ARKANSAS DEPARTMENT OF TRANSPORTATION

SUBSURFACE INVESTIGATION

STATE JOB NO. 061614

FEDERAL AID PROJECT NO. NHPP-BFP-0059(17)

WATTENSAW BAYOU & RELIEF STRS. & APPRS. (S)

STATE HIGHWAY 86 SECTION 0

IN PRAIRIE COUNTY

The information contained herein was obtained by the Department for design and estimating purposes only. It is being furnished with the express understanding that said information does not constitute a part of the Proposal or Contract and represents only the best knowledge of the Department as to the location, character and depth of the materials encountered. The information is only included and made available so that bidders may have access to subsurface information obtained by the Department and is not intended to be a substitute for personal investigation, interpretation and judgment of the bidder. The bidder should be cognizant of the possibility that conditions affecting the cost and/or quantities of work to be performed may differ from those indicated herein.

ARKANSAS DEPARTMENT OF TRANSPORTATION
ARDOT.gov | IDriveArkansas.com | Scott E. Bennett, P.E., Director
MATERIALS DIVISION
11301 West Baseline Road | P.O. Box 2261 | Little Rock, AR 72203-2261 | Phone: 501.569.2185 | Fax: 501.569.2368

September 30, 2019

TO: Mr. Trinity Smith, Engineer of Roadway Design

SUBJECT: Job No. 061614
Wattensaw Bayou & Relief Strs. & Apprs. (S)
Route 86 Section 0
Prairie County

Based on soil information from projects in the surrounding area, an estimated R-Value of eight is appropriate for pavement design.

Listed below is the additional information requested for use in developing the plans:

Asphalt Concrete Hot Mix

Type	Asphalt Cement %	Mineral Aggregate %
Surface Course	5.1	94.9
Binder Course	4.2	95.8
Base Course	4.4	95.6

Michael C. Benson
Materials Engineer

MCB:pt:bjj
Attachment
cc: State Constr. Eng. – Master File Copy
District 6 Engineer
System Information and Research Div.
G. C. File

Terracon GeoReport

Geotechnical Engineering Report

Job No. 061614, Wattensaw Bayou and Relief Structures & Approaches
Prairie County, Arkansas

February 4, 2022

Terracon Project No. 35205136

Prepared for:

Arkansas Department of Transportation

Little Rock, Arkansas

Prepared by:

Terracon Consultants, Inc.

Little Rock, Arkansas

February 4, 2022

Terracon GeoReport

Arkansas Department of Transportation
11301 Baseline Road
Little Rock, Arkansas 72209

Attn: Mr. Paul Tinsley
P: (501) 569-2496
E: Paul.Tinsely@ardot.gov

Re: Geotechnical Engineering Report
Job No. 061614, Wattensaw Bayou and Relief Structures & Approaches
Highway 86
Prairie County, Arkansas
Terracon Project No. 35205136

Dear Mr. Tinsley:

We have completed a Geotechnical Engineering evaluation for the referenced project. This study was performed in general accordance with Task Order Number G016, dated September 14, 2021. This report presents the findings of the subsurface investigation and provides geotechnical recommendations concerning the proposed bridge replacement for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

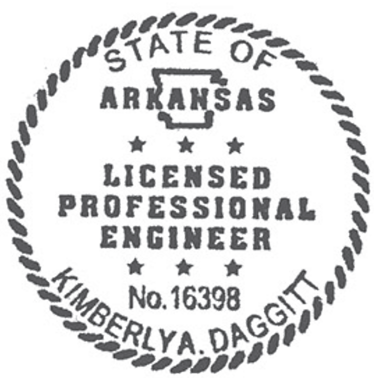
Sincerely,

Terracon Consultants, Inc.

Certificate of Authorization #223 Expires 12/31/2021

Kimberly A. Daggitt, P.E.
Project Engineer

Christopher S. Handley, P.E.
Geotechnical Department Manager



Terracon Consultants, Inc. 25809 I30 South Bryant, Arkansas 72022
P (501) 847 9292 F (501) 847 9210 terracon.com

REPORT TOPICS

Note: This report was originally delivered in a web-based format. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

Note: Refer to each individual Attachment for a listing of contents.

Geotechnical Engineering Report
Job No. 061614, Wattensaw Bayou and Relief Structures & Approaches
Highway 86
Prairie County, Arkansas
Terracon Project No. 35205136
February 4, 2022

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering evaluation performed for the proposed bridge replacements along Highway 86 near Prairie County, Arkansas. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- Site preparation and earthwork
- Bridge foundation design and construction
- Embankment slope stability
- Embankment settlement
- Seismic site class per AASHTO

Maps showing the site and boring locations are shown in the **Site Location** and **Exploration Plan** sections, respectively. The results of the laboratory testing performed on soil samples obtained from the site during the field investigation are included on the boring logs and/or as separate graphs in the **Exploration Results** section.

SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field investigation and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	Structure Number M1581 and Structure Number M1582 on Section 0 of Highway 86 in Prairie County, Arkansas. See **Site Location**
Existing Improvements	Existing bridges over the Wattensaw Bayou Relief area
Current Ground Cover	Existing bridge structure with asphalt pavement approaches and vegetated embankments

Item	Description
Existing Topography	From a provided topographic map, elevations of the existing ground at either end of the proposed bridge range from about 200 feet at river level to about 190 feet on either side.

PROJECT DESCRIPTION

Our initial understanding of the project was provided in our proposal and was discussed during project planning. A period of collaboration has transpired since the project was initiated, and our final understanding of the project conditions is as follows:

Item	Description
Project Description	ArDOT is proposing to replace the existing bridges with a bridge on offset alignments to the west of the existing structures. This will require the construction of bridge approach embankments. Pavement design recommendations are not a part of the geotechnical scope of work for this project.
Bridge Construction	From a consultant boring request dated August 6, 2021 we understand that the bridge will be supported on driven pile foundations. 16-inch, 18-inch, and 24-inch piles have been evaluated for each boring.
Maximum Loads	Gravity Loads were provided to Terracon by Neel-Schaffer via email on October 11, 2021. The following loading information was provided: Wattensaw Bayou Relief Structure: ■ End Bents: 115 kips (unfactored), 175 kips (factored) ■ Intermediate Bents: 205 kips (unfactored), 305 kips (factored) Wattensaw Bayou Structure: ■ End Bents: 150 kips (unfactored), 215 kips (factored) ■ Intermediate Bents: 275 kips (unfactored), 415 kips (factored)
Approach Embankments	The new bridges will be constructed to the west of the existing bridge. Based on a memo received on August 4, 2020 embankments are expected to be up to 15 feet in height.
Pavements	Pavement sections or recommendations are not in the scope of work for this project

GEOTECHNICAL CHARACTERIZATION

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface investigation, laboratory data, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of site preparation and foundation options. Conditions encountered at each investigation point are indicated on the individual logs. The individual logs can be found in the **Exploration Results** section and the GeoModel can be found in the **Figures** section of this report.

As part of our analyses, we identified the following model layers within the subsurface profile. For a more detailed view of the model layer depths at each boring location, refer to the GeoModel.

Model Layer	Layer Name	General Description
1	**Cohesive Soils**	Medium stiff to very stiff lean clay soils containing varying amounts of sand
2	**Intermediate Soils**	Loose to dense silty or clayey sand soils
3	**Sand Soil**	Medium dense to very dense poorly graded sand soils containing varying amounts of clay and gravel

The borings were observed during advancement for the presence and level of groundwater. Mud rotary procedures were utilized to advance the borings to the termination depths. The mud rotary procedure utilizes water as a drilling fluid; therefore, groundwater readings taken after the introduction of water into the borehole are not representative of the groundwater conditions. Because of this, the boreholes were pumped dry of the water used during drilling and left open until the completion of drilling on September 20, 2021. Groundwater readings were taken on that day prior to backfilling the boring. Groundwater was encountered between 37 to 57 feet below the existing ground surface in Borings B-2 and B-4 through B-7. Groundwater was not observed in the other borings performed. The groundwater levels observed in the boreholes can be found on the boring logs in **Exploration Results.**

The groundwater levels observed onsite are very deep and consistent with mapped aquifers in the area. For design purposes, the groundwater in the borings should be assumed to be at ab elevation that is consistent with the elevation of the normal river height.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the structures may be higher or lower than the levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

GEOTECHNICAL OVERVIEW

The Arkansas Department of Transportation is proposing a bridge replacement along Highway 86 over the Wattensaw Bayou and Relief area in Prairie County, Arkansas. The native soils at the boring locations are associated with alluvial deposits. Lean clay soils containing varying amounts of sand were observed overlying intermediate soils typically consisting of clayey sand. Clay content generally decreased with depth and the borings terminated in sand soils at depths of about 80 to 100 feet below the existing ground surface. During our study the following geotechnical concerns were identified:

- Low-strength soils
- Liquefaction Potential
- Moisture-sensitive soils

The following discussion addresses these items and provides the basis for design recommendations present in the subsequent sections. Additional construction-related concepts are provided in the various **Construction Consideration** sections of this report.

Low-strength Soils

Low-strength (soils with SPT N-values less than 5 blows per foot) lean clay and clayey sand soils were observed in most of the borings performed at various depths. The near-surface low-strength soils are not suitable for providing direct support to new fill and will provide low lateral resistance for pile foundations associated with bridge support. These low-strength soils were considered when developing recommendations for the embankments and deep foundations sections of this report.

Liquefaction Potential

The bridge borings contained loose to medium dense soils that were sandy in nature and could be subject to liquefaction during seismic events. During an earthquake event, liquefaction of these soils would result in reductions in lateral resistance of pile foundations and potential downdrag loads may develop. Liquefaction analyses were performed on the borings assuming a groundwater depth of 5 feet. From the liquefaction analyses performed, the silty sand soils in Boring B-3 from 23.5 to about 28.5 were found to be potentially liquefiable with a factor of safety of 1. The other borings were analyzed, and no other liquefiable zones were identified. As a result, no downdrag loads have been assessed for the project piles in the **Deep Foundations** section.

Moisture-Sensitive Soils

The lean soils that were observed at or near the ground surface at the boring locations are moisture-sensitive and prone to further strength loss with increased moisture content. These soils could become unstable with typical earthwork and construction traffic, especially after precipitation events; therefore, effective site drainage should be developed early in the construction sequence and maintained during and after construction. If possible, the construction should be performed during warmer and drier times of the year. If construction is performed during the winter months, an increased risk for unstable subgrade conditions will occur.

We understand that driven pipe piles will be used to support the bridge abutments. The **Deep Foundations** section addresses the support of the bridge abutments on driven piles. The **General Comments** section provides an understanding of the report limitations.

EARTHWORK

Earthwork should be performed as required in the most recent ArDOT Standard Specification for Highway Construction. The following recommendations for site preparation, excavation, subgrade preparation and placement of engineered fills on the project are considered general recommendations for earthwork on-site. The evaluation of earthwork should include observation and testing of engineered fill, subgrade preparation, and other geotechnical conditions during construction of the project.

Site Preparation

We understand that deep foundations are being utilized for the support of the bridge, so preparation of the subgrade may not be necessary in the bridge foundation areas. Where site preparation and grading are necessary for the roadway and approach aprons to the bridge, surface vegetation, topsoil, pavements and any other surface and subsurface structures should be removed from the construction areas. Unstable subgrade conditions will likely develop during site clearing operations, particularly near the creek and if the soils are wet and/or subjected to repetitive construction traffic. Using low ground pressure (tracked or balloon tired) construction equipment would aid in reducing subgrade disturbance. Even with using low ground pressure equipment, difficult conditions should be expected if the ground surface is disturbed and wetted.

After stripping of organic soils, completing rough grading operations, and prior to placing fill, the subgrade should be proof-rolled to aid in locating loose of soft areas. Proof-rolling can be performed with a loaded tandem axle dump truck. Where unstable soils are identified by proof-rolling, stabilization may be necessary. If embankments are constructed over existing ditches that can be fully drained, the existing ground should be stabilized in accordance with Section 210 of the ArDOT Standard Specifications. If stability cannot be achieved through normal processing, dumped riprap and geotextile should be used for embankment construction. For embankments that cannot be fully drained, a special provision to the standard specifications will be necessary. The appropriate method of improvement, if required, would depend on factors such as schedule, weather, the size of the area to be treated, and the nature of the instability and will be detailed in the special provision. Construction during warm, dry periods would help reduce the amount of subgrade stabilization required.

Fill Material Types

Fill materials should be free of organic matter and debris. While ArDOT has no specific requirement for borrow materials, they do require that the material be capable of forming and maintaining stable embankment when compacted. Therefore, we recommend specifically avoiding elastic silts (MH) and organic soils (OL, OH and PT) when considering materials for use as borrow. Materials with plasticity indices greater than 20 should not be used within the upper 2 feet of the finished pavement subgrade.

We suggest that approved imported borrow soils meet the following material property requirements:

Sieve Size	Percent Finer by Weight (ASTM C136)
3 inches	100
No. 4	50-100
No. 200	15-50

- Plasticity Index………………………………………………………..20(max)

Fill Placement

Where fill will be placed on existing slopes steeper than 4H:1V, benches should be cut into the existing slopes prior to fill placement. The benches should have a minimum vertical face height of 1 foot and a maximum vertical face height of 3 feet and should be cut wide enough to accommodate the compaction equipment. This benching will help provide a positive bond between the fill and natural soils and reduce the possibility of failure along the fill/natural soil interface. We recommend that fill slopes be filled beyond the planned final slope face and then cut back to develop an adequately compacted slope face.

Earthwork Construction Considerations

Unstable subgrade conditions are likely to develop during general construction operations, particularly where the soils are wetted and/or subjected to repetitive construction traffic. Unstable soils, where encountered, should be improved in-place prior to placing new engineered fill. If the in-place soils cannot be sufficiently improved, it may be necessary to strip and/or undercut the rutted and wet surface soils prior to performing subgrade improvement. Subgrade improvement techniques are discussed in detail in the following paragraphs.

The near-surface lean clay soils observed at this site are moisture-sensitive and susceptible to disturbance from construction activity, particularly when the soil has a high natural moisture content or is wetted by surface water or seepage. During wetter periods of the year, these soils will pump and rut under the weight of heavy construction equipment, especially rubber-tired vehicles. The contractor should consider using track-mounted (low ground pressure) equipment to reduce subgrade disturbance and/or instability.

If unstable subgrade conditions are encountered, the methods described below can be considered to improve subgrade strength. Common methods include scarification, moisture conditioning and compaction, removal of unstable materials and replacement with granular fill (with or without geosynthetics), and chemical stabilization. The appropriate method of improvement, if required, depends on factors such as schedule, weather, the size of area to be stabilized, and the nature of the instability.

If the exposed subgrade becomes unstable, methods outlined below can be considered.

- **Scarification and Compaction –** It may be feasible to scarify, dry and compact the exposed soils. The success of this procedure would depend primarily upon favorable weather and enough time to dry the soils. Stable subgrades likely would not be achievable if the thickness of the unstable soil is greater than about 1 foot, if the unstable soil is at or near the groundwater levels, or if construction is performed during a period of wet or cool weather when drying is difficult.

- **Crushed Stone –** The use of crushed stone or crushed gravel is the most common procedure to improve subgrade stability. Typical undercut depths would be expected to range from about 6 to 30 inches below the finished subgrade elevation. The use of high modulus geosynthetics (i.e., geotextile or geogrid) can also be considered after underground work such as utility construction is completed. Prior to placing the geotextile or geogrid, we recommend that all below-grade construction, such as utility line installation, be completed to avoid damaging the geosynthetics. Equipment should not be operated above the geosynthetics until one full lift of crushed stone fill is placed above it. The maximum particle size of granular material placed over the geosynthetics should conform to the manufacturer's recommendations and generally should not exceed 1½ inches.

Further evaluation of the need for subgrade stabilization should be provided by a qualified geotechnical engineer during construction as the subgrade conditions are exposed on a broad scale.

Temporary excavations will probably be required during grading operations. As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local, and/or state regulations.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming any responsibility for construction site safety, or the contractor's activities; such responsibility shall neither be implied nor inferred.

Construction Observation and Testing

The earthwork efforts should be monitored under the direction of the Geotechnical Engineer. Monitoring should include documentation of adequate removal of vegetation and topsoil, proofrolling, and mitigation of areas delineated by the proof-roll to require mitigation.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

DEEP FOUNDATIONS

Soil Strength Parameters

Soil parameters used to determine the nominal resistances of driven piles are shown below. The values were developed based on our interpolation of the generalized stratigraphy of the borings near each bridge and our experience with the soils in the project area.

Generalized Profile End Bents Bridge No. M1582 (Borings B-1 and B-4)

Stratum	Approximate Depth to Bottom of Stratum	Material Description	LPILE Soil Type	Effective Unit Weight (pcf)	Undrained Shear Strength (psf)	Friction Angle (°)
1	5	Lean clay	Stiff clay w/o free water	115	500	--
2	10	Lean clay	Stiff clay w/o free water	55	500	--
3	25	Lean clay	Stiff clay w/o free water	55	1,500	--
4	40	Lean clay and silt	Stiff clay w/o free water	55	500	--
5	60	Poorly graded sand with clay	Sand (Reese)	60	--	32
6	80	Poorly graded sand with clay	Sand (Reese)	60	--	34

Generalized Profile Intermediate Bents Bridge No. M1582 (Borings B-2 and B-3)

Stratum	Approximate Depth to Bottom of Stratum	Material Description	LPILE Soil Type	Effective Unit Weight (pcf)	Undrained Shear Strength (psf)	Friction Angle (°)
1	5	Lean clay	Stiff clay w/o free water	115	1,000	--
2	35	Clayey sand and silty sand	Sand (Reese)	55	--	30
3	60	Poorly graded sand with clay	Sand (Reese)	55	--	30

Stratum	Approximate Depth to Bottom of Stratum	Material Description	LPILE Soil Type	Effective Unit Weight (pcf)	Undrained Shear Strength (psf)	Friction Angle (°)
4	80	Poorly graded sand with clay	Sand (Reese)	60	--	34
5	100	Poorly graded sand with clay	Sand (Reese)	60	--	36

Generalized Profile End Bents (Borings B-5 and B-9) and Intermediate Bent B-8 Bridge No. M1581

Stratum	Approximate Depth to Bottom of Stratum	Material Description	LPILE Soil Type	Effective Unit Weight (pcf)	Undrained Shear Strength (psf)	Friction Angle (°)
1	5	Lean clay	Stiff clay w/o free water	115	1,000	--
2	10	Lean clay	Stiff clay w/o free water	55	1,000	--
3	25	Lean clay	Stiff clay w/o free water	55	500	--
4	35	Clayey sand and Poorly graded sand with clay	Sand (Reese)	55	--	30
5	80	Poorly graded sand with clay	Sand (Reese)	60	--	34
6	100	Poorly graded sand with clay	Sand (Reese)	60	--	36

Generalized Profile Intermediate Bents (Borings B-6 and B-7) Bridge No. M1581

Stratum	Approximate Depth to Bottom of Stratum	Material Description	LPILE Soil Type	Effective Unit Weight (pcf)	Undrained Shear Strength (psf)	Friction Angle (°)
1	5	Lean clay	Stiff clay w/o free water	115	1,000	--
2	18.5	Lean clay	Stiff clay w/o free water	55	1,000	--
3	40	Clayey sand	Sand (Reese)	55	--	30

Stratum	Approximate Depth to Bottom of Stratum	Material Description	LPILE Soil Type	Effective Unit Weight (pcf)	Undrained Shear Strength (psf)	Friction Angle (°)
4	80	Clayey sand and Poorly graded sand with clay	Sand (Reese)	60	--	34
5	100	Poorly graded sand with clay	Sand (Reese)	60	--	36

Driven Pile Resistances

From an email received from Neel-Schaffer on October 11, 2021 we understand that steel pipe will be used to support the new bridges. For each bent, 16-inch, 18-inch and 24-inch diameter steel pipe piles were considered.

The following considerations should be applied to the information provided in the tables above:

- The nominal resistances are applicable if the center-to-center spacing is equal to or greater than 3 times the maximum pile section dimension
- The factored resistance values are based on the nominal resistance multiplied by the structural resistance factor of 0.35 for clays and 0.45 for sand from Resistance Factors for geotechnical Resistance of Driven Piles, φ [AASHTO 10.5.5.2.3-1]. We understand that Arkansas Specifications state that a wave equation analysis of pile driving ("WEAP") will be performed prior to construction. At the completion of this analysis, a resistance factor of 0.5 from Resistance Factors for geotechnical Resistance of Driven Piles, φ [AASHTO 10.5.5.2.3-1] can be applied.
- The resistances provided are geotechnical resistances only and should be checked against the structural resistances of the proposed pile.

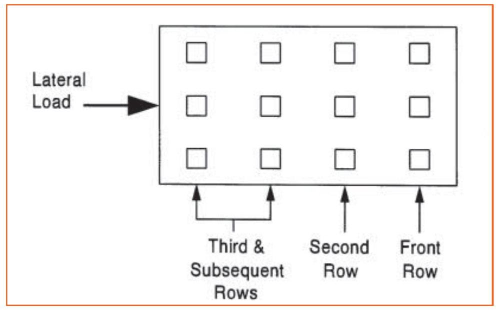
Wall thickness for pipe piles should be selected in consideration of the design nominal resistance (or conversely, the maximum nominal resistance, or structural limit state, should be established for the selected pipe pile section). The critical event occurs during driving, and piles stresses should be maintained less than $0.9F_y$ to reduce the potential for damage to the pile, where F_y = yield strength of steel. This driving stress is often correlated to a maximum allowable design capacity of $0.25*F_y*A_{st}$ when designing using ASD methods (where A_{st} = cross sectional steel area). For LRFD design methods, resistance factors for the strength limit state are provided in AASHTO Article 6.5.4.2 for pipe pile section; based on the subsurface conditions encountered in our exploratory borings, use of pile tips/driving shoes is not considered necessary at this site.

Driven Pile Lateral Loading

The strength parameters listed in the Soil Strength Parameters section can be used as input values for use in LPILE analyses. LPILE will estimate values of k_h and E_{50} based on the provided strength values. Where fill soils are present, the parameters of the top layer in the provided tables can be used for analyses. Effective unit soil weights should be used for input assuming a maximum groundwater level similar to flood stage elevation.

When piles are used in groups, the lateral resistances of the piles in the second, third, and subsequent rows of the group should be reduced as compared to the capacity of a single, independent pile. Guidance for applying p-multiplier factors to the p values in the p-y curves for each row of pile foundations within a pile group are as follows:

- Front row: P_m = 0.8;
- Second row: P_m = 0.4
- Third and subsequent row: P_m = 0.3.



The load resistances provided herein are based on the stresses induced in the supporting soil strata. The structural capacity of the piles should be checked to assure that they can safely accommodate the combined stresses induced by axial and lateral forces. Lateral deflections of piles should be evaluated using an appropriate analysis method, and will depend upon the pile's diameter, length, configuration, stiffness and "fixed head" or "free head" condition. We can provide additional analyses and estimates of lateral deflections for specific loading conditions upon request. The load-carrying capacity of piles may be improved by increasing the diameter of pipe piles.

Driven Pile – Uplift

Although no direct uplift forces are anticipated in conjunction with the bridge structures, the structures may be subjected to scour forces during period of flooding or high water. For uplift considerations, an average nominal unit skin friction of 500 psf can be applied over the area of the shaft experiencing the uplift force. This value is nominal and a reduction factor should be applied.

Driven Pile Construction Considerations

The contractor should select a driving hammer and cushion combination which can install the selected piling without overstressing the pile material. The hammer should have a rated energy in foot-pounds at least equal to 15 percent of the design compressive load capacity in pounds. The contractor should submit the pile driving plan and the pile hammer-cushion combination to the engineer for evaluation of the driving stresses in advance of pile installation. During driving, a maximum of 20 blows per inch is recommended to reduce the potential of damage to the piles. The predicted hammer blow count at the required ultimate bearing capacity should be between 3 and 12 blows/inch (36 to 144 blows/foot).

Pile driving conditions, hammer efficiency, and stress on the pile during driving could be better evaluated during installation using a Pile Driving Analyzer (PDA). A Terracon representative should observe pile driving operations. Each pile should be observed and checked for buckling, crimping and alignment in addition to recording penetration resistance, depth of embedment, and general pile driving operations.

The pile driving process should be observed by the Geotechnical Engineer or approved technician. Terracon should document the pile installation process including soil/rock and groundwater conditions encountered, consistency with expected conditions, and details of the installed pile.

Excavations for pile caps should be observed by the Geotechnical Engineer or approved technician. The base of all excavations should be free of water and loose soil, prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during construction. Excessively wet or dry material or any loose/disturbed material in the bottom of the footing excavations should be removed/reconditioned before foundation concrete is placed.

FILL EMBANKMENT CONSIDERATIONS

We understand that bridge approach embankments are planned for this project. Borrow sources for the embankment fill materials have not yet been identified. We assume soils in the embankment will be comparable to the observed on-site soils. The following recommendations may be considered prior to the identification of the embankment borrow source. The recommendations do not account for seepage or potential flooding that may dictate the use of flatter slopes. Detailed evaluation of the proposed borrow source materials should be undertaken prior to the final design and the results incorporated in the final slope stability and settlement recommendations.

General Description	Silts and silty or clayey sands	Low plasticity clays	High plasticity clays	Clayey gravels
ASTM Classification	**ML, SM, SC[1]**	**CL**	**CH[2]**	**GC**
Fill Side Slope**	2.5:1	2.5:1	3:1	2:1
Fill Spill Slope** (H* ≤20 feet)	2:1	2:1	2.5:1	2:1
Fill Spill Slope** (H* > 20 feet)[3]	2.5:1	2.5:1	3:1	2:1
Embankment compression (H* ≤20 feet)	1.5%	1.4%	2.6%	1.2%

General Description	Silts and silty or clayey sands	Low plasticity clays	High plasticity clays	Clayey gravels
ASTM Classification	**ML, SM, SC[1]**	**CL**	**CH[2]**	**GC**
Embankment compression (H* > 20 feet)	2.8%	2.6%	3.9%	2.4%

H* is the total height between the toe of the slope and grade at top of slope/grade at the end of structure

Slope** is the horizontal to vertical slope

1. Erosion control may be required for soil types other than SC
2. High Plasticity index materials (PI > 50) should be used with caution and require project specific analysis of slope stability and compression.
3. Steeper slopes for low spill slopes (H* ≤ 20 feet) assume some form of slope protection to control erosion and cyclic moisture changes.

Lean clay soils containing varying amounts of sand were observe in the upper layers of the performed borings. These soils are compressible under new loads such as the planned embankment. We understand embankments ranging from 13 to 15 feet in height are planned for the new bridge structures. We anticipate about 3 to 4 inches of total settlement in the native foundation soils planned for the new bridge replacement. We anticipate that settlement will occur over a 4 to 6-month timeframe with about half of the settlement occurring during construction of the embankment.

GRAIN SIZE ANALYSIS FOR SCOUR

Selected samples were chosen from the upper layers of the performed borings and a sieve analysis was performed on these samples for use in a D50 analysis. Grain size distribution of materials smaller than 0.0029 in (#200 sieve) were not further classified through a hydrometer analysis. Results of the sieve analyses are presented in the table below and the sieve results are attached to this report.

Boring Number	Material Description	Sample depth range (feet)	Percent Finer than #200
B-1	Lean clay with sand	2 to 3.5	84
B-1	Lean clay	5 to 6.5	92
B-2	Lean clay with sand	2 to 3.5	84
B-2	Clayey sand	5 to 6.5	47
B-2	Clayey sand	13.5 to 15	28
B-3	Lean clay with sand	2 to 3.5	71
B-3	Silty sand	5 to 6.5	49
B-4	Sandy lean clay	3.5 to 5	65
B-4	Lean clay	8.5 to 10	96
B-5	Silty clay	2 to 3.5	87

Boring Number	Material Description	Sample depth range (feet)	Percent Finer than #200
B-5	Lean clay with sand	8.5 to 10	78
B-6	Lean clay	0.5 to 2	88
B-6	Lean clay with sand	5 to 6.5	82
B-7	Lean clay	2 to 3.5	94
B-7	Lean clay with sand	13.5 to 15	83
B-8	Lean clay with sand	3.5 to 5	77
B-8	Sandy lean clay	8.5 to 10	63
B-9	Lean clay with sand	2 to 3.5	82
B-9	Sandy lean clay	8.5 to 10	65

SEISMIC CONSIDERATIONS

Code Reference	Site Classification
AASHTO LRFD Bridge Design Specifications [1]	D[1]

1. In general accordance with *AASHTO LRFD Bridge Design Specifications*. Site class determination is based on average properties of the subsurface profile within 100 feet of the ground surface. The exploratory borings extended to maximum depth of about 80 to 100 feet at the location of the bridge. Terracon's opinion of site class is based on data from the borings and our knowledge of geotechnical and geologic conditions at this locale.

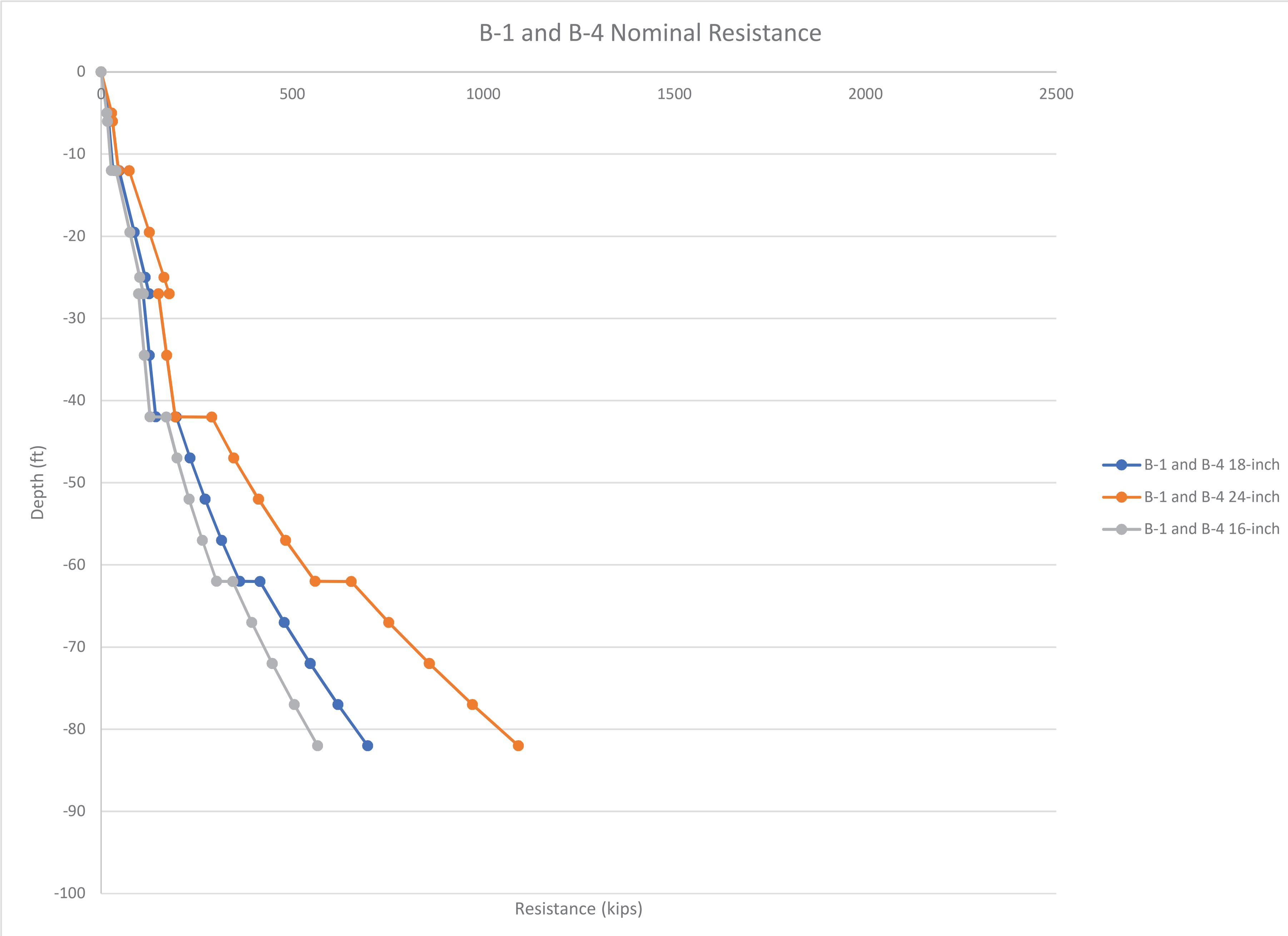
GENERAL COMMENTS

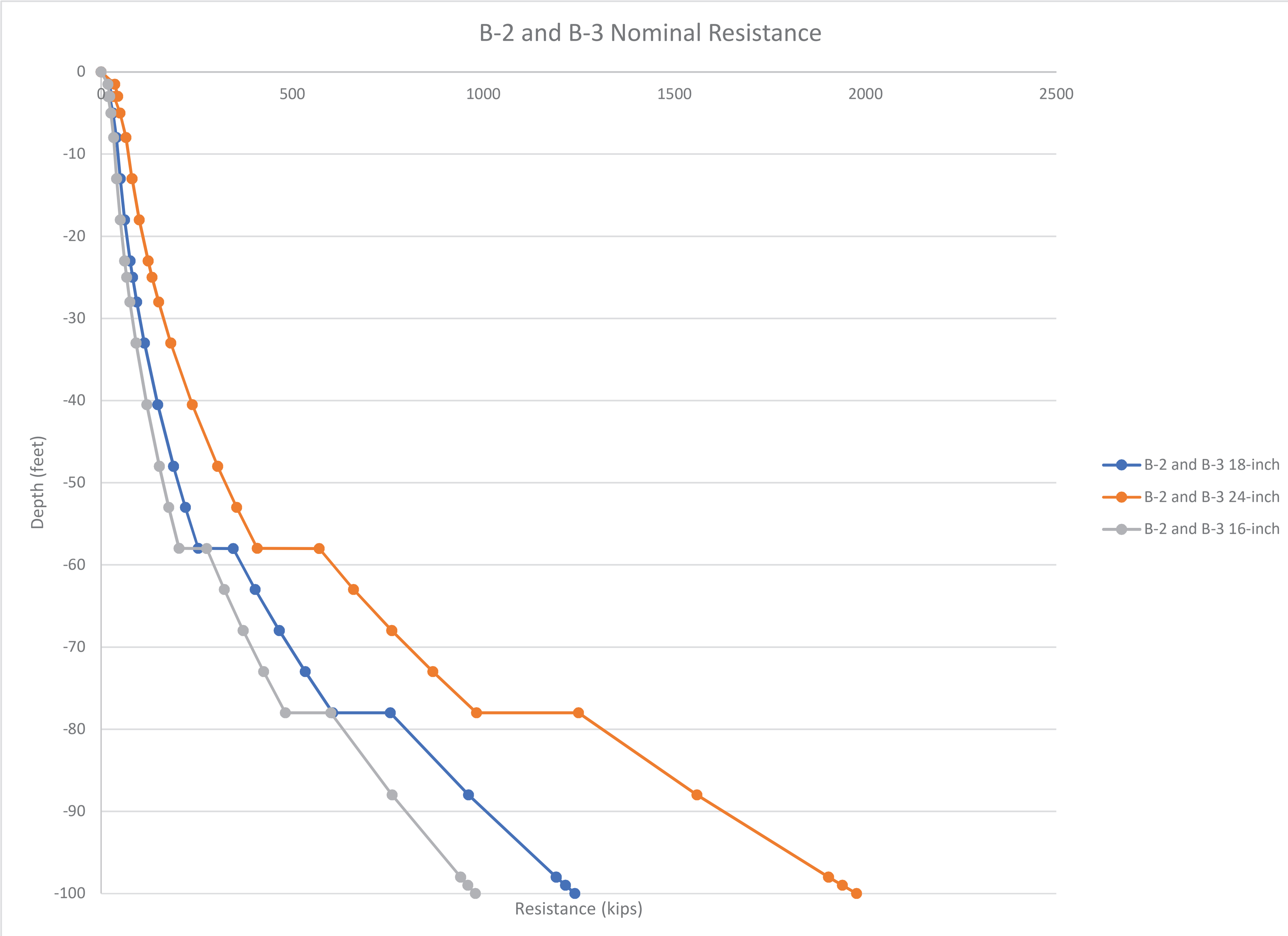
Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site investigation. Natural variations will occur between investigation point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

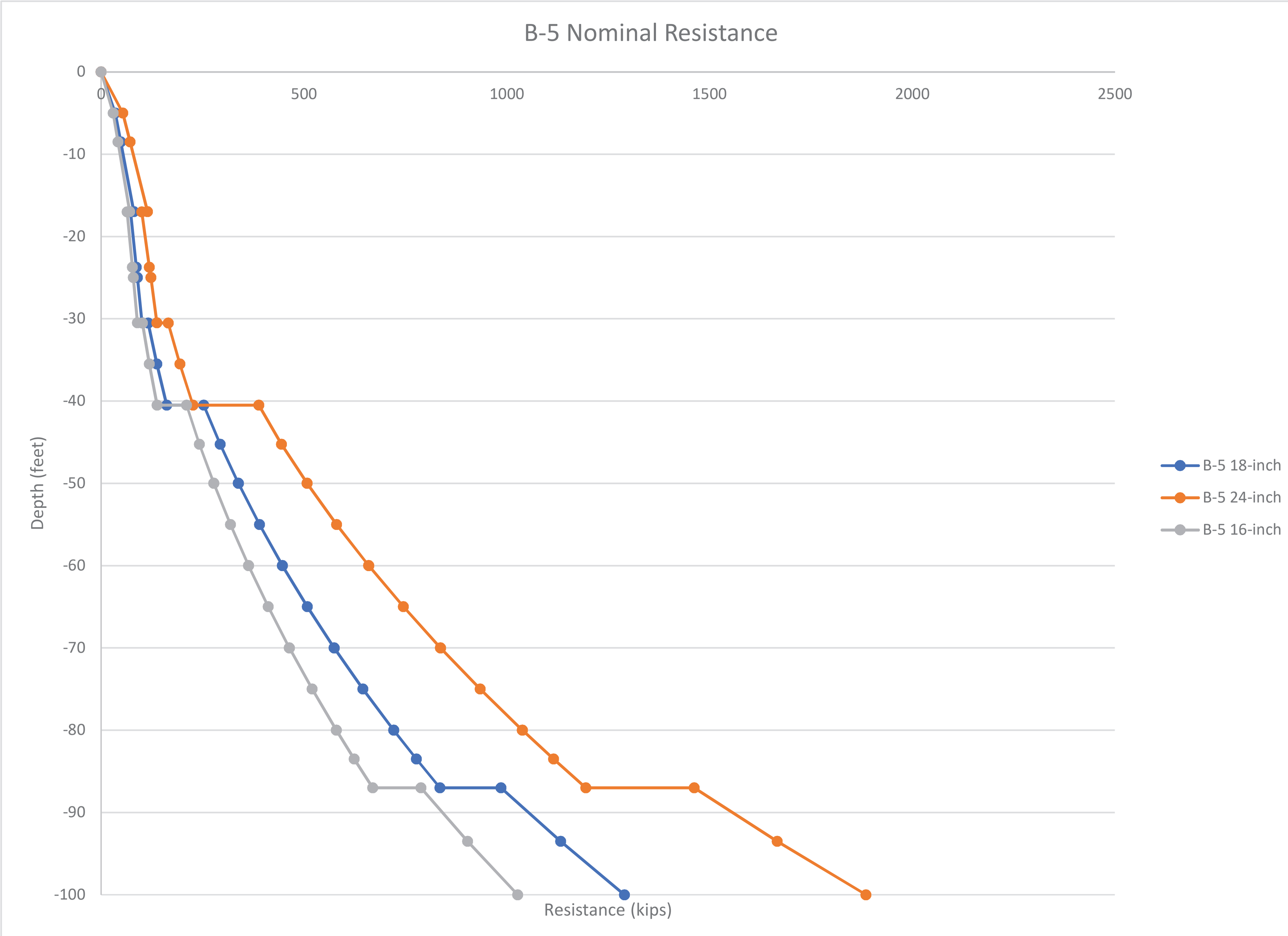
Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, cost estimating, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

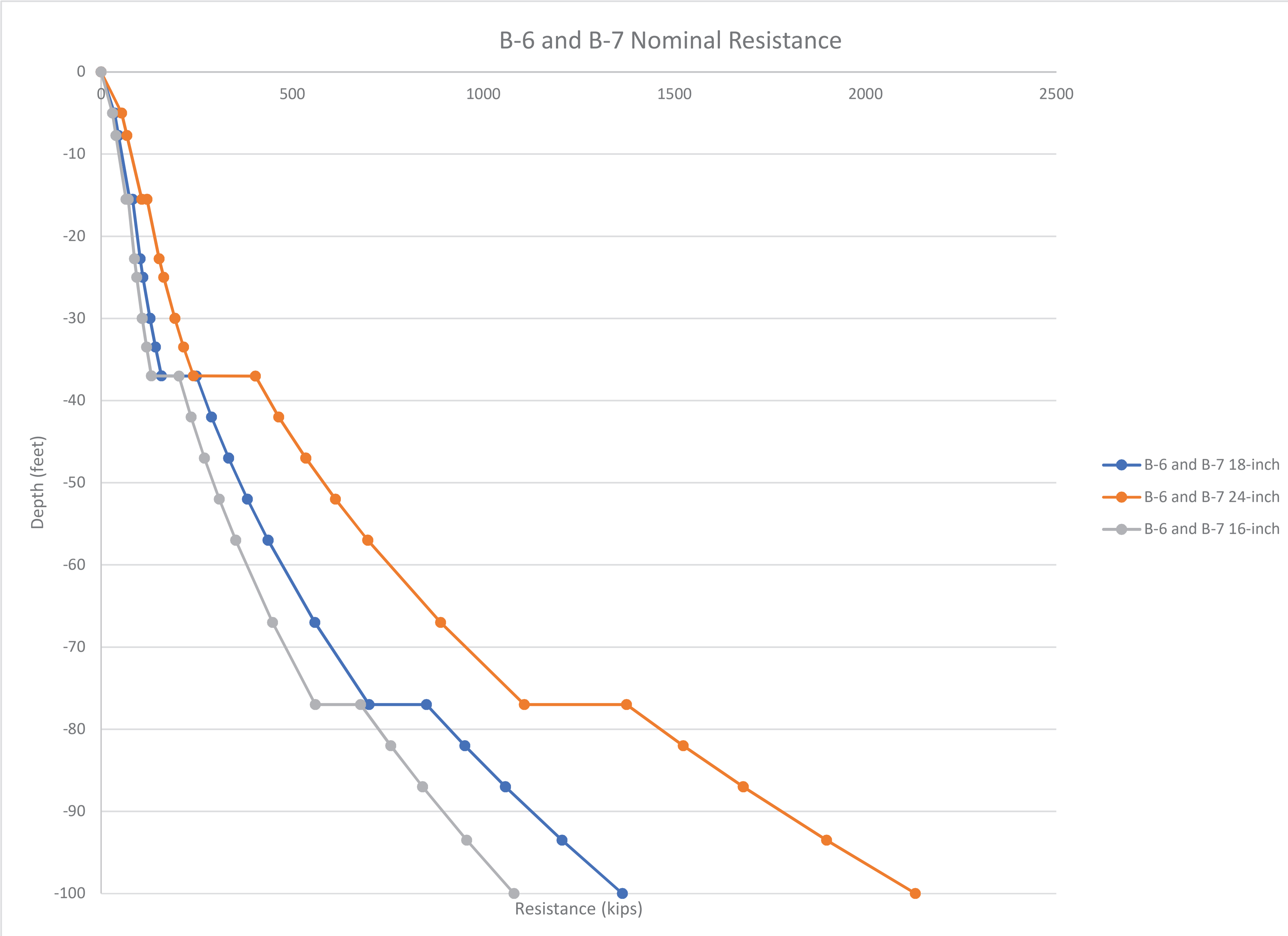

B-1 and B-4 Nominal Resistance
Depth (ft)
Resistance (kips)
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
0
500
1000
1500
2000
2500
B-1 and B-4 18-inch
B-1 and B-4 24-inch
B-1 and B-4 16-inch

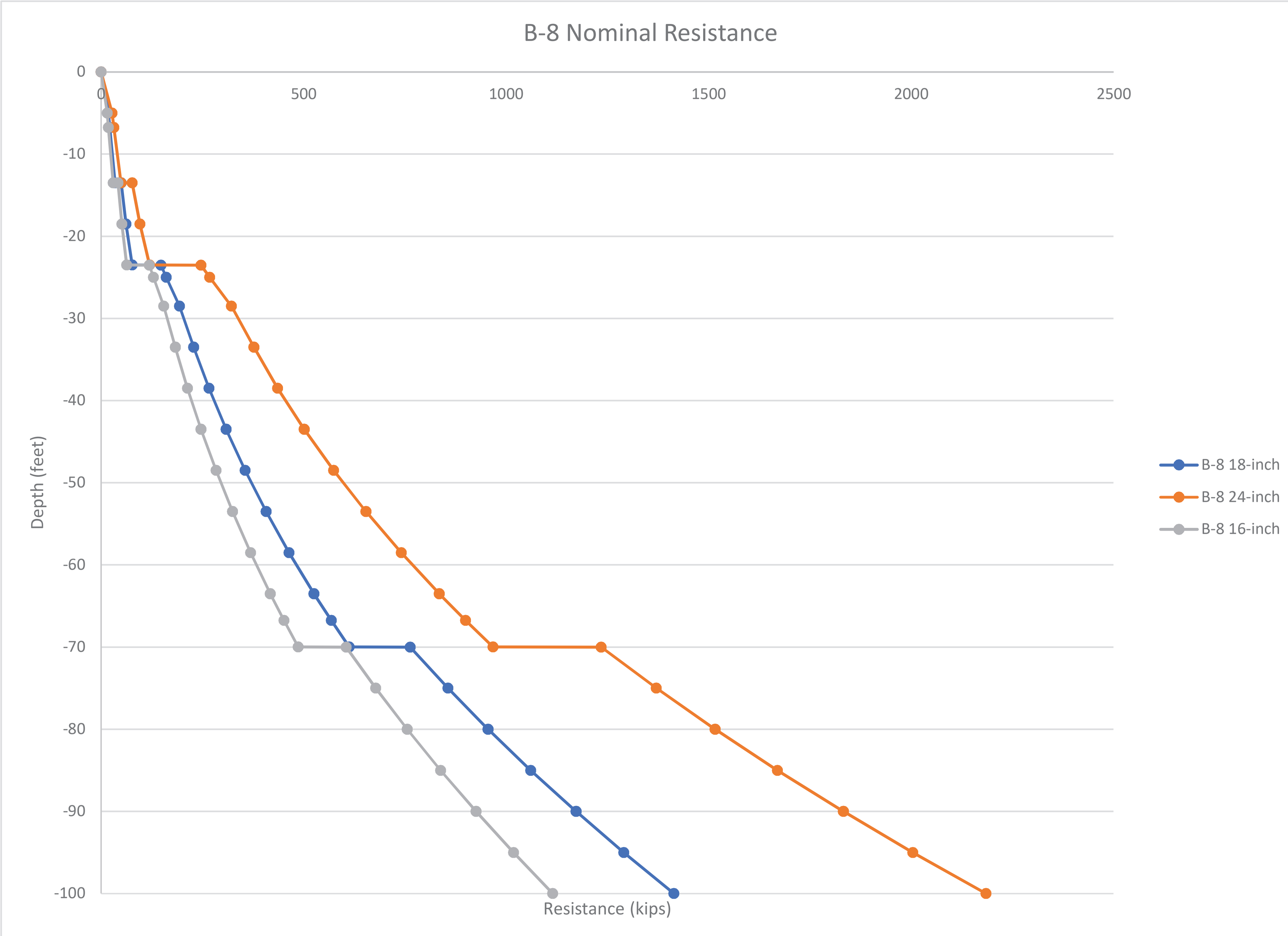


B-2 and B-3 Nominal Resistance
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Depth (feet)
0
500
1000
1500
2000
2500
Resistance (kips)
B-2 and B-3 18-inch
B-2 and B-3 24-inch
B-2 and B-3 16-inch

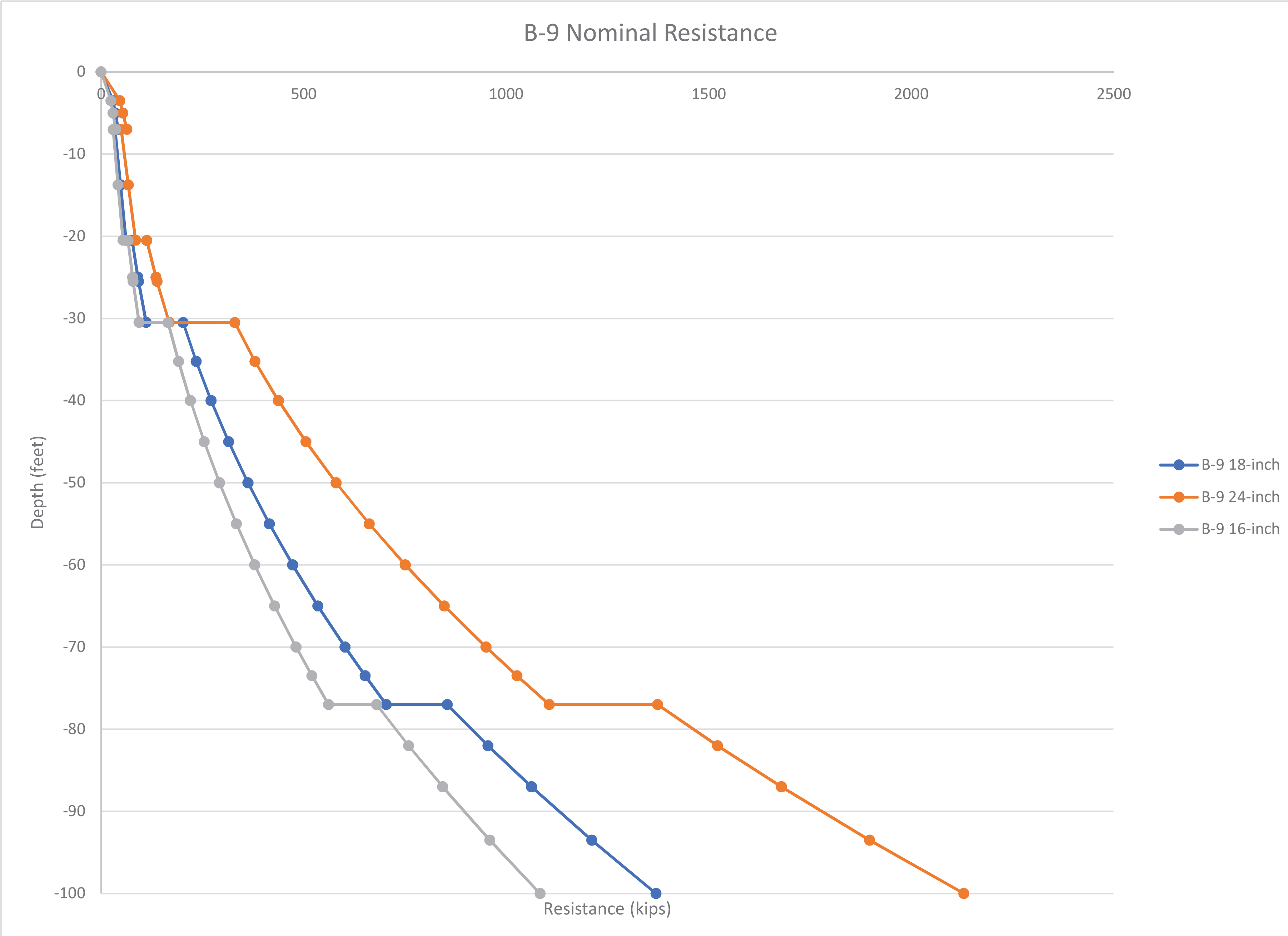


B-5 Nominal Resistance
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Depth (feet)
0
500
1000
1500
2000
2500
Resistance (kips)
B-5 18-inch
B-5 24-inch
B-5 16-inch


B-6 and B-7 Nominal Resistance
0
500
1000
1500
2000
2500
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Depth (feet)
Resistance (kips)
B-6 and B-7 18-inch
B-6 and B-7 24-inch
B-6 and B-7 16-inch



B-8 Nominal Resistance
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Depth (feet)
0
500
1000
1500
2000
2500
Resistance (kips)
B-8 18-inch
B-8 24-inch
B-8 16-inch



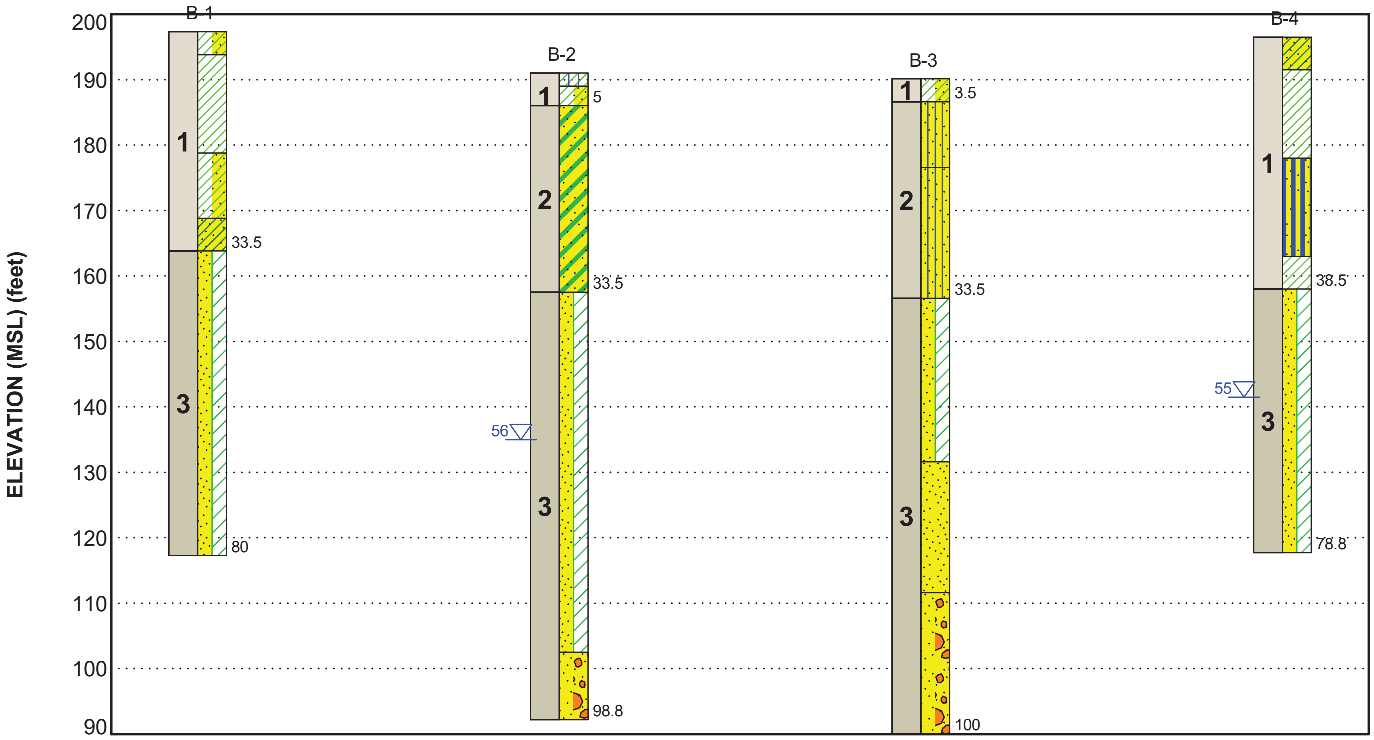
B-9 Nominal Resistance
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
0
500
1000
1500
2000
2500
Depth (feet)
Resistance (kips)
B-9 18-inch
B-9 24-inch
B-9 16-inch

FIGURES

Contents:

GEOMODEL

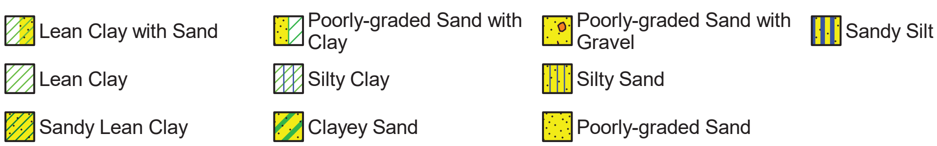
Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs. ■ Hickory Plains, Arkansas
Terracon Project No. 35215136



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Cohesive Soils	medium stiff to very stiff lean clay soils containing varying amounts of sand
2	Intermediate soils	Loose to dense silty or clayey sand soils
3	Sand Soils	Medium dense to very dense poorly graded sand soils containing varying amounts of clay and gravel

LEGEND



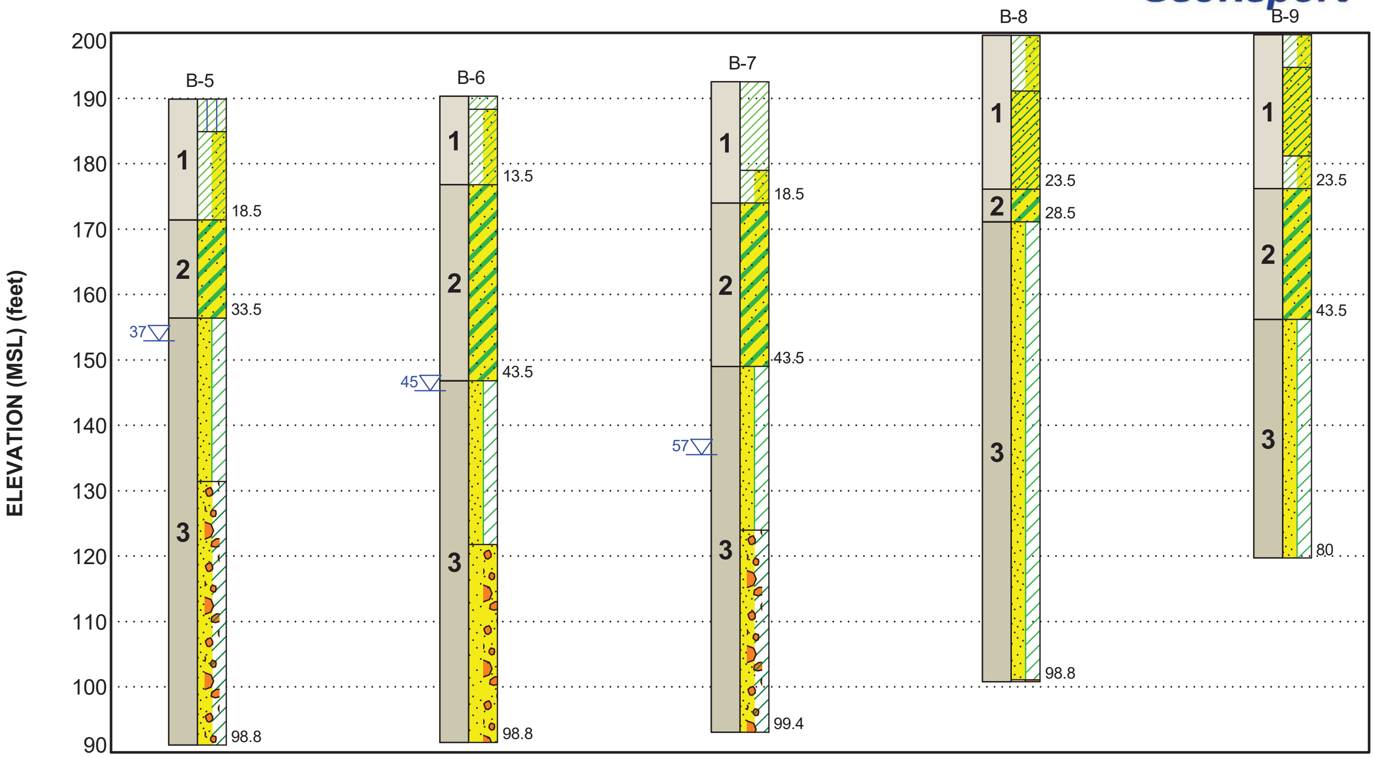
First Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time.
Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

GEOMODEL

Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs. ■ Hickory Plains, Arkansas
Terracon Project No. 35215136



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Cohesive Soils	medium stiff to very stiff lean clay soils containing varying amounts of sand
2	Intermediate soils	Loose to dense silty or clayey sand soils
3	Sand Soils	Medium dense to very dense poorly graded sand soils containing varying amounts of clay and gravel

LEGEND

- Silty Clay
- Lean Clay with Sand
- Clayey Sand
- Poorly-graded Sand with Clay
- Poorly-graded Sand with Clay and Gravel
- Lean Clay
- Poorly-graded Sand with Gravel
- Sandy Lean Clay
- Poorly-graded Gravel

First Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time.
Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project.
Numbers adjacent to soil column indicate depth below ground surface.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES

Field Investigation

Boring Layout and Elevations: After completion of the borings, ARDOT surveyed the borings. The latitude and longitude and northing and easting coordinates as well as the ground surface elevations of the borings are provided on the borings logs from a performed field survey.

Subsurface Exploration Procedures: We advanced the borings with a track-mounted, drill rig using continuous flight augers to auger refusal. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. We observed and recorded groundwater levels during auger drilling and sampling. For safety purposes, all borings were backfilled with auger cuttings after their completion.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Laboratory Testing

Representative soil samples were tested in the laboratory to measure their natural water content, gradation and Atterberg limits. The test results are provided on the appended boring logs and laboratory test reports.

The soil samples were classified in the laboratory based on visual observation, texture, plasticity, and the laboratory testing described above. The soil descriptions presented on the boring logs are in accordance with the enclosed General Notes and Unified Soil Classification System (USCS). The estimated USCS group symbols for native soils are shown on the boring logs, and a brief description of the USCS is included in this report.

SITE LOCATION AND INVESTIGATION PLANS

Contents:

Note: All attachments are one page unless noted above.

SITE LOCATION

Job No. 061614, Wattensaw Bayou and Relief Structures & Approaches ■ Prairie County, Arkansas
December 10, 2021 ■ Terracon Project No. 35205136

Terracon GeoReport

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN – Wattensaw Bayou Relief Bridge No. M1582

Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs. ■ Hickory PLains, AR
December 7, 2021 ■ Terracon Project No. 35215136

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

EXPLORATION RESULTS

Contents:

Boring Logs (B-1 through B-9)
Grain Size Distribution Test Results

Note: All attachments are one page unless noted above.

BORING LOG NO. B-1

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation, Little Rock, Arkansas

SITE: Route 86, Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.939000° Longitude: -91.655400°

Station: 116+03 Offset: 23 feet right of CL

Surface Elev.: 197.3 (Ft.)

MODEL LAYER	DEPTH	DESCRIPTION	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1		**LEAN CLAY WITH SAND (CL)**, light brown, stiff to very stiff				X	8-9-9 N=18	9.9		
						X	5-5-6 N=11	12.8	36-15-21	84
	3.5		194							
		LEAN CLAY (CL), light gray and gray, soft to stiff				X	3-2-2 N=4	22.8		
				5		X	2-2-2 N=4	28.4	35-18-17	92
						X	5-6-6 N=12	26.0		
				10						
						X	3-5-5 N=10	28.5		
				15						
	18.5		179							
		LEAN CLAY WITH SAND (CL), light gray and gray, stiff				X	4-5-10 N=15	21.6		77
				20						
						X	4-4-6 N=10	16.7		
				25						
	28.5		169							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

Water level not determined

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-13-2021	Boring Completed: 09-14-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-1

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation, Little Rock, Arkansas

SITE: Route 86, Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.939000° Longitude: -91.655400°

Station: 116+03 Offset: 23 feet right of CL

Surface Elev.: 197.3 (Ft.)

MODEL LAYER	DEPTH	Description	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1		**SANDY LEAN CLAY (CL)**, gray, very stiff				X	7-7-10 N=17	18.2		55
	33.5		164							
3		**POORLY GRADED SAND WITH CLAY (SP-SC)**, gray, medium dense to dense				X	6-7-13 N=20	30.8		
						X	10-16-17 N=33	15.5		
						X	15-15-15 N=30	19.7		8
						X	11-13-17 N=30	19.9		

Depth scale: 30, 35, 40, 45, 50, 55

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

Water level not determined

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-13-2021	Boring Completed: 09-14-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-1

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation Little Rock, Arkansas

SITE: Route 86 Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.939000° Longitude: -91.655400°

Station: 116+03 Offset: 23 feet right of CL

Surface Elev.: 197.3 (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH / DESCRIPTION / ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
3		**POORLY GRADED SAND WITH CLAY (SP-SC)**, gray, medium dense to dense *(continued)*							
			60		X	14-21-28 N=49	14.6		8
			65						
			70		X	13-19-21 N=40	18.7		6
			75						
		80.0 / 117.5	80		X	25-12-11 N=23	14.5		
		Boring Terminated at 80 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

Water level not determined

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-13-2021	Boring Completed: 09-14-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-2

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation Little Rock, Arkansas

SITE: Route 86 Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.939100° Longitude: -91.655400°

Station: 116+75 Offset: 17 feet right of CL

Surface Elev.: 191 (Ft.)

MODEL LAYER	DEPTH	Material Description	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1		**SILTY CLAY (CL-ML)**, reddish brown, stiff				X	5-4-5 N=9	16.8		
	2.0		189							
		LEAN CLAY WITH SAND (CL), light gray, very stiff				X	5-9-13 N=22	12.1	39-10-29	84
						X	10-11-13 N=24	19.2		
	5.0		186	5						
2		**CLAYEY SAND (SC)**, light gray and reddish brown, loose to medium dense				X	20-16-20 N=36	13.9	29-13-16	47
						X	11-13-15 N=28	10.8		
				10						
						X	7-9-7 N=16	8.7		28
				15						
						X	8-8-9 N=17	12.2		
				20						
						X	6-6-6 N=12	14.8		27
				25						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

▽ *56 feet on 9/20/2021*

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-14-2021	Boring Completed: 09-14-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-2

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation Little Rock, Arkansas

SITE: Route 86 Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.939100° Longitude: -91.655400°

Station: 116+75 Offset: 17 feet right of CL

Surface Elev.: 191 (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH / DESCRIPTION / ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
2		**CLAYEY SAND (SC)**, light gray and reddish brown, loose to medium dense *(continued)*	30		X	3-2-3 N=5	40.5	44-20-24	
		33.5 — 157.5							
3		**POORLY GRADED SAND (SP-SC)**, fine grained, light gray and gray, dense to very dense	35		X	16-21-25 N=46	18.6		10
			40		X	15-16-17 N=33	18.7		
			45		X	16-23-28 N=51	16.0		
			50		X	19-30-28 N=58	13.7		9
			55	▽					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

▽ *56 feet on 9/20/2021*

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-14-2021	Boring Completed: 09-14-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-2

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation Little Rock, Arkansas

SITE: Route 86 Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.939100° Longitude: -91.655400°

Station: 116+75 Offset: 17 feet right of CL

Surface Elev.: 191 (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH / ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
3		**POORLY GRADED SAND (SP-SC)**, fine grained, light gray and gray, dense to very dense *(continued)*							
			60		X	16-22-26 N=48	19.5		
			65						
			70		X	18-20-21 N=41	19.3		7
			75						
			80		X	18-23-24 N=47	7.6		6
			85						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

▽ *56 feet on 9/20/2021*

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-14-2021	Boring Completed: 09-14-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-2

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation, Little Rock, Arkansas

SITE: Route 86, Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.939100° Longitude: -91.655400°

Station: 116+75 Offset: 17 feet right of CL

Surface Elev.: 191 (Ft.)

MODEL LAYER	DEPTH	DESCRIPTION	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
3		**POORLY GRADED SAND (SP-SC)**, fine grained, light gray and gray, dense to very dense *(continued)*								
	88.5		102.5							
		POORLY GRADED SAND WITH GRAVEL (SP), gray and dark gray, very dense		90			33-38-50/5"	16.2		
				95						
	98.8		92				50/4"	13.9		

Boring Terminated at 98.8 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

▽ *56 feet on 9/20/2021*

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-14-2021	Boring Completed: 09-14-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-3

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation, Little Rock, Arkansas

SITE: Route 86, Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.939600° Longitude: -91.655400°

Station: 117+31 Offset: 18 feet right of CL

Surface Elev.: 190.1 (Ft.)

MODEL LAYER	DEPTH	DESCRIPTION	ELEVATION (Ft.)
1	0 – 3.5	**LEAN CLAY WITH SAND (CL)**, reddish brown and brown, medium stiff to very stiff	186.5
2	3.5 – 13.5	**SILTY SAND (SM)**, fine grained, reddish brown, dark gray and gray, medium dense to very dense	176.5
2	13.5 –	**SILTY SAND (SM)**, fine grained, reddish brown, dark gray and gray, loose to medium dense	

DEPTH (Ft.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0.5–2	4-3-4 N=7	12.7		
2–3.5	4-8-10 N=18	14.5	37-16-21	71
3.5–5	6-9-11 N=20	19.1		
5–6.5	17-24-32 N=56	10.3	NP	49
8.5–10	13-15-21 N=36	10.1		
13.5–15	6-9-11 N=20	16.4		
18.5–20	4-5-10 N=15	16.1		45
23.5–25	3-4-5 N=9	20.7	NP	

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

Water level not determined

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-14-2021	Boring Completed: 09-15-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-3

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation Little Rock, Arkansas

SITE: Route 86 Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.939600° Longitude: -91.655400°

Station: 117+31 Offset: 18 feet right of CL

Surface Elev.: 190.1 (Ft.)

MODEL LAYER	DEPTH	DESCRIPTION	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
2		**SILTY SAND (SM)**, fine grained, reddish brown, dark gray and gray, loose to medium dense *(continued)*				X	4-5-10 N=15	20.1		25
	33.5		156.5							
3		**POORLY GRADED SAND WITH CLAY (SP-SC)**, fine to medium grained, gray and dark gray, medium dense				X	7-10-16 N=26	20.4		
						X	9-12-15 N=27	20.4		6
						X	10-12-14 N=26	25.4		
						X	9-12-8 N=20	22.5		5

Depth scale: 30, 35, 40, 45, 50, 55

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

Water level not determined

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-14-2021	Boring Completed: 09-15-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-3

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation Little Rock, Arkansas

SITE: Route 86 Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.939600° Longitude: -91.655400°

Station: 117+31 Offset: 18 feet right of CL

Surface Elev.: 190.1 (Ft.)

MODEL LAYER	DEPTH	DESCRIPTION	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
3	58.5	**POORLY GRADED SAND WITH CLAY (SP-SC)**, fine to medium grained, gray and dark gray, medium dense *(continued)*	131.5							
		POORLY GRADED SAND (SP), coarse grained, grayish brown, dense to very dense		58.5–60		X	20-23-21 N=44	19.5		5
				68.5–70		X	20-25-28 N=53	17.3		
	78.5		111.5							
		POORLY GRADED SAND WITH GRAVEL (SP), coarse grained, grayish brown and reddish brown, dense to very dense		78.5–79.9		X	10-26-50/5"	10.1		4

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

Water level not determined

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-14-2021	Boring Completed: 09-15-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-3

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation Little Rock, Arkansas

SITE: Route 86 Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.939600° Longitude: -91.655400°

Station: 117+31 Offset: 18 feet right of CL

Surface Elev.: 190.1 (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH / DESCRIPTION / ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
3		**POORLY GRADED SAND WITH GRAVEL (SP)**, coarse grained, grayish brown and reddish brown, dense to very dense *(continued)*							
						50/3"			
			90						
			95						
						30-30-18 N=48	11.8		5
		100.0 — 90	100						
		Boring Terminated at 100 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

Water level not determined

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-14-2021	Boring Completed: 09-15-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-4

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation, Little Rock, Arkansas

SITE: Route 86, Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.939400° Longitude: -91.655400°

Station: 118+34 Offset: 25 feet right of CL

Surface Elev.: 196.5 (Ft.)

Model Layer: 1

DEPTH	ELEVATION (Ft.)	Description
0 – 5.0	191.5	**SANDY LEAN CLAY (CL)**, reddish brown and brown, medium stiff to very stiff
5.0 – 18.5	178	**LEAN CLAY (CL)**, reddish brown and brown, soft to very stiff; - gray and reddish brown
18.5 –		**SANDY SILT (ML)**, gray, soft to stiff

Approx. Depth (Ft.)	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
0.5–2	5-9-8 N=17	8.6		
2–3.5	3-5-3 N=8	14.0		
3.5–5	2-2-3 N=5	20.7	33-17-16	65
5–6.5	0-0-4 N=4	24.8		
8.5–10	4-6-10 N=16	23.8	46-18-28	96
13.5–15	4-6-7 N=13	28.6		
18.5–20	7-7-7 N=14	19.2		
23.5–25	3-2-1 N=3	20.7	NP	68

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

▽ *55 feet on 9/20/2021*

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-15-2021	Boring Completed: 09-15-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-4

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation, Little Rock, Arkansas

SITE: Route 86, Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.939400° Longitude: -91.655400°

Station: 118+34 Offset: 25 feet right of CL

Surface Elev.: 196.5 (Ft.)

MODEL LAYER	DEPTH	DESCRIPTION	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1		**SANDY SILT (ML)**, gray, soft to stiff *(continued)*				X	7-10-14 N=24	17.1		
	33.5		163							
		LEAN CLAY (CL), dark gray, soft				X	0-0-4 N=4	43.9		93
	38.5		158							
3		**POORLY GRADED SAND WITH CLAY (SP-SC)**, trace gravel, gray and dark gray, medium dense to very dense				X	7-11-17 N=28	17.3		
						X	7-8-8 N=16	16.7		5
						X	11-16-21 N=37	16.2		
				55	▽					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

▽ *55 feet on 9/20/2021*

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-15-2021	Boring Completed: 09-15-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-4

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation Little Rock, Arkansas

SITE: Route 86 Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.939400° Longitude: -91.655400°

Station: 118+34 Offset: 25 feet right of CL

Surface Elev.: 196.5 (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH / ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
3		**POORLY GRADED SAND WITH CLAY (SP-SC)**, trace gravel, gray and dark gray, medium dense to very dense *(continued)*							
		- clay seam at about 58.5 feet			X	15-17-17 N=34	16.8		40
			60						
			65						
					X	12-26-34 N=60	18.9		7
			70						
			75						
		78.8 / 117.5			X	50/4"	17.9		
		Boring Terminated at 78.8 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

55 feet on 9/20/2021

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-15-2021	Boring Completed: 09-15-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-5

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation, Little Rock, Arkansas

SITE: Route 86, Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.940800° Longitude: -91.655400°

Station: 123+17 Offset: 24 feet right of CL

Surface Elev.: 189.9 (Ft.)

MODEL LAYER	DEPTH	DESCRIPTION	ELEVATION (Ft.)
1	0.0–5.0	**SILTY CLAY (CL-ML)**, trace gravel, light brown and brown, medium stiff to stiff	185
1	5.0–18.5	**LEAN CLAY WITH SAND (CL)**, light brown and brown, medium stiff to stiff	171.5
2	18.5–	**CLAYEY SAND (SC)**, dark gray and gray, medium dense	

FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
4-4-4 N=8	14.0		
2-5-4 N=9	19.1	23-19-4	87
7-6-6 N=12	15.3		
8-5-5 N=10	23.4		
2-4-4 N=8	21.5		78
2-3-3 N=6	20.1	27-14-13	
5-7-7 N=14	20.7		
7-11-16 N=27	16.4		32

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method: Mud Rotary Drilling

Abandonment Method: Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

37 feet on 9/20/2021

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-16-2021	Boring Completed: 09-16-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-5

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation Little Rock, Arkansas

SITE: Route 86 Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.940800° Longitude: -91.655400°

Station: 123+17 Offset: 24 feet right of CL

Surface Elev.: 189.9 (Ft.)

MODEL LAYER	DEPTH	DESCRIPTION	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
2		**CLAYEY SAND (SC)**, dark gray and gray, medium dense *(continued)*				X	4-8-10 N=18	14.0		
	33.5		156.5							
3		**POORLY GRADED SAND WITH CLAY (SP-SC)**, gray and dark gray, medium dense to very dense				X	7-13-17 N=30	18.0		7
				37	▽					
						X	8-10-13 N=23	16.7		
						X	11-10-16 N=26	20.8		5
						X	22-42-50/5"	16.8		

Depth scale: 30, 35, 40, 45, 50, 55

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

▽ *37 feet on 9/20/2021*

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-16-2021	Boring Completed: 09-16-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-5

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation Little Rock, Arkansas

SITE: Route 86 Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.940800° Longitude: -91.655400°

Station: 123+17 Offset: 24 feet right of CL

Surface Elev.: 189.9 (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH / DESCRIPTION / ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
3		**POORLY GRADED SAND WITH CLAY (SP-SC)**, gray and dark gray, medium dense to very dense *(continued)*							
		58.5 — 131.5							
		POORLY GRADED SAND WITH CLAY AND GRAVEL (SP-SC), gray, dense to very dense			X	11-15-16 N=31	19.5		6
			60						
			65						
					X	18-19-20 N=39	19.9		
			70						
			75						
					X	50/5"	15.7		
			80						
			85						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

37 feet on 9/20/2021

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-16-2021	Boring Completed: 09-16-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-5

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation Little Rock, Arkansas

SITE: Route 86 Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.940800° Longitude: -91.655400°

Station: 123+17 Offset: 24 feet right of CL

Surface Elev.: 189.9 (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH / DESCRIPTION / ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
3		**POORLY GRADED SAND WITH CLAY AND GRAVEL (SP-SC)**, gray, dense to very dense *(continued)*							
			90		X	30-27-26 N=53	16.7		5
			95						
		98.8 ... 91				50/3"	9.2		
		Boring Terminated at 98.8 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

▽ *37 feet on 9/20/2021*

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-16-2021	Boring Completed: 09-16-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-6

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation, Little Rock, Arkansas

SITE: Route 86, Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.941000° Longitude: -91.655400°

Station: 123+73 Offset: 24 feet right of CL

Surface Elev.: 190.3 (Ft.)

MODEL LAYER	DEPTH	Material Description	ELEVATION (Ft.)
1		**LEAN CLAY (CL)**, brown, stiff	
	2.0	**LEAN CLAY WITH SAND (CL)**, light brown and gray, medium stiff to stiff	188.5
2	13.5	**CLAYEY SAND (SC)**, gray, loose to dense	177

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0.5–2	X	4-4-5 N=9	16.7	39-17-22	88
2–3.5	X	3-4-3 N=7	25.7		
3.5–5	X	8-7-5 N=12	21.1		
5–6.5	X	7-6-7 N=13	18.8		82
8.5–10	X	7-6-4 N=10	18.2		
13.5–15	X	3-2-3 N=5	20.8	25-13-12	
18.5–20	X	5-7-9 N=16	22.0		21
23.5–25	X	9-12-13 N=25	18.2		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

▽ *45 feet on 9/20/2021*

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-16-2021	Boring Completed: 09-16-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-6

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation, Little Rock, Arkansas

SITE: Route 86, Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.941000° Longitude: -91.655400°

Station: 123+73 Offset: 24 feet right of CL

Surface Elev.: 190.3 (Ft.)

MODEL LAYER	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
2	**CLAYEY SAND (SC)**, gray, loose to dense *(continued)*				X	5-4-6 N=10	20.3		31
			30						
					X	9-12-14 N=26	20.8		
			35						
					X	12-16-21 N=37	19.4		
			40						
	43.5	147							
3	**POORLY GRADED SAND WITH CLAY (SP-SC)**, gray, dense to very dense				X	13-16-18 N=34	21.4		6
			45	▽					
					X	23-36-43 N=79	16.0		
			50						
			55						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

▽ *45 feet on 9/20/2021*

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-16-2021	Boring Completed: 09-16-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-6

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation, Little Rock, Arkansas

SITE: Route 86, Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.941000° Longitude: -91.655400°

Station: 123+73 Offset: 24 feet right of CL

Surface Elev.: 190.3 (Ft.)

MODEL LAYER	DEPTH	DESCRIPTION	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
3		**POORLY GRADED SAND WITH CLAY (SP-SC)**, gray, dense to very dense *(continued)*				X	16-18-21 N=39	18.9		
	68.5	**POORLY GRADED SAND WITH GRAVEL (SP)**, gray, very dense	122			X	21-26-32 N=58	18.7		6
						X	50/2"			

Depth scale: 60, 65, 70, 75, 80, 85

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

45 feet on 9/20/2021

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-16-2021	Boring Completed: 09-16-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-6

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation, Little Rock, Arkansas

SITE: Route 86, Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.941000° Longitude: -91.655400°

Station: 123+73 Offset: 24 feet right of CL

Surface Elev.: 190.3 (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH / DESCRIPTION / ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
3		**POORLY GRADED SAND WITH GRAVEL (SP)**, gray, very dense *(continued)*							
					X	34-41-47 N=88	12.8		4
			90						
			95						
		98.8 — 91.5			X	50/4"	3.8		
		Boring Terminated at 98.8 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

▽ *45 feet on 9/20/2021*

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-16-2021	Boring Completed: 09-16-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-7

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation Little Rock, Arkansas

SITE: Route 86 Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.941300° Longitude: -91.655400°

Station: 124+36 Offset: 17 feet right of CL

Surface Elev.: 192.5 (Ft.)

MODEL LAYER	DEPTH	DESCRIPTION	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1		**LEAN CLAY (CL)**, reddish brown and gray, medium stiff to stiff				X	4-4-2 N=6	15.4		
						X	3-4-4 N=8	19.8	36-19-17	94
						X	10-8-5 N=13	17.3		
				5		X	4-5-5 N=10	25.3		
						X	2-4-4 N=8	22.2		
	13.5	**LEAN CLAY WITH SAND (CL)**, light gray, stiff	179			X	4-6-6 N=12	20.6	25-16-9	83
2	18.5	**CLAYEY SAND (SC)**, fine grained, light gray, medium dense to dense	174			X	6-9-9 N=18	17.7		
						X	7-9-12 N=21	16.4		13

Depth scale: 5, 10, 15, 20, 25

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

▽ *57 feet on 9/20/2021*

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-17-2021	Boring Completed: 09-17-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-7

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation
Little Rock, Arkansas

SITE: Route 86
Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.941300° Longitude: -91.655400°

Station: 124+36 Offset: 17 feet right of CL

Surface Elev.: 192.5 (Ft.)

MODEL LAYER	DEPTH	DESCRIPTION	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
2		**CLAYEY SAND (SC)**, fine grained, light gray, medium dense to dense *(continued)*					8-8-8 N=16	16.7		
				30						
							7-7-11 N=18	14.3		13
				35						
							10-14-20 N=34	19.7		
				40						
	43.5		149							
3		**POORLY GRADED SAND WITH CLAY (SP-SC)**, gray and dark gray, dense to very dense					14-21-30 N=51	15.7		8
				45						
							20-23-21 N=44	18.3		
				50						
				55						
					▽					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

▽ *57 feet on 9/20/2021*

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-17-2021	Boring Completed: 09-17-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-7

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation Little Rock, Arkansas

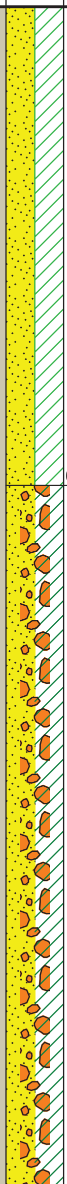
SITE: Route 86 Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.941300° Longitude: -91.655400°

Station: 124+36 Offset: 17 feet right of CL

Surface Elev.: 192.5 (Ft.)



MODEL LAYER	DEPTH	DESCRIPTION	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
3		**POORLY GRADED SAND WITH CLAY (SP-SC)**, gray and dark gray, dense to very dense *(continued)*								
				60		X	10-20-20 N=40	21.4		8
				65						
	68.5		124							
		POORLY GRADED SAND WITH CLAY AND GRAVEL (SP-SC), coarse grained, gray, very dense		70		X	14-21-22 N=43	19.7		7
				75						
						X	50/4"	14.1		
				80						
				85						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

57 feet on 9/20/2021

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-17-2021	Boring Completed: 09-17-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-7

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation Little Rock, Arkansas

SITE: Route 86 Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.941300° Longitude: -91.655400°

Station: 124+36 Offset: 17 feet right of CL

Surface Elev.: 192.5 (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH / ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
3		**POORLY GRADED SAND WITH CLAY AND GRAVEL (SP-SC)**, coarse grained, gray, very dense *(continued)*			X	30-46-50/5"	11.6		5
			90						
			95						
		99.4 / 93			X	27-50/5"	12.9		
		Boring Terminated at 99.4 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

57 feet on 9/20/2021

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-17-2021	Boring Completed: 09-17-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-8

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation Little Rock, Arkansas

SITE: Route 86 Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.941500° Longitude: -91.655400°

Station: 125+84 Offset: 26 feet right of CL

Surface Elev.: 199.6 (Ft.)

MODEL LAYER	DEPTH	DESCRIPTION	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1		**LEAN CLAY WITH SAND (CL)**, reddish brown and light brown, medium stiff to stiff				X	2-2-4 N=6	11.2		
						X	2-4-4 N=8	17.9		
						X	9-8-5 N=13	17.6	35-18-17	77
				5		X	8-6-5 N=11	22.9		
	8.5	**SANDY LEAN CLAY (CL)**, reddish brown and light brown, medium stiff to stiff	191			X	2-4-4 N=8	17.8	28-12-16	63
				10						
						X	2-3-3 N=6	37.6		
				15						
						X	3-2-3 N=5	45.4	68-20-48	
				20						
2	23.5	**CLAYEY SAND (SC)**, reddish brown and gray, medium dense	176			X	6-8-8 N=16	20.2		28
				25						
	28.5		171							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

Water level not determined

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-18-2021	Boring Completed: 09-18-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-8

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation Little Rock, Arkansas

SITE: Route 86 Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.941500° Longitude: -91.655400°

Station: 125+84 Offset: 26 feet right of CL

Surface Elev.: 199.6 (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH / ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
3		**POORLY GRADED SAND WITH CLAY (SP-SC)**, fine to medium grained, brown, reddish brown and light brown, medium dense to very dense	29-30		X	5-10-12 N=22	21.5		
			34-35		X	7-9-13 N=22	17.4		9
			39-40		X	8-20-23 N=43	17.4		
			44-45		X	11-17-23 N=40	17.8		
			49-50		X	14-19-20 N=39	18.2		7

Depth scale: 30, 35, 40, 45, 50, 55

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

Water level not determined

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-18-2021	Boring Completed: 09-18-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-8

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation Little Rock, Arkansas

SITE: Route 86 Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.941500° Longitude: -91.655400°

Station: 125+84 Offset: 26 feet right of CL

Surface Elev.: 199.6 (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH / ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
3		**POORLY GRADED SAND WITH CLAY (SP-SC)**, fine to medium grained, brown, reddish brown and light brown, medium dense to very dense *(continued)*							
			60		X	12-22-29 N=51	15.0		
			65						
			70		X	17-20-23 N=43	18.9		5
			75						
			80		X	20-24-23 N=47	18.5		7
			85						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

Water level not determined

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-18-2021	Boring Completed: 09-18-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-8

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation Little Rock, Arkansas

SITE: Route 86 Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.941500° Longitude: -91.655400°

Station: 125+84 Offset: 26 feet right of CL

Surface Elev.: 199.6 (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH / ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
3		**POORLY GRADED SAND WITH CLAY (SP-SC)**, fine to medium grained, brown, reddish brown and light brown, medium dense to very dense *(continued)*							
			90		X	28-31-21 N=52	18.0		
			95						
		98.5 / 101							
		98.8 / 101 **POORLY GRADED GRAVEL (GP)**, gray, very dense			X	50/4"	13.2		
		Boring Terminated at 98.8 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

Water level not determined

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-18-2021	Boring Completed: 09-18-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-9

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation, Little Rock, Arkansas

SITE: Route 86, Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.941700° Longitude: -91.655400°

Station: 126+45 Offset: 29 feet right of CL

Surface Elev.: 199.7 (Ft.)

MODEL LAYER	DEPTH	DESCRIPTION	ELEVATION (Ft.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1		**LEAN CLAY WITH SAND (CL)**, reddish brown and gray, medium stiff to very stiff		5-6-6 N=12	15.5		
				5-3-3 N=6	17.2	39-17-22	82
				11-9-7 N=16	13.0		
	5.0	**SANDY LEAN CLAY (CL)**, reddish brown and light brown, medium stiff to stiff	194.5	6-7-7 N=14	19.2		
				3-4-4 N=8	20.4	27-12-15	65
				2-2-4 N=6	41.0		
	18.5	**LEAN CLAY WITH SAND (CL)**, reddish brown, medium stiff to stiff	181	3-3-5 N=8	21.0		75
2	23.5	**CLAYEY SAND (SC)**, reddish brown, medium dense to dense	176	6-8-9 N=17	24.2		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

Water level not determined

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-20-2021	Boring Completed: 09-20-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-9

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation, Little Rock, Arkansas

SITE: Route 86, Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.941700° Longitude: -91.655400°

Station: 126+45 Offset: 29 feet right of CL

Surface Elev.: 199.7 (Ft.)

Model Layer	Depth	Description	Elevation (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
2		**CLAYEY SAND (SC)**, reddish brown, medium dense to dense *(continued)*				X	7-10-11 N=21	17.4		28
				35		X	10-16-20 N=36	17.4		
				40		X	14-20-24 N=44	17.2		
	43.5		156							
3		**POORLY GRADED SAND WITH CLAY (SP-SC)**, brown, gray and dark gray, medium dense to very dense		45		X	15-20-23 N=43	15.4		6
				50		X	8-14-19 N=33	19.1		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary Drilling

Abandonment Method:
Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

Water level not determined

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-20-2021	Boring Completed: 09-20-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

BORING LOG NO. B-9

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

CLIENT: Arkansas Department of Transportation Little Rock, Arkansas

SITE: Route 86 Hickory Plains, Arkansas

LOCATION See Exploration Plan

Latitude: 34.941700° Longitude: -91.655400°

Station: 126+45 Offset: 29 feet right of CL

Surface Elev.: 199.7 (Ft.)

MODEL LAYER	DEPTH / ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
3	**POORLY GRADED SAND WITH CLAY (SP-SC)**, brown, gray and dark gray, medium dense to very dense *(continued)*							
		58.5–60		X	15-21-38 N=59	16.3		10
		68.5–70		X	16-20-26 N=46	19.9		
		78.5–80		X	27-35-41 N=76	15.5		
	80.0 / 119.5	80						

Boring Terminated at 80 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method: Mud Rotary Drilling

Abandonment Method: Borings backfilled with auger cuttings and bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

WATER LEVEL OBSERVATIONS

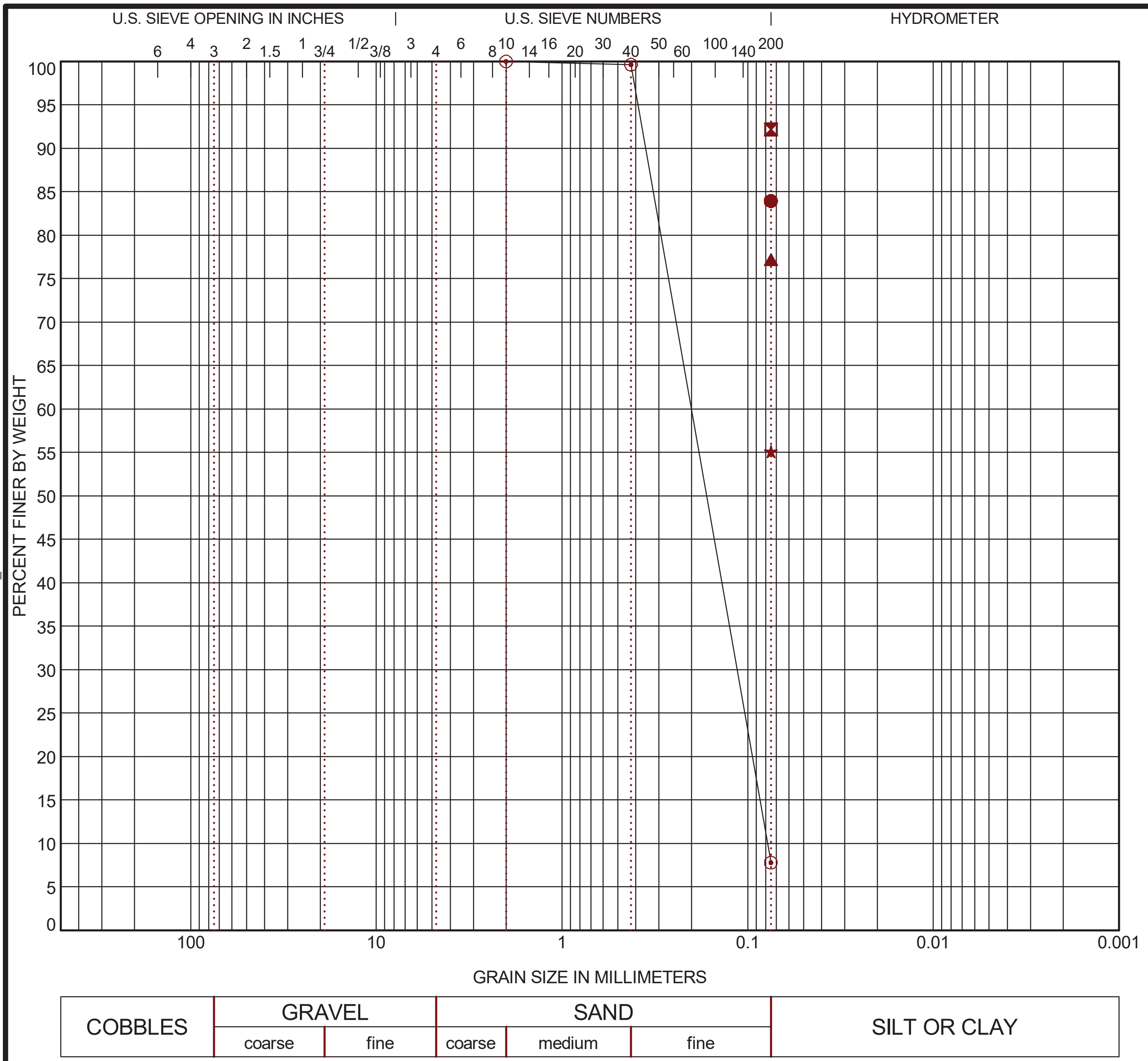
Water level not determined

Terracon
25809 I 30
Bryant, AR

Boring Started: 09-20-2021	Boring Completed: 09-20-2021
Drill Rig: 763	Driller: ME
Project No.: 35215136	

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



	Boring ID	Depth	AASHTO Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-1	2 - 3.5	A-6 (16)	12.8	36	15	21		
⊠	B-1	5 - 6.5	A-6 (15)	28.4	35	18	17		
▲	B-1	18.5 - 20		21.6					
★	B-1	28.5 - 30		18.2					
⊙	B-1	43.5 - 45		19.7				0.83	2.57

	Boring ID	Depth	D_{100}	D_{90}	D_{50}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-1	2 - 3.5	0.075				0.0	0.0		83.9	
⊠	B-1	5 - 6.5	0.075				0.0	0.0		92.2	
▲	B-1	18.5 - 20	0.075				0.0	0.0		77.2	
★	B-1	28.5 - 30	0.075				0.0	0.0		55.1	
⊙	B-1	43.5 - 45	2	0.354	0.166	0.078	0.0	92.2		7.8	

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

SITE: Route 86
Hickory Plains, Arkansas

Terracon
25809 I 30
Bryant, AR

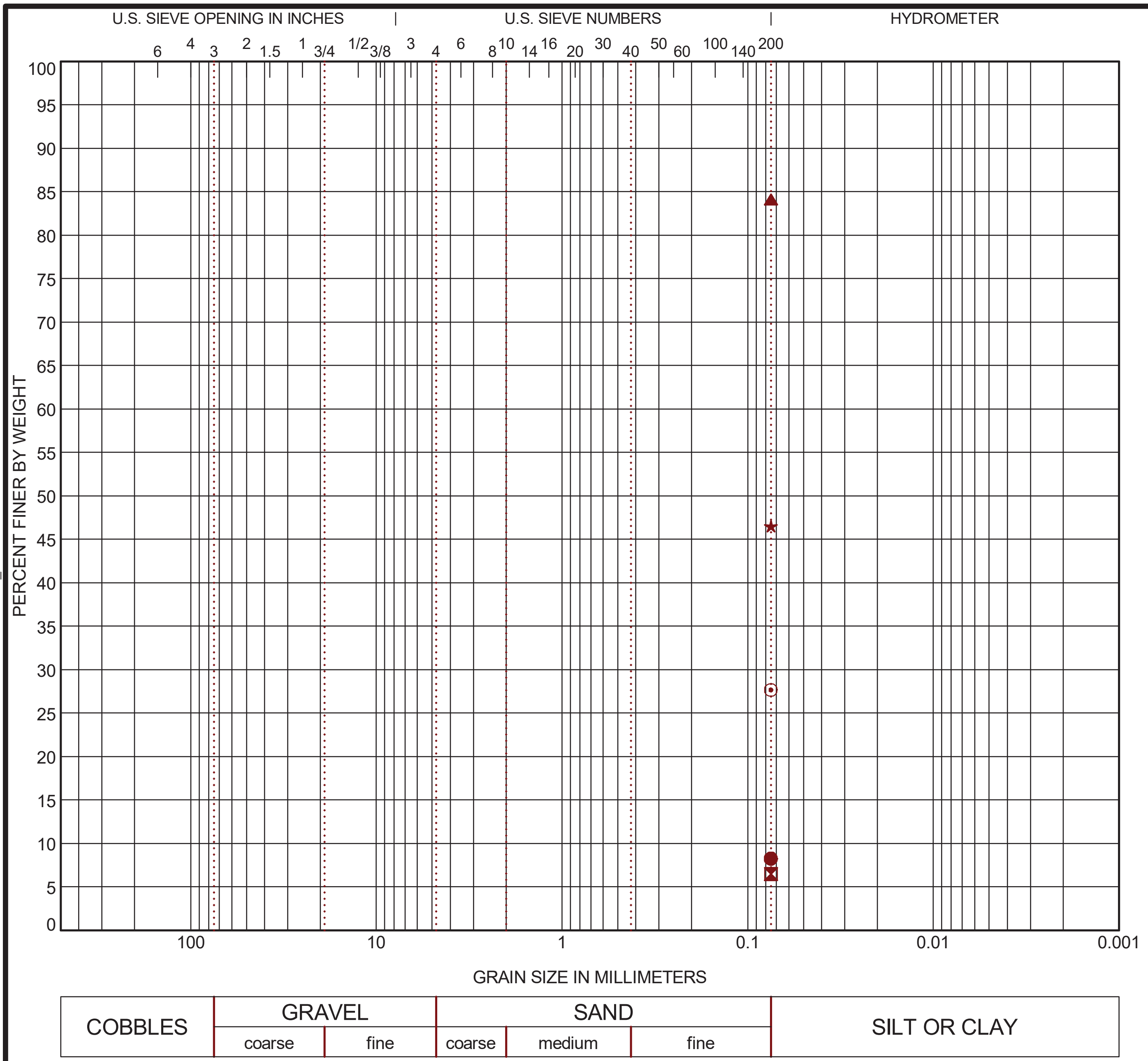
PROJECT NUMBER: 35215136

CLIENT: Arkansas Department of Transportation
Little Rock, Arkansas

EXHIBIT: B-1

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



Boring ID	Depth	AASHTO Classification	WC (%)	LL	PL	PI	Cc	Cu
● B-1	58.5 - 60		14.6					
⊠ B-1	68.5 - 70		18.7					
▲ B-2	2 - 3.5	A-6 (23)	12.1	39	10	29		
★ B-2	5 - 6.5	A-6 (4)	13.9	29	13	16		
⊙ B-2	13.5 - 15		8.7					

Boring ID	Depth	D_{100}	D_{90}	D_{50}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
● B-1	58.5 - 60	0.075				0.0	0.0		8.3	
⊠ B-1	68.5 - 70	0.075				0.0	0.0		6.5	
▲ B-2	2 - 3.5	0.075				0.0	0.0		84.1	
★ B-2	5 - 6.5	0.075				0.0	0.0		46.5	
⊙ B-2	13.5 - 15	0.075				0.0	0.0		27.7	

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

SITE: Route 86
Hickory Plains, Arkansas

Terracon
25809 I 30
Bryant, AR

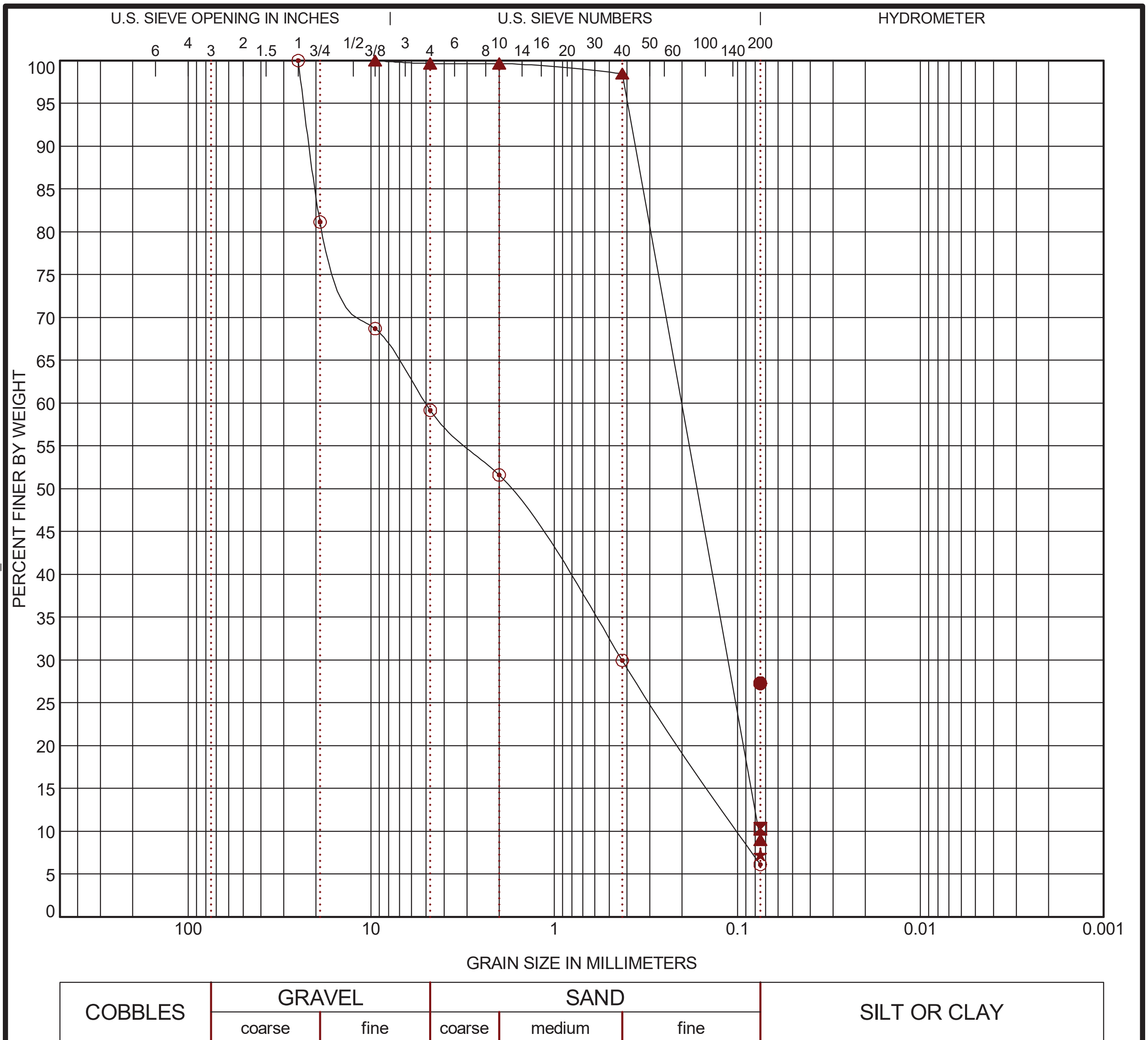
PROJECT NUMBER: 35215136

CLIENT: Arkansas Department of Transportation
Little Rock, Arkansas

EXHIBIT: B-2

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



	Boring ID	Depth	AASHTO Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-2	23.5 - 25		14.8					
⊠	B-2	33.5 - 35		18.6					
▲	B-2	48.5 - 50		13.7				0.82	2.64
★	B-2	68.5 - 70		19.3					
⊙	B-2	78.5 - 80		7.6				0.36	50.74

	Boring ID	Depth	D_{100}	D_{90}	D_{50}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-2	23.5 - 25	0.075				0.0	0.0		27.3	
⊠	B-2	33.5 - 35	0.075				0.0	0.0		10.3	
▲	B-2	48.5 - 50	9.5	0.361	0.166	0.076	0.3	90.7		9.0	
★	B-2	68.5 - 70	0.075				0.0	0.0		7.3	
⊙	B-2	78.5 - 80	25	21.613	1.782	0.099	40.8	53.0		6.1	

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

SITE: Route 86
Hickory Plains, Arkansas

Terracon
25809 I 30
Bryant, AR

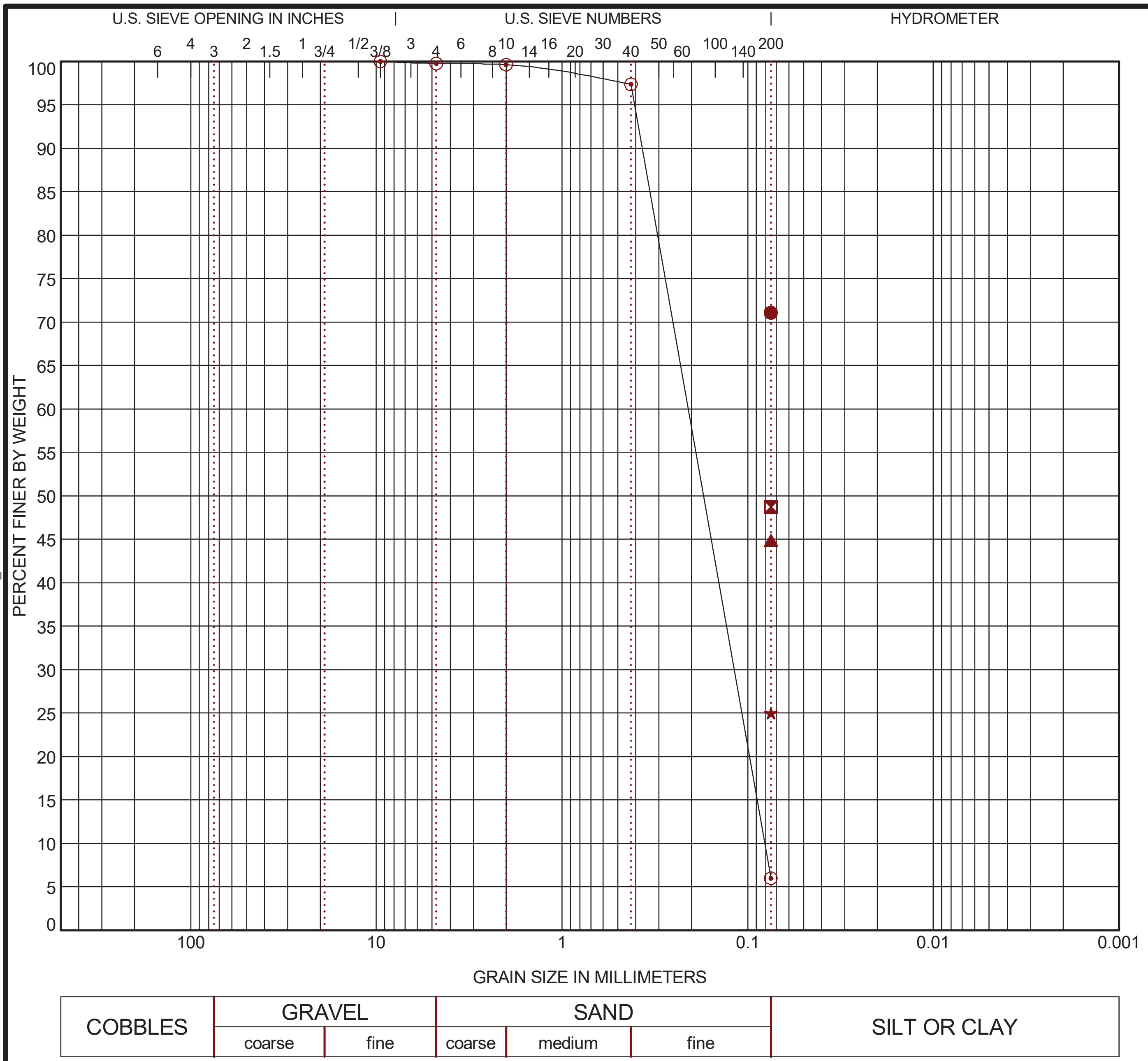
PROJECT NUMBER: 35215136

CLIENT: Arkansas Department of Transportation
Little Rock, Arkansas

EXHIBIT: B-3

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



Boring ID	Depth	AASHTO Classification	WC (%)	LL	PL	PI	Cc	Cu
● B-3	2 - 3.5	A-6 (13)	14.5	37	16	21		
⊠ B-3	5 - 6.5	A-4 (0)	10.3	NP	NP	NP		
▲ B-3	18.5 - 20		16.1					
★ B-3	28.5 - 30		20.1					
⊙ B-3	38.5 - 40		20.4				0.83	2.58

Boring ID	Depth	D_{100}	D_{90}	D_{50}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
● B-3	2 - 3.5	0.075				0.0	0.0		71.1	
⊠ B-3	5 - 6.5	0.075				0.0	0.0		48.8	
▲ B-3	18.5 - 20	0.075				0.0	0.0		44.9	
★ B-3	28.5 - 30	0.075				0.0	0.0		25.0	
⊙ B-3	38.5 - 40	9.5	0.369	0.173	0.081	0.2	93.8		6.0	

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

SITE: Route 86
Hickory Plains, Arkansas

Terracon
25809 I 30
Bryant, AR

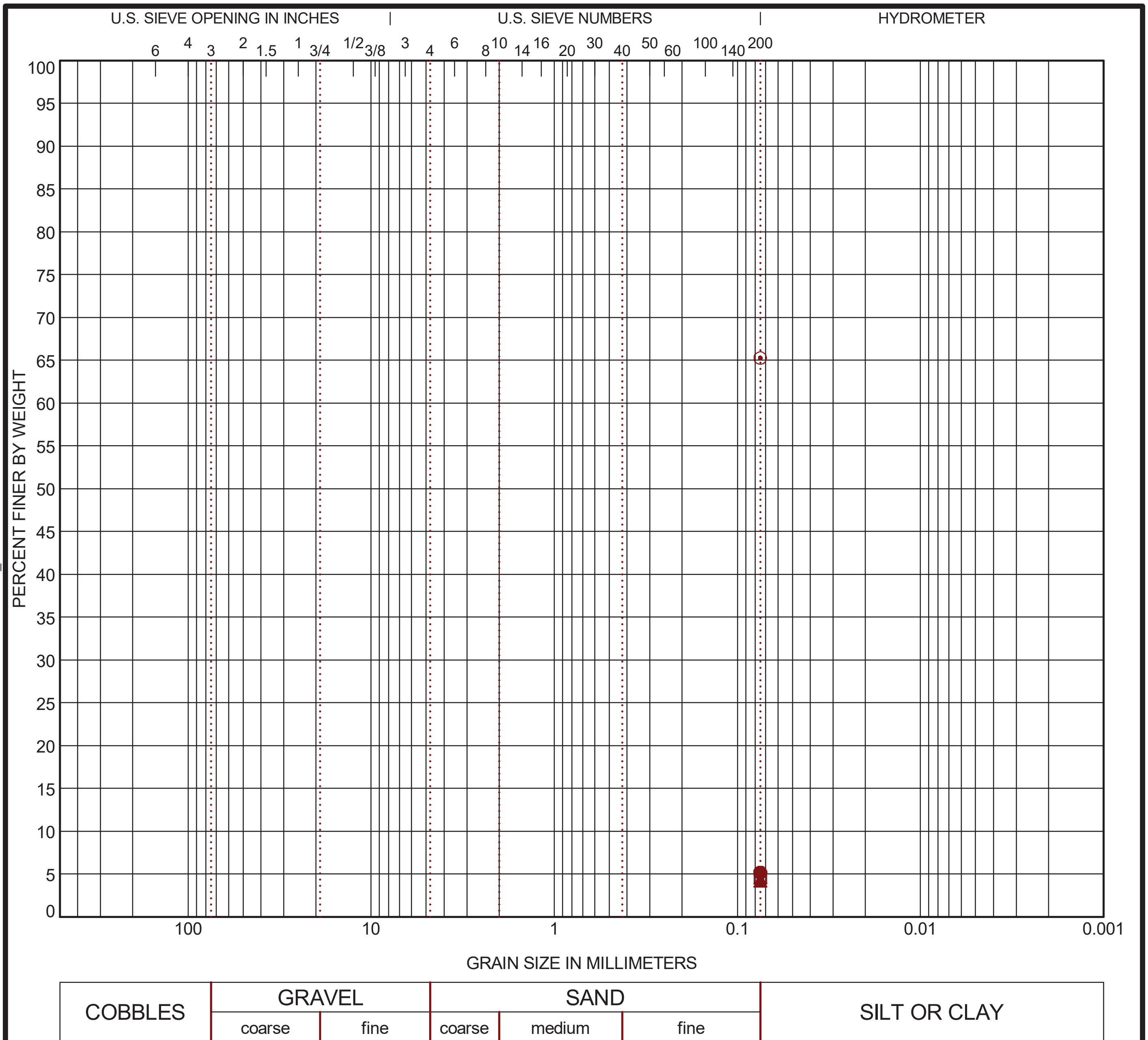
PROJECT NUMBER: 35215136

CLIENT: Arkansas Department of Transportation
Little Rock, Arkansas

EXHIBIT: B-4

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



Boring ID		Depth	AASHTO Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-3	48.5 - 50		22.5					
⊠	B-3	58.5 - 60		19.5					
▲	B-3	78.5 - 79.9		10.1					
★	B-3	98.5 - 100		11.8					
⊙	B-4	3.5 - 5	A-6 (8)	20.7	33	17	16		

Boring ID		Depth	D_{100}	D_{90}	D_{50}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-3	48.5 - 50	0.075				0.0	0.0		5.2	
⊠	B-3	58.5 - 60	0.075				0.0	0.0		4.6	
▲	B-3	78.5 - 79.9	0.075				0.0	0.0		4.1	
★	B-3	98.5 - 100	0.075				0.0	0.0		4.9	
⊙	B-4	3.5 - 5	0.075				0.0	0.0		65.3	

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

SITE: Route 86
Hickory Plains, Arkansas

Terracon
25809 I 30
Bryant, AR

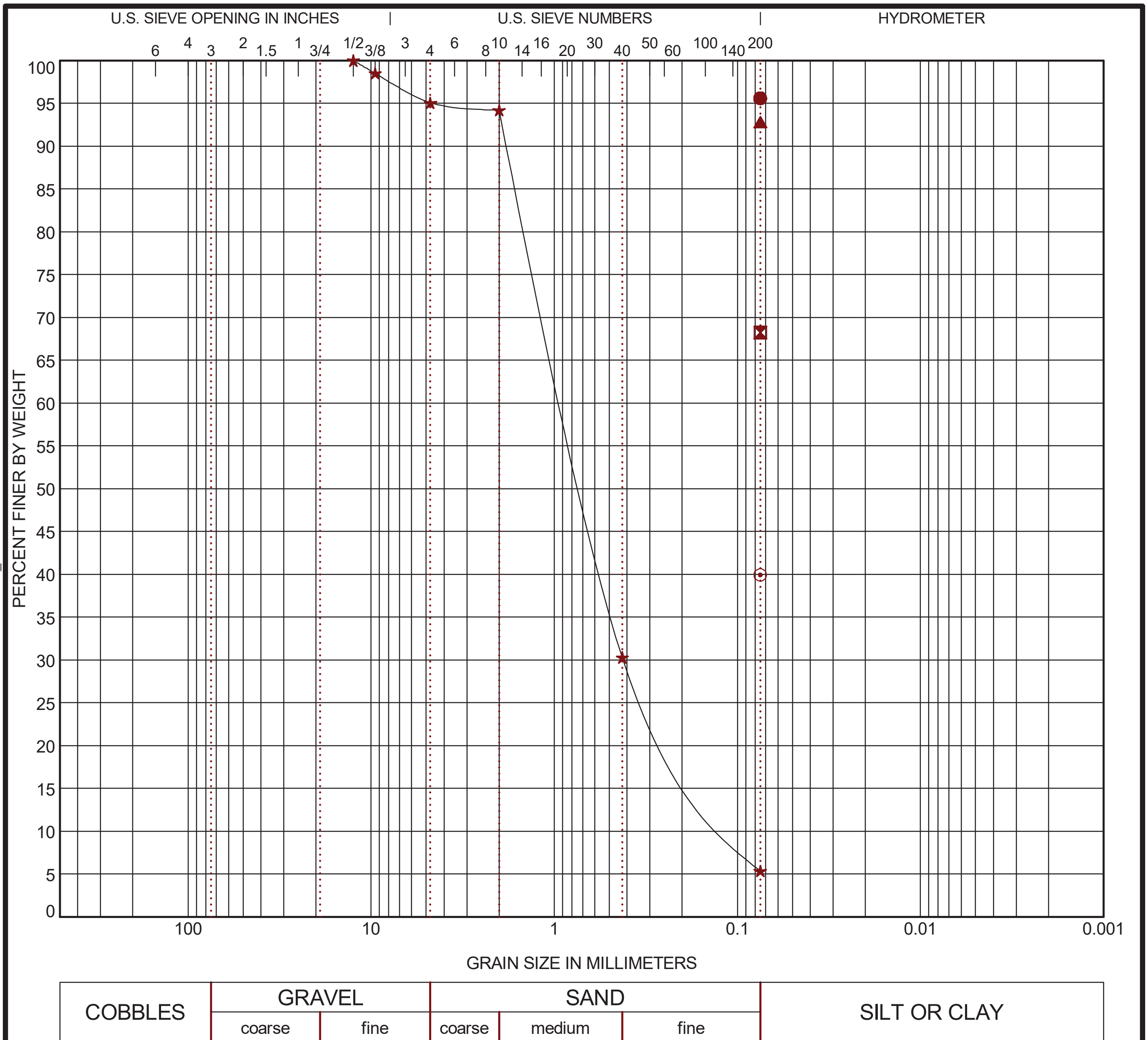
PROJECT NUMBER: 35215136

CLIENT: Arkansas Department of Transportation
Little Rock, Arkansas

EXHIBIT: B-5

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



Boring ID		Depth	AASHTO Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-4	8.5 - 10	A-7-6 (29)	23.8	46	18	28		
⊠	B-4	23.5 - 25	A-4 (0)	20.7	NP	NP	NP		
▲	B-4	33.5 - 35		43.9					
★	B-4	43.5 - 45		16.7				1.92	8.43
⊙	B-4	58.5 - 60		16.8					

Boring ID		Depth	D_{100}	D_{90}	D_{50}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-4	8.5 - 10	0.075				0.0	0.0		95.6	
⊠	B-4	23.5 - 25	0.075				0.0	0.0		68.2	
▲	B-4	33.5 - 35	0.075				0.0	0.0		92.8	
★	B-4	43.5 - 45	12.5	1.806	0.685	0.104	4.9	89.7		5.4	
⊙	B-4	58.5 - 60	0.075				0.0	0.0		39.9	

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

SITE: Route 86
Hickory Plains, Arkansas

Terracon
25809 I 30
Bryant, AR

PROJECT NUMBER: 35215136

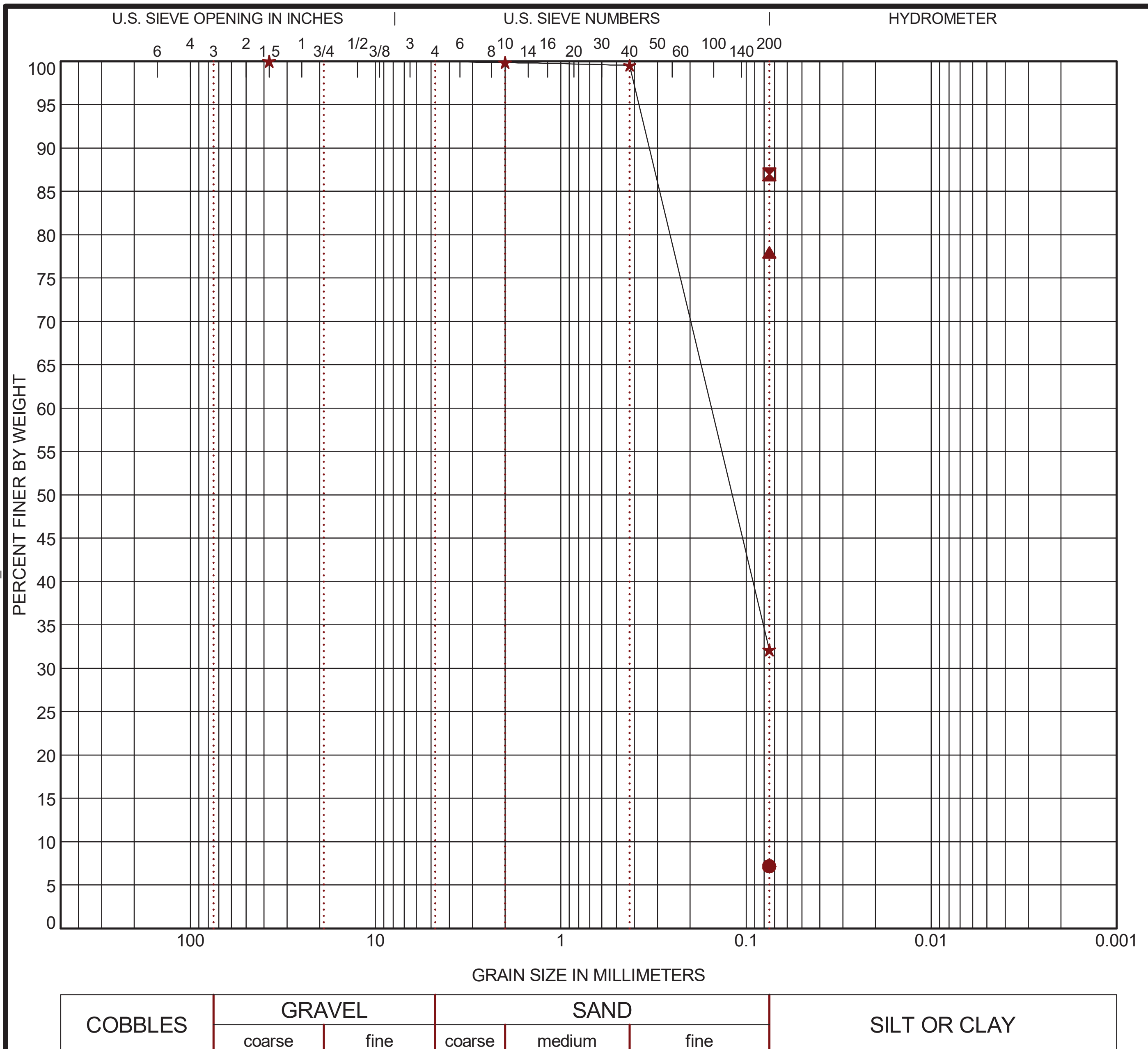
CLIENT: Arkansas Department of Transportation
Little Rock, Arkansas

EXHIBIT: B-6

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. NC DOT GRAIN SIZE: D50-D90 35215136 JOB NO. 061614 WA.GPJ TERRACON_DATATEMPLATE.GDT 10/14/21

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



	Boring ID	Depth	AASHTO Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-4	68.5 - 70		18.9					
⊠	B-5	2 - 3.5	A-4 (2)	19.1	23	19	4		
▲	B-5	8.5 - 10		21.5					
★	B-5	23.5 - 25		16.4					
⊙	B-5	33.5 - 35		18.0					

	Boring ID	Depth	D_{100}	D_{90}	D_{50}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-4	68.5 - 70	0.075				0.0	0.0		7.2	
⊠	B-5	2 - 3.5	0.075				0.0	0.0		87.0	
▲	B-5	8.5 - 10	0.075				0.0	0.0		78.0	
★	B-5	23.5 - 25	37.5	0.333	0.119		0.1	67.8		32.1	
⊙	B-5	33.5 - 35	0.075				0.0	0.0		7.2	

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

SITE: Route 86
Hickory Plains, Arkansas

Terracon
25809 I 30
Bryant, AR

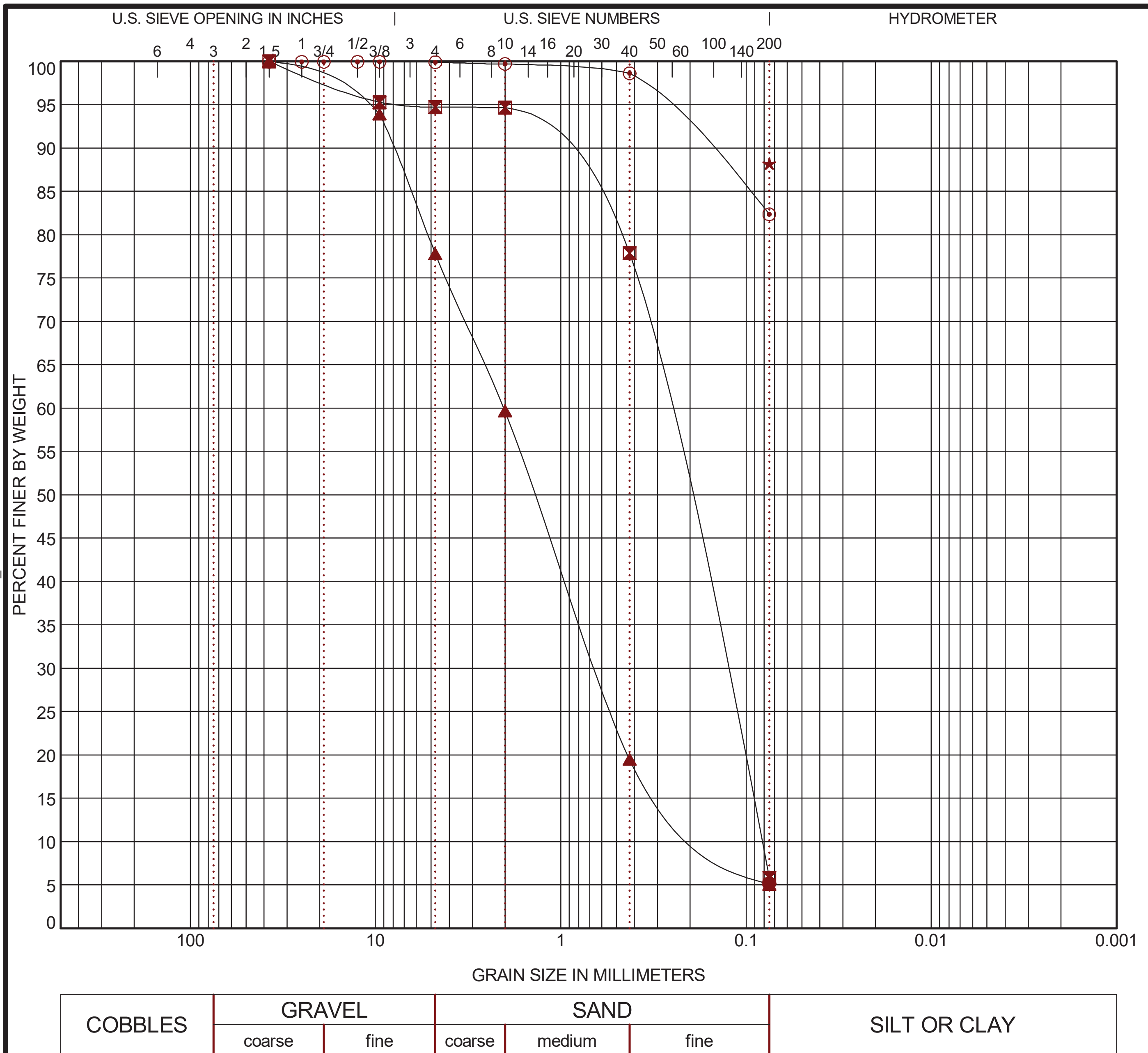
PROJECT NUMBER: 35215136

CLIENT: Arkansas Department of Transportation
Little Rock, Arkansas

EXHIBIT: B-7

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



Boring ID		Depth	AASHTO Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-5	43.5 - 45		20.8					
⊠	B-5	58.5 - 60		19.5				0.79	3.33
▲	B-5	88.5 - 90		16.7				1.47	14.97
★	B-6	0.5 - 2	A-6 (19)	16.7	39	17	22		
⊙	B-6	5 - 6.5		18.8					

Boring ID		Depth	D_{100}	D_{90}	D_{50}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-5	43.5 - 45	0.075				0.0	0.0		5.2	
⊠	B-5	58.5 - 60	37.5	1.3	0.217	0.083	5.3	88.9		5.8	
▲	B-5	88.5 - 90	37.5	8.036	1.378	0.136	22.2	72.7		5.1	
★	B-6	0.5 - 2	0.075				0.0	0.0		88.2	
⊙	B-6	5 - 6.5	37.5	0.169			0.0	17.5		82.4	

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

SITE: Route 86
Hickory Plains, Arkansas

Terracon
25809 I 30
Bryant, AR

PROJECT NUMBER: 35215136

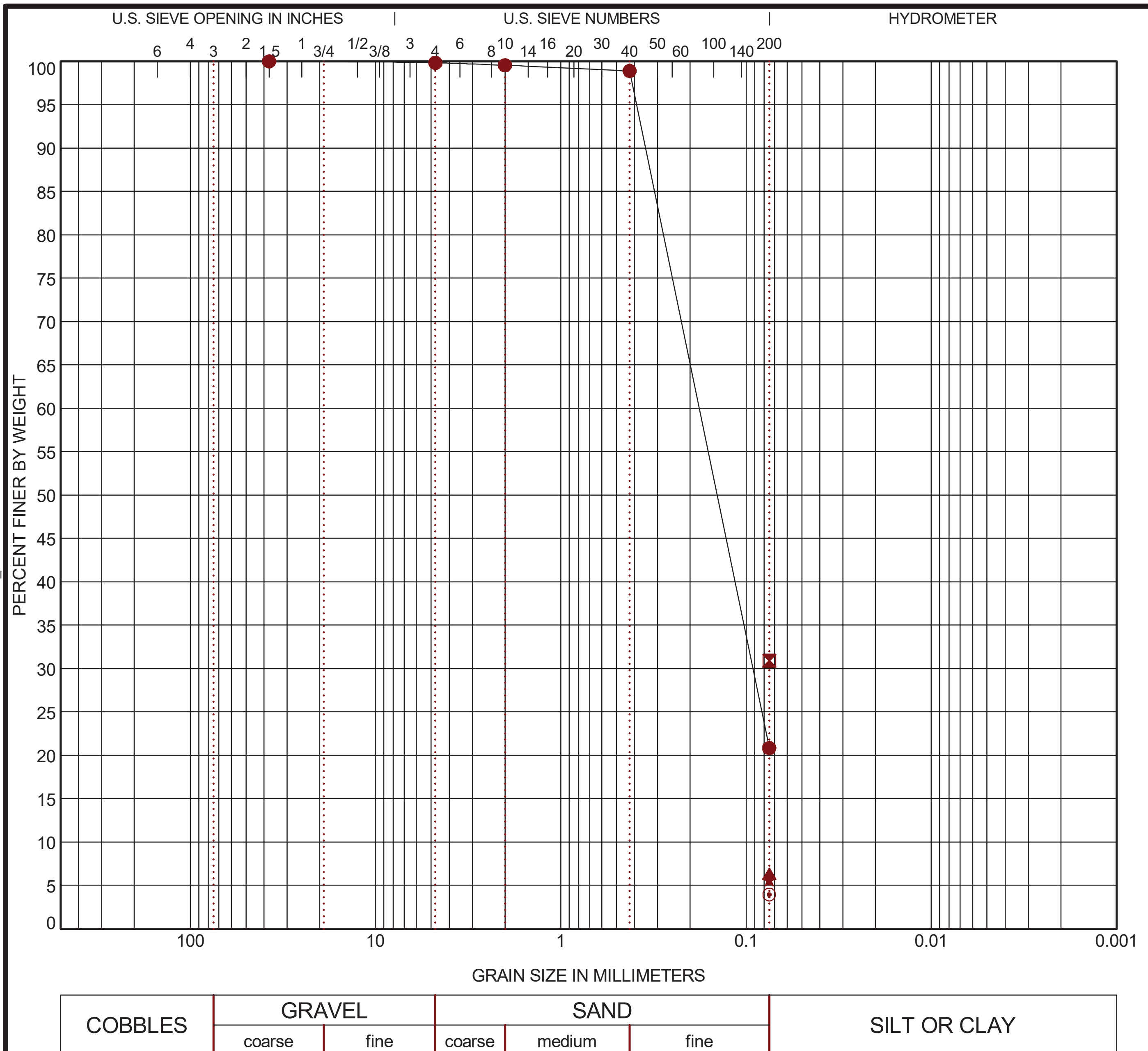
CLIENT: Arkansas Department of Transportation
Little Rock, Arkansas

EXHIBIT: B-8

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. NC DOT GRAIN SIZE: D50-D90 35215136 JOB NO. 061614 WA.GPJ TERRACON_DATATEMPLATE.GDT 10/14/21

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



Boring ID		Depth	AASHTO Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-6	18.5 - 20		22.0					
⊠	B-6	28.5 - 30		20.3					
▲	B-6	43.5 - 45		21.4					
★	B-6	68.5 - 70		18.7					
⊙	B-6	88.5 - 90		12.8					

Boring ID		Depth	D_{100}	D_{90}	D_{50}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-6	18.5 - 20	37.5	0.349	0.143		0.2	79.0		20.8	
⊠	B-6	28.5 - 30	0.075				0.0	0.0		30.9	
▲	B-6	43.5 - 45	0.075				0.0	0.0		6.3	
★	B-6	68.5 - 70	0.075				0.0	0.0		5.6	
⊙	B-6	88.5 - 90	0.075				0.0	0.0		4.0	

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

SITE: Route 86
Hickory Plains, Arkansas

Terracon
25809 I 30
Bryant, AR

PROJECT NUMBER: 35215136

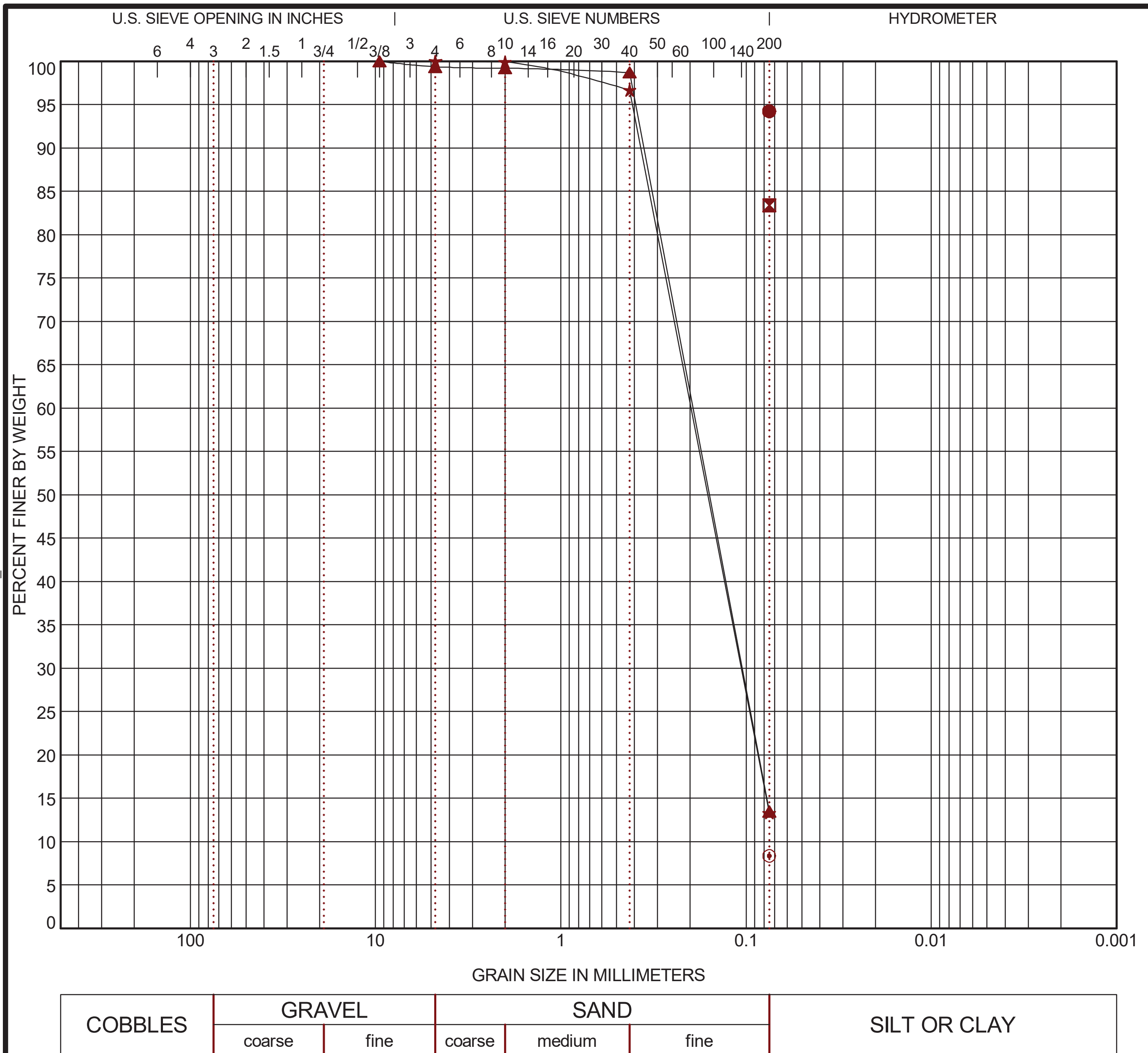
CLIENT: Arkansas Department of Transportation
Little Rock, Arkansas

EXHIBIT: B-9

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. NC DOT GRAIN SIZE: D50-D90 35215136 JOB NO. 061614 WA.GPJ TERRACON_DATATEMPLATE.GDT 10/14/21

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



Boring ID		Depth	AASHTO Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-7	2 - 3.5	A-6 (16)	19.8	36	19	17		
⊠	B-7	13.5 - 15	A-4 (5)	20.6	25	16	9		
▲	B-7	23.5 - 25		16.4					
★	B-7	33.5 - 35		14.3					
⊙	B-7	43.5 - 45		15.7					

Boring ID		Depth	D_{100}	D_{90}	D_{50}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-7	2 - 3.5	0.075				0.0	0.0		94.2	
⊠	B-7	13.5 - 15	0.075				0.0	0.0		83.4	
▲	B-7	23.5 - 25	9.5	0.356	0.158		0.6	85.9		13.5	
★	B-7	33.5 - 35	4.75	0.37	0.161		0.0	86.7		13.3	
⊙	B-7	43.5 - 45	0.075				0.0	0.0		8.4	

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

SITE: Route 86
Hickory Plains, Arkansas

Terracon
25809 I 30
Bryant, AR

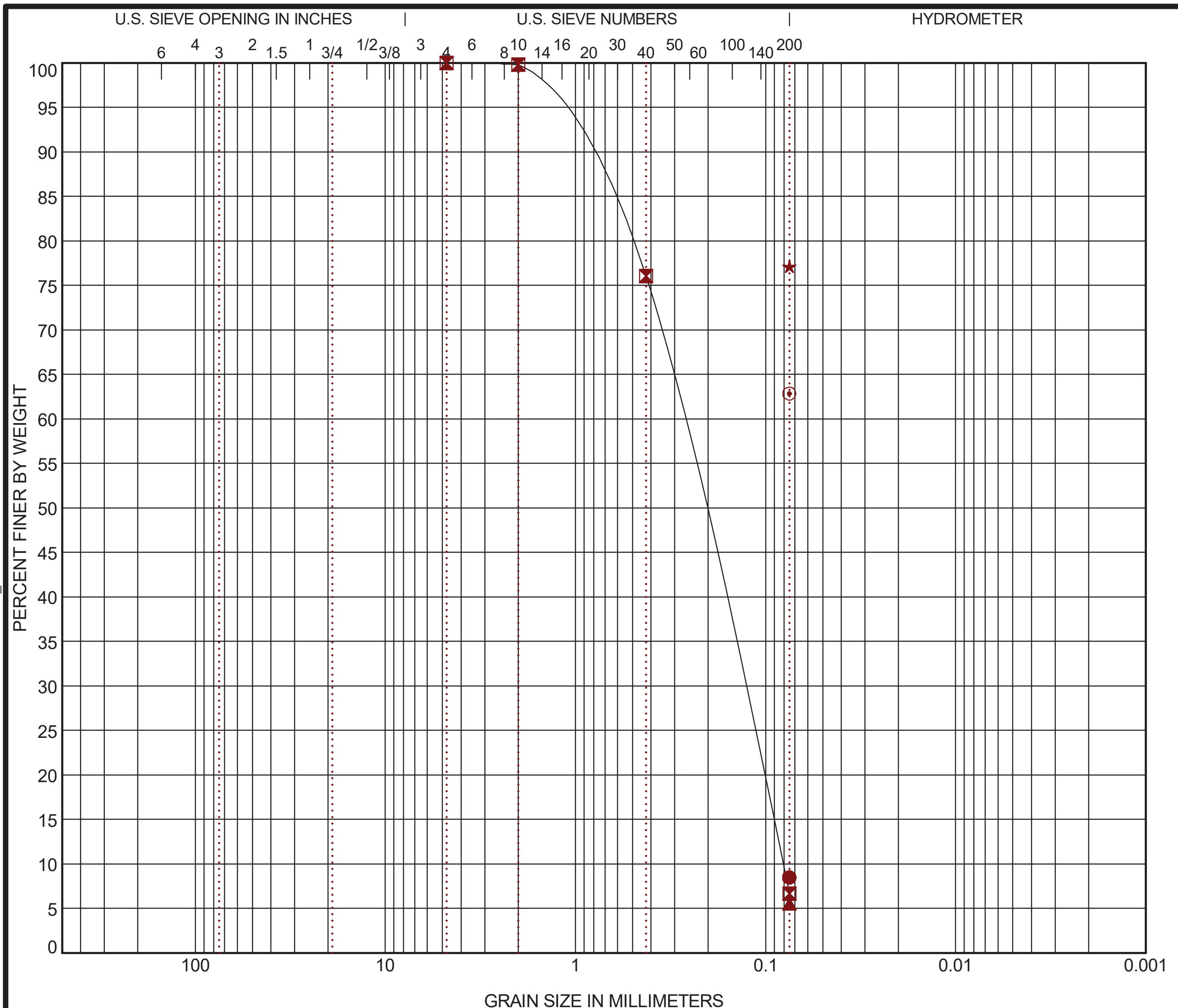
PROJECT NUMBER: 35215136

CLIENT: Arkansas Department of Transportation
Little Rock, Arkansas

EXHIBIT: B-10

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth	AASHTO Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-7	58.5 - 60		21.4					
⊠	B-7	68.5 - 70		19.7				0.78	3.49
▲	B-7	88.5 - 89.9		11.6					
★	B-8	3.5 - 5	A-6 (12)	17.6	35	18	17		
⊙	B-8	8.5 - 10	A-6 (7)	17.8	28	12	16		

	Boring ID	Depth	D_{100}	D_{90}	D_{50}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-7	58.5 - 60	0.075				0.0	0.0		8.5	
⊠	B-7	68.5 - 70	4.75	1.054	0.221	0.081	0.0	93.3		6.7	
▲	B-7	88.5 - 89.9	0.075				0.0	0.0		5.5	
★	B-8	3.5 - 5	0.075				0.0	0.0		77.1	
⊙	B-8	8.5 - 10	0.075				0.0	0.0		62.9	

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

SITE: Route 86
Hickory Plains, Arkansas

Terracon
25809 I 30
Bryant, AR

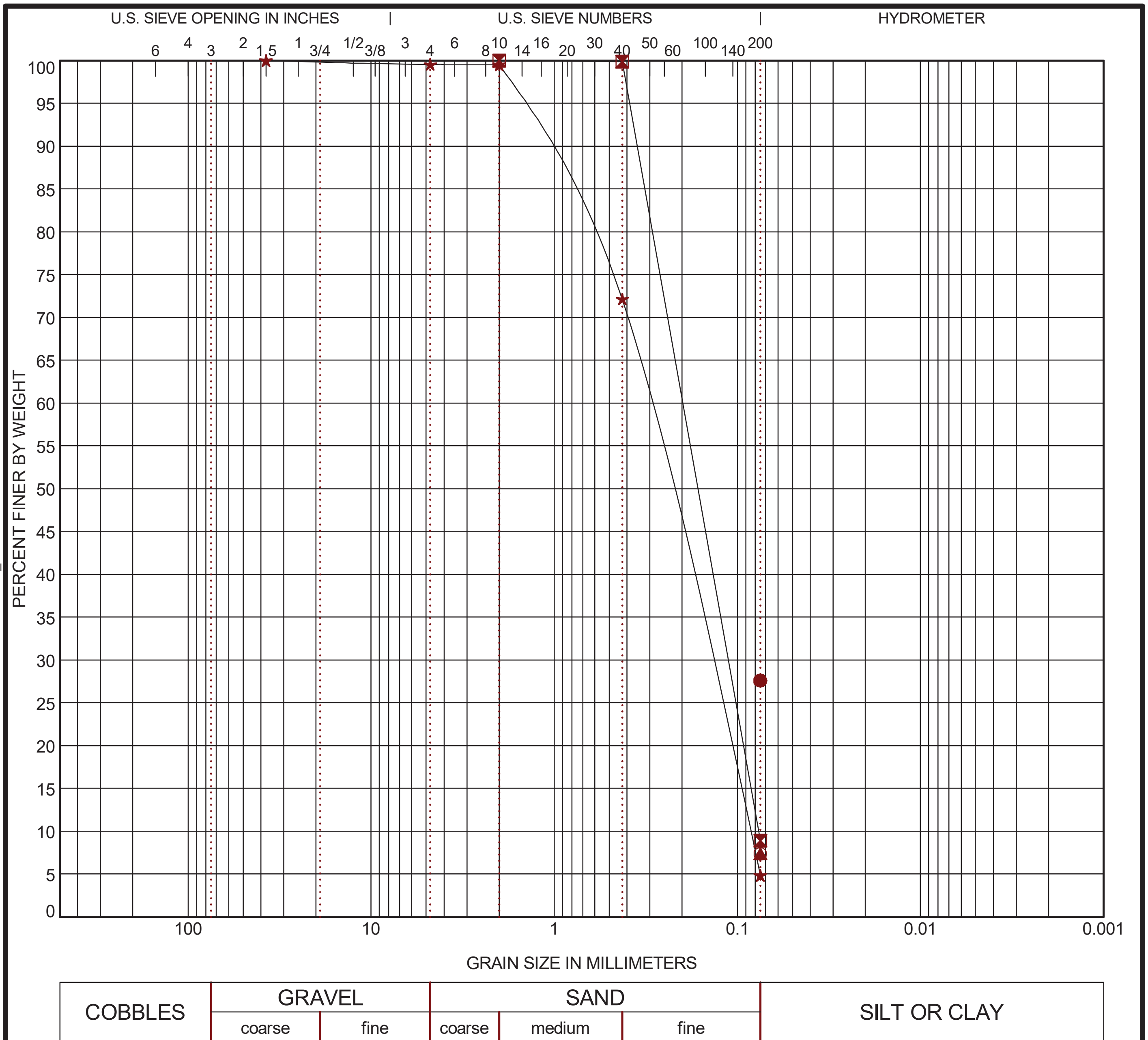
PROJECT NUMBER: 35215136

CLIENT: Arkansas Department of Transportation
Little Rock, Arkansas

EXHIBIT: B-11

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



	Boring ID	Depth	AASHTO Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-8	23.5 - 25		20.2					
⊠	B-8	33.5 - 35		17.4				0.83	2.59
▲	B-8	48.5 - 50		18.2					
★	B-8	68.5 - 70		18.9				0.77	3.63
⊙	B-8	78.5 - 80		18.5					

	Boring ID	Depth	D_{100}	D_{90}	D_{50}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-8	23.5 - 25	0.075				0.0	0.0		27.6	
⊠	B-8	33.5 - 35	2	0.352	0.164	0.077	0.0	91.1		8.9	
▲	B-8	48.5 - 50	0.075				0.0	0.0		7.4	
★	B-8	68.5 - 70	37.5	1.167	0.24	0.086	0.4	94.7		4.8	
⊙	B-8	78.5 - 80	0.075				0.0	0.0		7.4	

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

SITE: Route 86
Hickory Plains, Arkansas

Terracon
25809 I 30
Bryant, AR

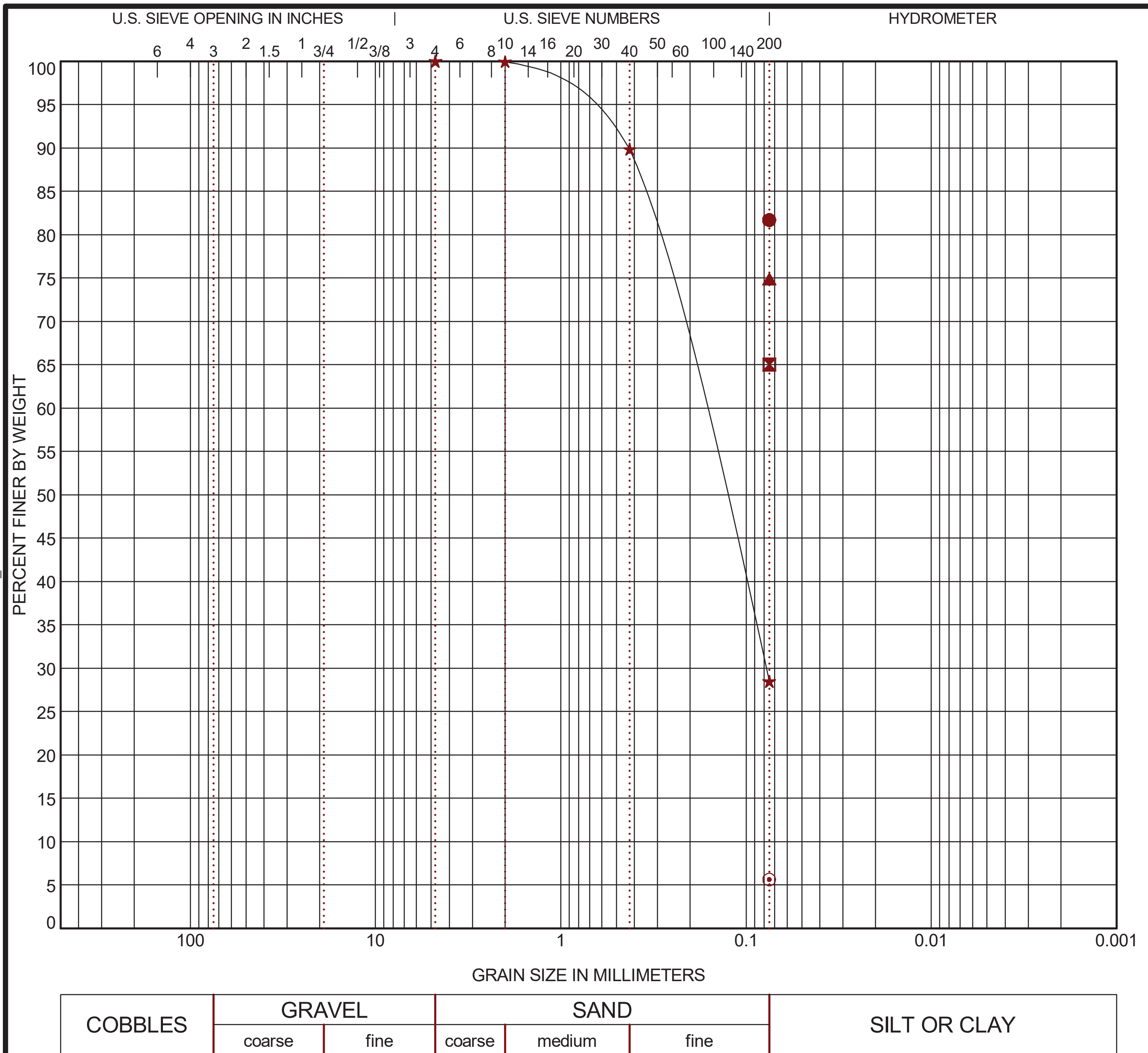
PROJECT NUMBER: 35215136

CLIENT: Arkansas Department of Transportation
Little Rock, Arkansas

EXHIBIT: B-12

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



Boring ID	Depth	AASHTO Classification	WC (%)	LL	PL	PI	Cc	Cu
● B-9	2 - 3.5	A-6 (17)	17.2	39	17	22		
⊠ B-9	8.5 - 10	A-6 (7)	20.4	27	12	15		
▲ B-9	18.5 - 20		21.0					
★ B-9	28.5 - 30		17.4					
⊙ B-9	43.5 - 45		15.4					

Boring ID	Depth	D_{100}	D_{90}	D_{50}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
● B-9	2 - 3.5	0.075				0.0	0.0		81.7	
⊠ B-9	8.5 - 10	0.075				0.0	0.0		65.0	
▲ B-9	18.5 - 20	0.075				0.0	0.0		74.9	
★ B-9	28.5 - 30	4.75	0.433	0.138		0.0	71.5		28.5	
⊙ B-9	43.5 - 45	0.075				0.0	0.0		5.6	

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.

SITE: Route 86
Hickory Plains, Arkansas

Terracon
25809 I 30
Bryant, AR

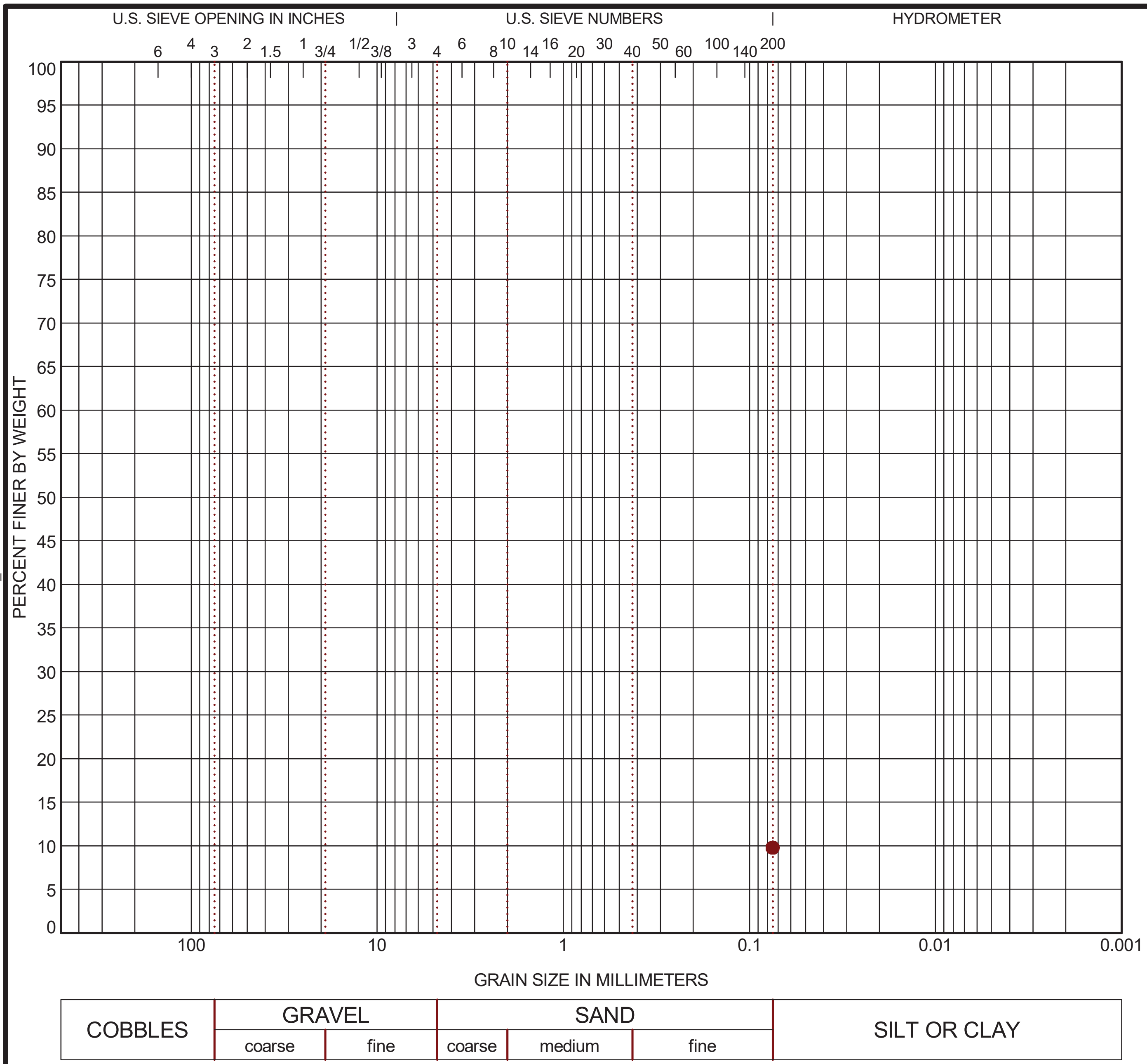
PROJECT NUMBER: 35215136

CLIENT: Arkansas Department of Transportation
Little Rock, Arkansas

EXHIBIT: B-13

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



Boring ID	Depth	AASHTO Classification	WC (%)	LL	PL	PI	Cc	Cu
● B-9	58.5 - 60		16.3					

Boring ID	Depth	D_{100}	D_{90}	D_{50}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
● B-9	58.5 - 60	0.075				0.0	0.0		9.8	

PROJECT: Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs.	Terracon 25809 I 30 Bryant, AR	PROJECT NUMBER: 35215136
SITE: Route 86 Hickory Plains, Arkansas		CLIENT: Arkansas Department of Transportation Little Rock, Arkansas
		EXHIBIT: B-14

SUPPORTING INFORMATION

Contents:

Note: All attachments are one page unless noted above.

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

Job No. 061614 Wattensaw Bayou & Relief Strs. & Apprs. ■ Hickory Plains, Arkansas

Terracon Project No. 35215136

Terracon GeoReport

SAMPLING	WATER LEVEL		FIELD TESTS	
☒ Standard Penetration Test	▽	**Water Initially Encountered**	**N**	**Standard Penetration Test Resistance (Blows/Ft.)**
	▽	**Water Level After a Specified Period of Time**	**(HP)**	**Hand Penetrometer**
	▼	**Water Level After a Specified Period of Time**	**(T)**	**Torvane**
		Cave In Encountered	**(DCP)**	**Dynamic Cone Penetrometer**
	Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.		**UC**	**Unconfined Compressive Strength**
			(PID)	**Photo-Ionization Detector**
			(OVA)	**Organic Vapor Analyzer**

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

LOCATION AND ELEVATION NOTES

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	**Standard Penetration or N-Value Blows/Ft.**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength Qu, (tsf)**	**Standard Penetration or N-Value Blows/Ft.**
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

RELEVANCE OF SOIL BORING LOG

The soil boring logs contained within this document are intended for application to the project as described in this document. Use of these soil boring logs for any other purpose may not be appropriate.

UNIFIED SOIL CLASSIFICATION SYSTEM

Terracon GeoReport

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification: Group Symbol	Soil Classification: Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]		GW	Well-graded gravel [F]
			$Cu < 4$ and/or $[Cc<1$ or $Cc>3.0]$ [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F, G, H]
			Fines classify as CL or CH		GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]		SW	Well-graded sand [I]
			$Cu < 6$ and/or $[Cc<1$ or $Cc>3.0]$ [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G, H, I]
			Fines classify as CL or CH		SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	$PI > 7$ and plots on or above "A"		CL	Lean clay [K, L, M]
			$PI < 4$ or plots below "A" line [J]		ML	Silt [K, L, M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay [K, L, M, N]
			Liquid limit - not dried			Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K, L, M]
			PI plots below "A" line		MH	Elastic Silt [K, L, M]
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay [K, L, M, P]
			Liquid limit - not dried			Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains $\geq$ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains $\geq$ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains $\geq$ 30% plus No. 200 predominantly sand, add "sandy" to group name.

[M] If soil contains $\geq$ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] $PI \geq 4$ and plots on or above "A" line.

[O] $PI < 4$ or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.