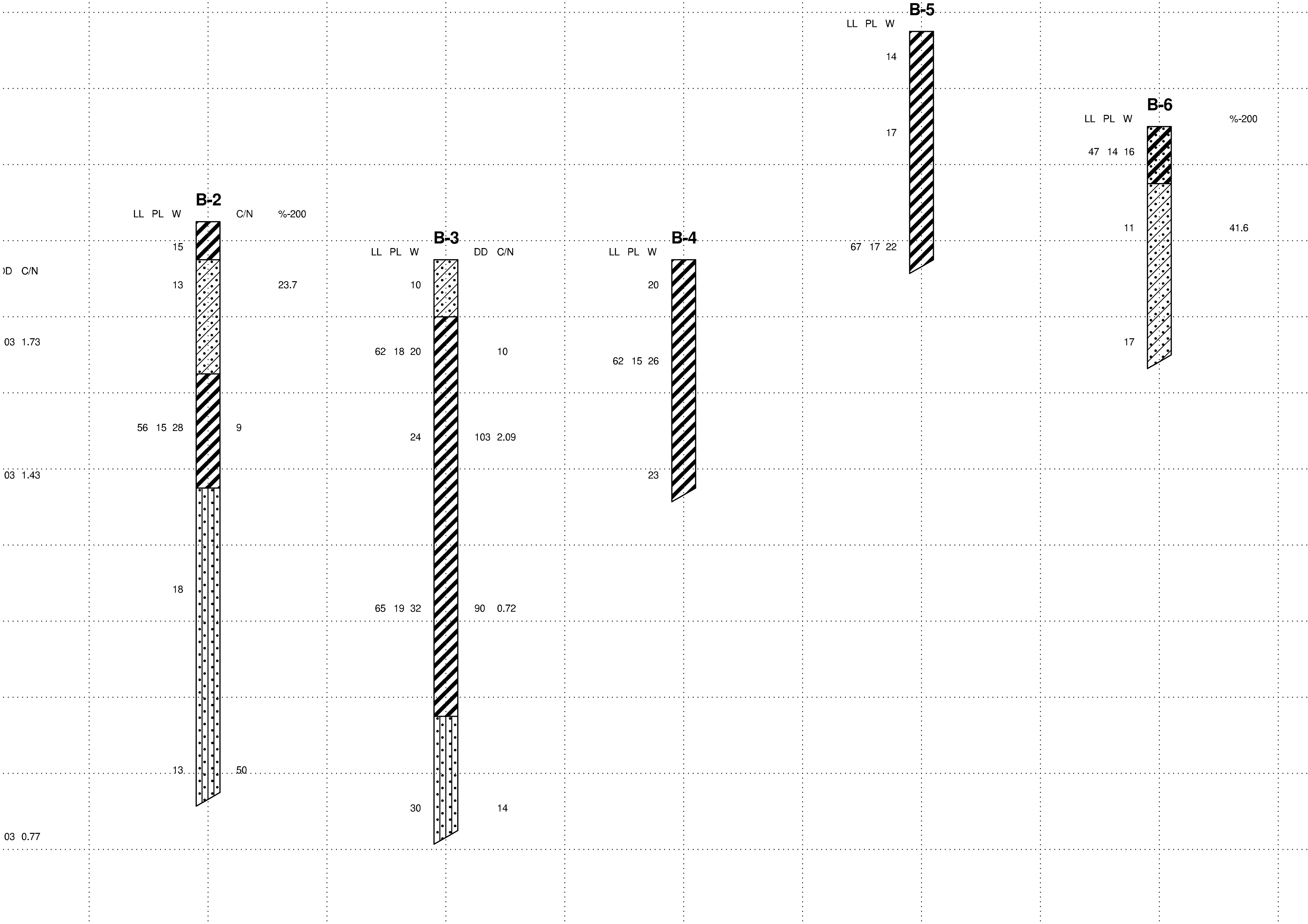
FIGURE 9



END:
= Liquid Limit
= Plastic Limit

SUBSURF