ARKANSAS DEPARTMENT OF TRANSPORTATION

SUBSURFACE INVESTIGATION

STATE JOB NO. CA1003

FEDERAL AID PROJECT NO. 9991

HWY. 67 – HWY. 141 (WIDENING) (S)

STATE HIGHWAY 412 SECTION 7 & 8

IN LAWRENCE & GREENE 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.

Geotechnical Engineering Report

Revision 1
AHTD Job No. CA 1003
Highway 412 Light Bypass
Highway 67 – Highway 141 (Widening) (S)
FAP NO.9991
Lawrence and Greene Counties, Arkansas
January 24, 2018
Terracon Project No. 35135121

Prepared for:
Atkins North America, Inc.
Dallas, Texas

Prepared by:
Terracon Consultants, Inc.
Little Rock, Arkansas

January 24, 2018

Terracon

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Re: Geotechnical Engineering Report, Revision 1
AHTD Job No. CA1003
Highway 412 Light Bypass
Highway 67 – Highway 141 (Widening) (S)
FAP No. 9991
Lawrence and Greene Counties, Arkansas
Terracon Project No. 35135121

Dear Ms. Romero:

Terracon Consultants, Inc. (Terracon) has completed the geotechnical engineering services for the above-referenced project. The project was authorized per the Master Services Agreement signed December 16, 2011. This report presents the findings of the field exploration performed for AHTD Job No. CA1003 Highway 412 Light Bypass in Lawrence and Greene Counties, Arkansas.

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 12/31/2019

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STATE OF ARKANSAS
1/24/2018
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LAWRENCE AND GREENE COUNTIES, ARKANSAS

Terracon Project No. 35135121

January 24, 2018

1.0 INTRODUCTION

This report presents the results of the geotechnical engineering services performed for the AHTD Job No. CA 1003 Light Bypass along Highway 412 in Lawrence and Greene Counties, Arkansas. Terracon prepared a Shoulder Survey Report, dated September 26, 2016, for the Highway 412 alignment, excluding the Light Bypass section. Seventeen exploratory borings extending to depths of approximately 4 to 40 feet below existing ground surface were drilled in the planned Light Bypass alignment for this report. The boring logs, site plan and boring location plan are presented in the Appendix.

2.0 PROJECT INFORMATION

2.1 Project Description

Item	Description
Site layout	See Appendix A Site Location Plan, Exhibit A-1 Boring Location Plans, Exhibits A-2 through A-4
Structures	We understand the overall project involves widening about 14.4 miles of Highway 412 between Highway 67 and Highway 141 in Lawrence and Greene Counties, Arkansas. The Light Bypass, for which this report was prepared, will involve constructing a new four-lane highway (two lanes each direction) to the south of the existing Highway 412 alignment. Construction will include: n new asphaltic concrete pavement n new drainage culverts n culverts

2.2 Site Location and Description

Item	Description
Location	See Appendix A, Exhibit A-1, Site Location Plan Approximately between Sta. 556+00 and Sta. 705+00 Approximately 2.8 miles in Greene County, Arkansas.
Existing improvements	Two-lane Highway 412 at east and west ends of proposed bypass. The existing pavement is asphaltic concrete with paved shoulder on both sides of the highway. The bypass route is farmland, with ground cover of exposed soil, agricultural crops or grass, and a few relatively small areas of tree growth. Arkansas Highway 228 and a few unpaved farm roads cross the bypass route.
Grading	Based on the Final Plans and Profiles, the Light Bypass will require engineered fill to raise the grade above the floodplain. We estimate maximum cuts and fills of about 7 feet and 13 feet, respectively, based on the Final Plans. Final slopes are designed at or less than 3H:1V, typically at 3H:1V and 6H:1V

3.0 SUBSURFACE CONDITIONS

3.1 Geology

Formation [1]	Description [2]
Terrace Deposits **Quaternary Period** **Pleistocene Epoch**	The terrace deposits include a complex sequence of unconsolidated gravels, sandy gravels, sands, silty sands, silts, clayey silts, and clays. The individual deposits are often lenticular and discontinuous. At least three terrace levels are recognized with the lowest being the youngest. Fossils are rare. The lower contact is unconformable and the thickness is variable.
Dune Sand **Quaternary Period** **Pleistocene Epoch**	The sand dunes generally consist of homogeneous, massive, well-sorted, tan or buff to grayish- or reddish-brown, fine sands. Cross-stratification and bedding features are lacking in the interval, apparently due to extensive weathering and biogenic reworking. These sands are thought to be derived from glacial outwash originally deposited along major drainages during the initial stages of interglacial times. The dunes are best developed on the east sides of the White, Current, and Black Rivers. The dune sand fines with distance from these rivers. Dunes are present on all terrace levels, but not on present-day alluvium. No significant fossils have been discovered associated with these sands. The lower contact seems to be unconformable in most places.

1. "Geologic Map of Arkansas", published by the United States Geological Survey, 1993.
2. "Stratigraphic Summary of Arkansas", published by the Arkansas Geological Commission, 1998.

Based on the information published in the USDA Natural Resources Conservation Service "Soil Survey of Greene County, Arkansas" the site can be broadly divided into three soil map units.

Greene County

Foley-Bonn Complex – This complex is typically found along stream terraces. The surface layer is comprised of dark grayish brown silt loam about 3 inches thick. Gray silt loam with iron accumulations underlie the surface layer and measures about 11 inches thick. From 14 to 23 inches, gray silty clay loam and light brownish gray silt loam is found. Gray silty clay loam with iron accumulations underlie this layer and is typically found between 23 to 37 inches. Finally at 37 to 72 inches lies grayish brown silt loam with iron accumulations.

Forestdale Silty Clay Loam – This soil consists of poorly drained soils that formed in the stratified beds of loamy and clayey alluvium. It is found on old natural levees. The surface layer is dark grayish-brown to light brownish-gray silt loam, 4 to 7 inches thick. The subsoil is

gray or grayish-brown silty clay underlain by gray or light brownish-gray loam to sand. It has slow permeability and moderate water capacity.

Wiville Fine Sandy Loam - The Wiville series consists of very deep, well drained, moderately permeable soils that formed in eolian deposits. In a representative profile the surface layer consists of 5 inches of dark yellowish brown fine sandy loam. From 5 to 11 inches; dark yellowish brown fine sandy loam. Underlying this layer, from 11 to 18 inches is brown fine sandy loam. Brown fine sandy loam is found at 18 to 27 inches. Beneath this layer from 27 to 56 inches brown sandy clay loam with a blocky structure is observed. From 56 to 64 inches dark yellowish brown fine sandy loam can be seen. Finally the underlying material consists of yellowish brown fine sand at a depth of 72 inches or more.

The soil map units described in this section were obtained by locating the subject site on available large-scale soil survey maps. Due to the scales involved, precise location of the borings on the mapped soil units can be difficult to determine. In addition, the large scale soil survey maps describe only general trends. Local variations are possible and site-specific soil conditions may differ from those described above. A site-specific detailed soil survey was not included in our scope of work for this project.

3.2 Typical Profile

Based on the results of the borings, subsurface conditions at the pavement borings are comprised of silty clays, lean clay with varying amounts of sand, fat clays, clayey sands, silt, silty sands and poorly graded sands with variable amounts of clay. Conditions and details observed at the boring locations are indicated on the boring logs included in Appendix A. Stratification boundaries on the boring logs represent the approximate location of changes in soil types; in-situ, the transition between materials may be gradual.

Atterberg limits (liquid limit and plastic limit) tests were performed on selected samples of cohesive native soils. The tested native soils were classified as having low to high plasticity with liquid limits ranging between 21 and 54 and plasticity indices ranging between 6 and 40. The laboratory test results are shown on the boring logs in Appendix A. A description of the laboratory testing program is provided in Appendix B.

3.3 Groundwater

The boreholes were observed while drilling and after completion for the presence and level of groundwater. Groundwater was observed in Borings B-61BP, B-63BP, B-64BP, and B-65BP a depths of about 9 to 13.5 feet below the existing ground surface while drilling. Groundwater was not observed in the other borings while drilling or at times of about 24 hours after completion. Water level observations in the boreholes can be found on the boring logs included with this report.

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 indicated on the boring logs. Longer observation in piezometers or observation wells sealed from the influence of surface water are often required to define groundwater levels in these soil types. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

3.4 Bypass Subgrade Soil

Terracon drilled a total of 17 borings, designated as B-60BP through B-76BP, for this project at the approximate locations shown on the attached boring location plans in Appendix A. The borings were drilled within the proposed bypass right-of-way and spaced approximately 800 feet along the alignment. The boring locations were selected in consultation with the client, and were generally located in the turn rows of existing crop fields.

Water content and classification tests were performed on selected soil samples obtained from the borings. Classification, moisture-density relationship (standard Proctor) and resilient modulus tests were performed on the three bulk samples representing the major pedological map units obtained from various locations. The results of these tests are presented in Appendix B. Based on the results of the laboratory testing, the anticipated upper subgrade soils in pavement areas represented by Borings B-60BP through B-68BP have AASHTO classifications predominantly of A-4, while upper soils in areas represented by Borings B-69BP through B-76BP are predominantly A-6 and A-7-6 soils.

4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

4.1 Geotechnical Considerations

Based upon the field penetration resistance values, moisture content values and the classification test results, it is our opinion that the native soils or new engineered fill should be able to support new pavements.

Low-strength (SPT N-values of 5 blows per foot or less) soils were observed at some of the borings at various depths below the existing ground surface. A summary of the low-strength areas is presented in the following table:

Boring Locations	Weak Soil Thickness (ft)
B-63BP	2 – 3.5
B-68BP	8.5 - 10
B-71BP	3.5 – 11.5 (below termination depth)

Additionally, the lean clay and silty lean clay soils encountered at this site are susceptible to strength loss with moisture content increases and when subjected to repeated construction traffic. In their present condition, the low-strength soils are not suitable for supporting new fill or pavements. We expect that ground improvement will be required, and difficult construction conditions will exist during site preparation and grading due to the presence of the near-surface, low-strength soils. Ground improvement alternatives are discussed in Section **4.2 Earthwork.** We strongly recommend the geotechnical engineer be retained to evaluate the site conditions during site grading and construction and provide ground improvement recommendations based on the actual conditions. The pavement subgrade soils should be evaluated, tested and improved as necessary as described in this report.

Fat clay soils were observed from the surface to a depth of about 2 feet in Boring B-72BP. The fat clays have high plasticity and are subject to shrinking and swelling with variations in moisture content. These shrink/swell movements can be detrimental to pavement surfaces. Although it may not be possible to eliminate all shrink/swell movement of the fat clay soils, we recommend removing the fat clay soils to a minimum depth of 2 feet below finished pavement subgrade elevation and replacing the fat clay soils with a low-volume change, engineered fill to reduce the amount of shrink/swell movement of the subsurface soils.

Highway construction for this project should be performed in accordance with applicable sections of the Arkansas Highway and Transportation Department (AHTD) Standard Specification for Highway Construction, 2014 edition.

4.2 Earthwork

Earthwork should be performed as required in the AHTD Standard Specifications for Highway Construction, 2014 edition. The following presents general recommendations for site preparation, excavation, subgrade preparation and placement of engineered fills on the project. The evaluation of earthwork should include overexcavation operations, observation and testing of engineered fills, subgrade preparation, and other geotechnical conditions exposed during construction of the project.

4.2.1 Site Preparation

Where new pavement is planned, all surface vegetation, topsoil, existing pavements, tree roots and stumps and any surface or subsurface structures from previous site use should be removed full-depth. The borings were conducted mainly in agricultural fields that contained disturbed surficial soils within a till zone. We estimated the till zone was about 1 foot thick. Excavations resulting from the removal of any surface or subsurface structures should be cleaned of all loose and disturbed material before placing fill. As previously discussed, surficial fat clay soils were observed to a depth of about 2 feet below the existing ground surface near Boring B-72BP. Where exposed in the pavement subgrade after stripping, we recommend removing and replacing the fat clay soils with new engineered fill to a minimum depth of 2 feet below the

planned finished subgrade elevation. Soils containing organic matter, debris or deleterious matter should not be used as engineered fill.

Drainage ditches that are disturbed during construction will need to be drained of any water and mucked out to remove all low-strength soils. All organic and deleterious material should be removed full-depth. Fills placed within the drainage ditch should be benched into the ditch side slopes as the fill placement progresses vertically. The benches should be cut at an equivalent 6H:1V slope. For example, each bench cut 1 foot deep should be at least 6 feet wide. Additionally, the benches should be wide enough for proof-rolling and compaction equipment to sufficiently compact new fill to meet the compaction requirements in Section **4.2.3 Compaction Requirements**.

Areas requiring new fill placement should be initially graded to create a relatively level surface to receive fill and to provide for a relatively uniform thickness of fill beneath the roadway. The exposed subgrade should be proof-rolled with heavy construction equipment such as a loaded tandem-axle dump truck weighing at least 25 tons to aid in locating unstable subgrade materials and prior to placing fills to confirm there are no unstable areas that could prevent proper compaction of additional fills. If unstable areas are noted, the geotechnical engineer should be notified to provide supplemental recommendations.

All exposed subgrade areas, once properly cleared and effectively proof-rolled, should be scarified to a maximum depth of 12 inches, conditioned to near optimum moisture content and compacted. Subgrade soils exposed to the elements for an extended period of time should be checked for density and moisture content prior to placing additional fill and/or constructing pavements. During construction of the subgrade, exposed surfaces should be graded to prevent water from ponding adjacent to the existing roadway pavement and on the exposed subgrade.

We anticipate excavations for the proposed construction can be accomplished with conventional earthmoving equipment.

The stability of subgrade soils may also be affected by precipitation, repetitive construction traffic or other factors. If unstable conditions are encountered or develop during construction, workability can be improved by overexcavating the wet, unstable zones and moisture conditioning and recompacting that soil, or by removing and replacing full-depth with new engineered fill to provide stable subgrade soils. Use of lime could also be considered as a ground improvement treatment technique. Laboratory evaluation is recommended to determine the effect of chemical treatment on subgrade soils prior to construction. The use of lime is further discussed in Section **4.2.4 Lime Treated Subgrade**.

4.2.2 Import Material Specifications

Fill materials should be free of organic matter and debris. Clean, on-site soils or approved imported borrow materials may be used as fill material. The fat clay (CH) soils observed at

the Boring B-72BP exhibited a plasticity index value of 40, which is not suitable for use as engineered fill in the upper 2 feet of pavement subgrade. Most of the natural soils observed at the boring locations appear to be suitable for use as engineered fill. If it is desired to use the on-site fat clay soils as engineered fill for this project, we recommend limiting their use to depths greater than 2 feet below finished pavement subgrade elevation.

While the AHTD has no specific requirements for borrow materials, they do require that the materials must be capable of forming and maintaining a 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. Clay soils should exhibit well-defined moisture-density relationships.

We suggest that on-site soils or approved imported borrow soils should meet the following material property requirements:

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

- Plasticity Index……..20 (max)

4.2.3 Compaction Requirements

Engineered fill should be placed and compacted in horizontal lifts, using equipment and procedures that will produce recommended moisture contents and densities throughout the lift.

Item	Description
Fill maximum lift thickness	8 inches or less in loose thickness
Compaction requirements [1]	At least 95 percent of the material’s standard Proctor maximum dry density (AASHTO T 99) This density will not be required immediately adjacent to wingwalls of box culverts
Moisture content of cohesive material [1]	Within ±2 percentage points of the material’s optimum moisture content value as determined by the standard Proctor test (AASHTO T 99) at the time of compaction
Moisture content of granular material [2]	Workable moisture levels

Item	Description
1.	We recommend engineered fill be tested for moisture content and compaction during placement (AASHTO T-310 or AHTD Test Method 347 or 348). Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified moisture and compaction requirements are achieved.
2.	Specifically, moisture levels should be maintained low enough to allow for satisfactory compaction to be achieved without the fill material pumping when proof-rolled.

4.2.4 Lime Treated Subgrade

Low-strength (SPT N-values of 5 blows per foot or less) soils were encountered at some of the borings at varying depths below the existing ground surface. To improve the subgrade conditions, use of lime could be considered as a treatment technique, as outlined in Section 301 of AHTD Standard Specifications for Highway Construction, 2014 edition. The use of lime treatment is considered only as a ground improvement alternative. The lime-treated subgrade is not considered to be a structural component of the pavement section.

The lime should be mixed into the upper 12 inches of the soils exposed at plan finished subgrade elevations. Using this chemical additive, the effectiveness of the chemical treatment will be dependent on 1) the amount of lime used, 2) how thoroughly the lime is mixed into the native soils, and 3) the contractor adhering to time constraints for the mixing and compaction of the soil/lime mixture. The contractor should consider performing a test section to evaluate their proposed process and methods.

Based on the exposed soils consisting of lean clays and fat clays, we estimate that 6 to 8 percent lime, by dry weight of soil, will be required to lime-treat the on-site lean to fat clays. The actual amount should be evaluated in accordance with ASTM test method D 6276. The lime content determined by this test should be increased by 0.5 percentage point to allow for construction mixing. Additionally, laboratory evaluation is recommended to determine the effect of chemical treatment on subgrade soils prior to construction. The on-site clay soils could contain soluble sulfate sufficient to adversely react with the lime additive. Soluble sulfate tests run in accordance with TxDOT Test Method TEX 145-E should be performed to confirm soluble sulfate concentrations are less than 3,000 ppm.

Lime treatment of the subgrade soils should be completed in accordance with Section 301, “Lime Treated Subgrade,” Arkansas State Highway and Transportation Department (AHTD) Standard Specifications for Highway Construction, 2014 Edition. The lime additive should be thoroughly mixed into the native soils to a minimum depth of 12 inches below finished subgrade. Mixing of the soils with a rotary-type mixer is recommended to adequately combine the additive into the existing soils.

The mixing of the lime with the native soils is time-dependent due to the curing and hydration processes of the lime-treated soil material. A 48-hour hour cure time is recommended from

when the lime is added to the soil, mixed, and compacted to realize the full strengthening properties of the lime-treated subgrade. Construction traffic on the lime-treated soils should be avoided during curing. After curing, the lime-treated subgrade should be protected with a layer of aggregate base for a construction working surface. Per AHTD Standard Specifications, QA/QC testing for lime treated soils shall be in accordance with one (1) test per 12,000 square yards of subgrade area at a minimum depth of 8 inches.

4.2.5 Excavation and Trench Construction

Excavations into the on-site native soils may encounter caving soils and possibly groundwater, depending upon the final depth of excavation. The individual contractor(s) should be made responsible for designing and constructing stable, temporary excavations as required to maintain stability of both the excavation sides and bottom. All excavations should be sloped or shored in the interest of safety following local and federal regulations, including current OSHA excavation and trench safety standards.

Soils penetrated by the proposed excavations may vary significantly across the site. The soil classifications are based solely on the materials observed in the exploratory test borings. The contractor should verify that similar conditions exist throughout the proposed area of excavation. If different subsurface conditions are encountered at the time of construction, the actual conditions should be evaluated to determine any excavation modifications necessary to maintain safe conditions.

As a safety measure, it is recommended that spoil piles be kept a minimum lateral distance from the crest of the slope equal to no less than the slope height. The exposed slope face should be protected against the elements.

4.2.6 Utility Trench Backfill

All trench excavations should be made with sufficient working space to permit construction including backfill placement and compaction. It is strongly recommended that a qualified person provide full-time observation and compaction testing of trench backfill within pavement areas.

4.3 Cut and Fill Slopes

We understand that final cut and fill slopes will typically be constructed at a 3H:1V or 6H:1V inclination as shown on the Final Plans. Slopes constructed at a 3H:1V inclination and less than 10 feet high in the types of soils at this site generally exhibit a factor of safety in excess of 1.5 against short- and long-term global stability. The planned slopes appear to be reasonable for construction.

Soil slopes should be covered for protection from rain, and surface runoff should be diverted away from the slopes. For erosion protection, a protective cover of grass or other vegetation should be established on permanent soil slopes as soon as possible.

5.0 PAVEMENTS

5.1 Pavement Design

Resilient modulus testing was performed for each soil map unit identified in the Light Bypass alignment. The resilient modulus testing performed for the Light Bypass pavement subgrade soils yielded similar, slightly higher R-values than the R-values estimated for the pavement subgrade soils for the remaining portion of the Highway 412 widening project (see Terracon's Shoulder Survey Report for results, issued under separate cover). The resilient modulus tests for the three Light Bypass pavement subgrade soils are provided in Appendix B of this report. Based on these test results, the pavement section design alternatives issued on January 12, 2016, for the Highway 412 widening are considered suitable for designing the Light Bypass alignment pavements. No new pavement section design alternatives are provided in this report.

5.2 Pavement Subgrade Preparation

Based on the subsurface conditions observed at the boring locations and considering the subgrade is prepared as recommended in Section **4.2 Earthwork**, the pavement subgrade materials should consist of tested and approved native soils or new engineered fill.

Prior to evaluating the subgrade, all topsoil and vegetation should be removed from the construction area. We recommend the moisture content and density of the top 12 inches of the subgrade be re-evaluated and that it be proof-rolled within two days prior to placing aggregate base. Areas not in compliance with the required ranges of moisture or density should be moisture conditioned and recompacted. Particular attention should be paid to high traffic areas that were rutted and disturbed earlier and to areas where backfilled trenches are located. Areas where unsuitable conditions are located should be repaired by removing and replacing the materials with properly compacted fills.

5.3 Post-Construction Settlement of Pavement

Based on the planned grading shown in the Final Plans, the subsurface conditions observed at the boring locations, and by preparing the pavement subgrade per project specifications and this report, we expect that pavement settlement should be within project tolerance requirements.

6.0 BOX CULVERT RECOMMENDATIONS

6.1 Structure Descriptions and Locations

Item	Description
Location	See Appendix A, Exhibit A-1, Site Location Plan. Stations 605+29, 645+07, and 694+25
Culvert Construction	We understand that three box culverts are planned along the Light Bypass alignment n At Station 605+29 (Boring B-65BP) a triple-cell (7-foot x 4-foot x 128-foot) reinforced concrete box culvert will be installed n At Station 645+07 (Boring B-70BP) a triple-cell (9-foot x 9-foot x 121-foot) reinforced concrete box culvert will be installed n At Station 694+25 (Boring B-76BP) a quad-cell (8-foot x 6-foot x 148-foot) reinforced concrete box culvert will be installed
Grading	Based on the Final Plans, backfills on the order of 5 to 10 feet will be required in the immediate vicinity of the planned box culverts

6.2 Box Culvert Construction Considerations

Site preparation, import material specifications, and compaction requirements should follow the recommendations stated in Section **4.2 Earthwork.** The following recommendations are specific to the construction of box culverts as specified for the completion of the Light Bypass alignment.

6.2.1 Excavation and Trench Construction

Excavations into the on-site fill materials and native soils may encounter caving soils and possibly groundwater, depending upon the final depth of excavation. The individual contractor(s) should be made responsible for designing and constructing stable, temporary excavations as required to maintain stability of both the excavation sides and bottom. All excavations should be sloped or shored in the interest of safety following local and federal regulations, including current OSHA excavation and trench safety standards.

Soils penetrated by the proposed excavations may vary significantly across the site. The soil classifications are based solely on the materials observed in the exploratory test borings. The contractor should verify that similar conditions exist throughout the proposed area of excavation. If different subsurface conditions are encountered at the time of construction, the actual conditions should be evaluated to determine any excavation modifications necessary to maintain safe conditions.

We recommend that spoil piles be kept a minimum lateral distance from the crest of the slope equal to no less than the slope height. The exposed slope face should be protected against the elements.

6.2.2 Utility Trench Backfill

All trench excavations should be made with sufficient working space to permit construction including backfill placement and compaction. We strongly recommend that a qualified person provide full-time observation and compaction testing of trench backfill within the box culvert areas.

6.3 Culvert Subgrades and Wing Wall Foundations

Based on the subsurface conditions encountered at the culvert borings, we expect native lean clay soils, clayey sand or poorly graded sand soils will be present at the three culvert and wing wall strip footing bearing levels. The box culverts are designed to bear on a minimum 2-foot thick layer of foundation backfill material constructed on stable soils.

The combined traffic surcharge, the weight of the culvert and the weight of fill materials placed beside and on top of the culvert will result in stress increase within the soil profile below the culvert, which could result in settlement and consolidation of soils below the culvert.

For the culvert planned at Station 605+29 (Boring B-65BP), the culvert foundation bearing materials are underlain by medium dense clayey sand soils. Poorly graded sand soils were observed below the clayey sand stratum to the termination depth. Based on the subsurface conditions at the boring location and our analysis, we estimate less than 1 inch of post-construction settlement of the culvert.

For the culvert planned at Station 645+07 (Boring B-70BP), the culvert foundation bearing soils are underlain by medium dense, poorly graded sand soils to the termination depth of the boring. The 2 feet of engineered fill is the only source of potential settlement due to consolidation. Based on the subsurface conditions at the boring location and our analysis, we estimate less than 1 inch of post-construction settlement of the culvert.

For the culvert planned at Station 694+25 (Boring B-76BP), the culvert foundation bearing soils are underlain by an approximately 1.5-foot thick layer of very stiff lean clay overlying medium dense to dense clayey sand soils to a depth of about 38.5 feet. The native lean clay soils could potentially consolidate with time and be a source of settlement. Based on the subsurface conditions at the boring location and our analysis, we estimate about 1/2 inch of immediate settlement could occur in the sand soils during construction, and about 1 inch of post-construction settlement due to consolidation of the native lean clay soils beneath the culvert. If the box culvert cannot tolerate the estimated 1-1/2 inches of settlement, we recommend overexcavating the lean clay soils remaining after excavating for the foundation backfill material to reach the underlying granular soils, and replacing them with compacted engineered fill.

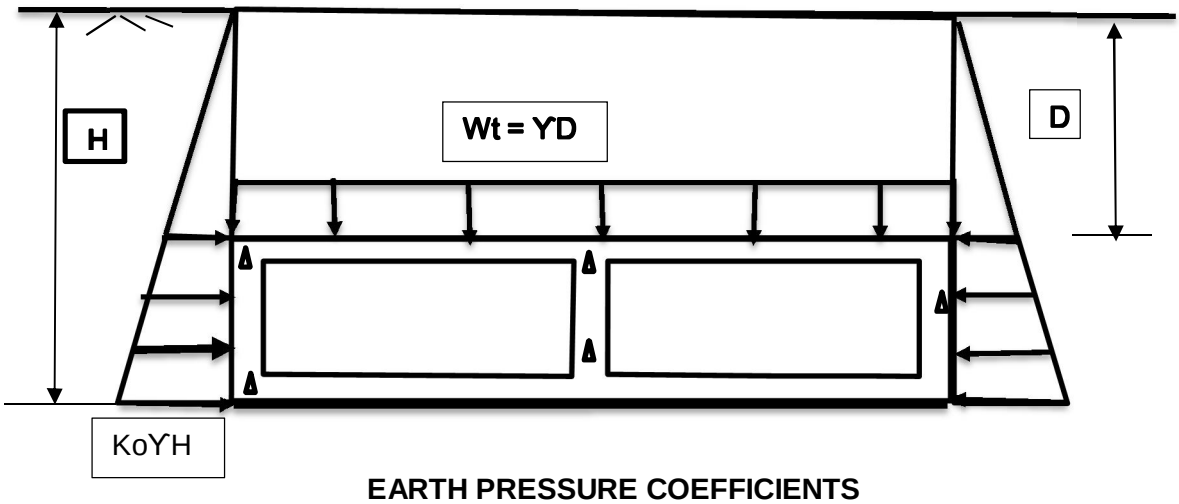
6.3.1 Culvert and Wing Wall Construction Considerations

Water may be encountered near or above the planned culvert slab bearing levels. It will be imperative that the water in the ditches/creeks and any surface water be collected and diverted away from planned culverts to allow construction to occur "in the dry." As an alternative, upstream retention of the creek water and pumping could be considered.

Unsuitable soils should be removed and replaced as recommended in Section **4.2 Earthwork.** The bearing surface for the culvert base slabs should be free of water and loose/soft soil prior to placing the culverts. The culvert subgrade soils should be proof-rolled, if possible, prior to placement of new culverts. Should the materials at bearing level become excessively dry, disturbed, saturated, or frozen and they cannot be satisfactorily improved in-place by scarification, moisture conditioning and compaction, the affected soils should be completely removed and replaced with new engineered fill prior to placing the culverts. Engineered fill placed below the culvert base slabs may consist of the materials indicated in Section **4.2.2 Import Material Specifications.**

6.3.2 Lateral Earth Pressures

Earth pressures will be influenced by structural design of the walls, conditions of wall restraint, methods of construction and/or compaction and the strength of the materials being restrained. We understand the culvert and wing walls will be designed using the "at-rest" earth pressure condition. The at-rest condition considers no wall rotation and would be applicable for culvert walls and their structurally connected wing walls. The recommended design lateral earth pressures do not include a factor of safety and do not provide for possible hydrostatic pressure on the walls.



EARTH PRESSURE COEFFICIENTS

Earth Pressure Conditions	Coefficient for Backfill Type	Equivalent Fluid Weight (kcf)	Surcharge Pressure, P_1 (ksf)	Earth Pressure, P_2 (ksf)
At-Rest (Ko)	**Granular**			
	(0.5)	0.055	(0.5)S	(0.055)H
	Fine Grained			
	(0.6)	0.065	(0.6)S	(0.065)H
Active (Ka)	**Granular**			
	(0.3)	0.033	(0.3)S	(0.033)H
	Fine Grained			
	(0.4)	0.050	(0.4)S	(0.050)H

Conditions applicable to the above conditions include:

- For active earth pressure, wall must rotate about base, with top lateral movements of about 0.002 H to 0.004 H, where H is wall height
- Uniform surcharge, where S is surcharge pressure
- In-situ soil backfill weight a maximum of 110 pcf and a friction angle of 30 degrees
- Horizontal backfill, compacted at about 95 percent of standard Proctor maximum dry density
- Loading from heavy compaction equipment not included
- No hydrostatic pressures acting on wall
- No dynamic loading
- No safety factor included in soil parameters

Backfill placed against structures should consist of granular soils. However, to prevent seepage along the culvert walls, we recommend constructing a clay plug consisting of compacted clay near the upstream end of the culvert. The clay plug should extend a minimum distance of 8 feet. For the granular values to be valid, the granular backfill must extend out from the base of the wall at an angle of at least 45 degrees from vertical for the at-rest case. To calculate the resistance to sliding, an ultimate coefficient of friction value of 0.34 should be used where the footing bears on native clay soils or new engineered fill. An appropriate resistance factor should be applied to the ultimate coefficient of friction.

6.4 Seismicity

The soil profile at the three culvert locations generally consists of medium stiff to very stiff lean soils underlain by medium dense clayey sands and poorly graded sands to maximum drilling depths of 40 feet. The high water table is within 5 to 10 feet of the existing ground surface. Given the nature of the clean underlying sands, shallow groundwater and proximity to the New Madrid Fault, the sandy soils at all of the culvert location are considered to be potentially

liquefiable. During a seismic event, the liquefied soils develop very high pore water pressures and lose their strength and some amount of deformation in the structures should be expected.

7.0 GENERAL COMMENTS

Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to provide observation and testing services during grading, excavation, pavement construction and other earth-related construction phases of the project.

The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, 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. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental 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.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

APPENDIX A
FIELD EXPLORATION

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

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

Project Manager:	KAD
Drawn by:	KAD
Checked by:	SPB
Approved by:	DEP

Project No.	35135121
Scale:	AS SHOWN
File Name:	35135121
Date:	10/30/2017

Terracon
25809 I 30
Bryant, AR 72022-9313

SITE LOCATION PLAN

Proposed Highway 412 Widening

US Highway 412 Light Bypass
Light, Arkansas

Exhibit

A-1

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

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

Project Manager:	KAD
Drawn by:	KAD
Checked by:	SPB
Approved by:	DEP

Project No.	35135121
Scale:	AS SHOWN
File Name:	35135121
Date:	10/30/2017

Terracon
25809 I 30
Bryant, AR 72022-9313

EXPLORATION PLAN

Proposed Highway 412 Widening

US Highway 412 Light Bypass
Light, Arkansas

Exhibit

A-2

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

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

Project Manager:	KAD
Drawn by:	KAD
Checked by:	SPB
Approved by:	DEP

Project No.	35135121
Scale:	AS SHOWN
File Name:	35135121
Date:	10/30/2017

Terracon
25809 I 30
Bryant, AR 72022-9313

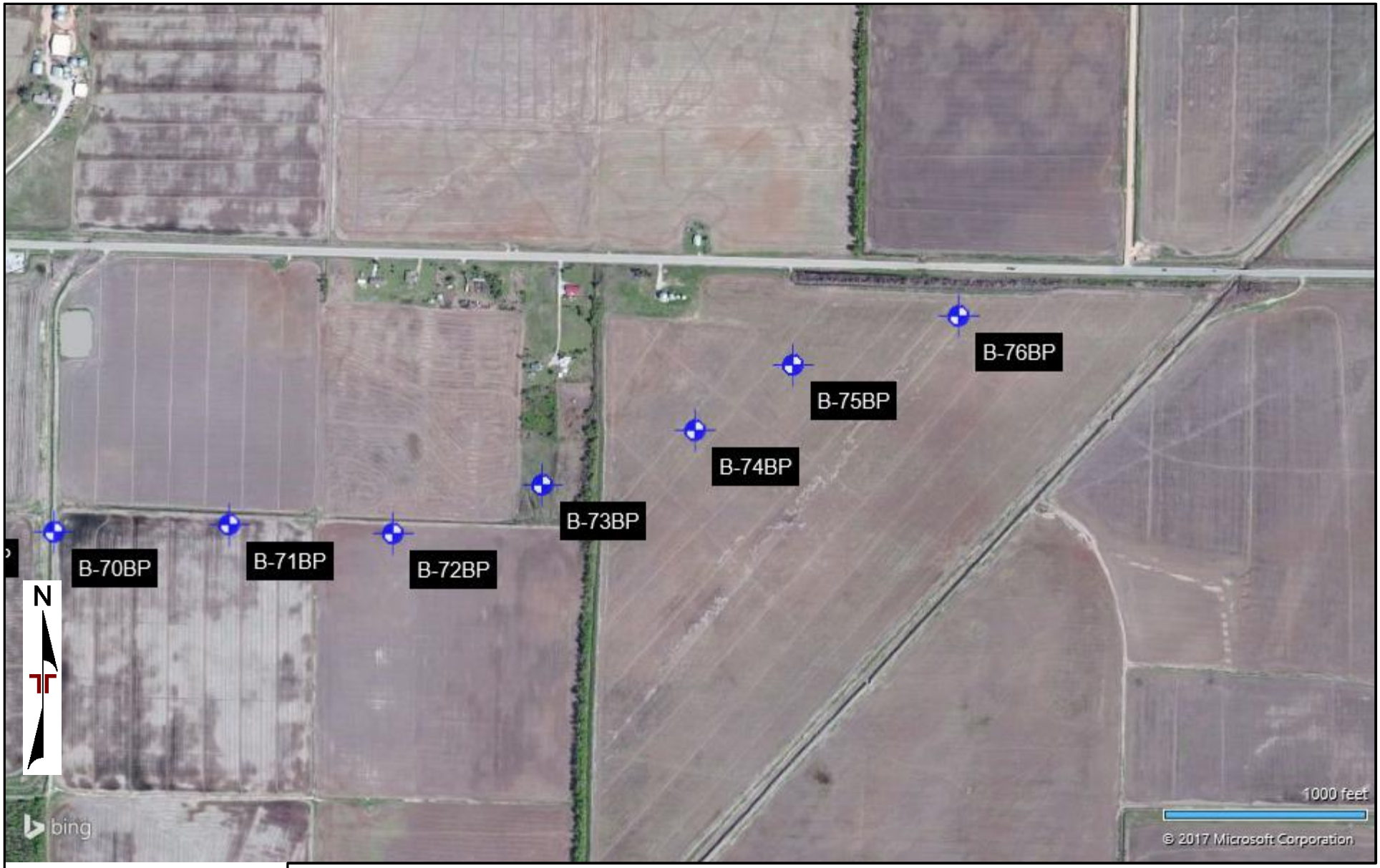
EXPLORATION PLAN

Proposed Highway 412 Widening

US Highway 412 Light Bypass
Light, Arkansas

Exhibit

A-3



AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

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

Project Manager:	KAD
Drawn by:	KAD
Checked by:	SPB
Approved by:	DEP

Project No.	35135121
Scale:	AS SHOWN
File Name:	35135121
Date:	10/30/2017

Terracon
25809 I 30
Bryant, AR 72022-9313

EXPLORATION PLAN

Proposed Highway 412 Widening

US Highway 412 Light Bypass
Light, Arkansas

Exhibit

A-4

Field Exploration Description

Seventeen borings were drilled at the site on October 16 through October 18, 2017. The borings were drilled to depths of about 10 to 40 feet below the ground surface at the approximate locations shown on the attached Boring Location Plans.

The boring locations were marked in the field by Terracon using a hand-held GPS at locations determined by Terracon. The borings were spaced approximately 800 feet apart in the proposed highway bypass alignment. The latitude and longitude of the locations are shown near the top of the boring logs. The locations of the borings should be considered accurate only to the degree implied by the methods used to define them.

Borings B-61BP through B-73BP and B-76BP were advanced with track-mount Acker drill rig using solid-stem flight augers. Standard penetration tests were performed to collect split-barrel samples. At the completion of the drilling activities, the boreholes were checked for the presence of groundwater and were backfilled with auger cuttings.

Borings B-60BP, B-74BP, and B-75BP were located in planted fields and were therefore advanced with a hand auger because access using the drill rig was restricted. Soil samples were taken in approximate 6-inch intervals and a dynamic cone penetrometer (DCP) was used on Boring B-60BP to approximate soil consistency or relative density.

In the split-barrel sampling procedure, the number of blows required to advance a standard 2-inch O.D. split-spoon sampler the last 12 inches of the typical total 18-inch penetration by means of a 140-pound standard hammer with a free fall of 30 inches, is the standard penetration resistance value (SPT-N). This value is used to estimate the in-situ consistency of cohesive soils and relative density of granular soils.

An automatic SPT hammer was used to advance the split-barrel sampler in the borings. A significantly greater efficiency is achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. This higher efficiency has an appreciable effect on the SPT-N value. The effect of the automatic hammer's efficiency has been considered in the interpretation and analysis of the subsurface information for this report.

The samples were tagged for identification, sealed to reduce moisture loss, and taken to our laboratory for further examination, testing, and classification.

Field logs were prepared by the drill crew. The logs included visual classifications of the materials encountered during drilling as well as the driller’s interpretation of the subsurface conditions between samples. The final boring logs included with this report represent the engineer's interpretation of the subsurface conditions at the boring locations based on field and laboratory data and observation of the samples.

Bulk samples of subgrade soils were obtained from depths of about 0 to 5 feet at all the boring locations. Three soil map units were identified and the bulk samples from Borings B-61BP, B-67BP, and B-76BP were selected and tested for compaction characteristics of soil and resilient modulus. Sample locations are shown on the respective test reports.

Our exploration services include storing the collected soil samples and making them available for inspection until after construction is completed. The samples will then be discarded unless requested otherwise.

Procedural standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practices or professional judgment.

BORING LOG NO. B-60BP

PROJECT: CA1003 Hwy 67 - Hwy 141 Light Bypass

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634295.69 Easting: 1676140.09

Surface Elev.: 258.5 (Ft.)

DEPTH	ELEVATION (Ft.)		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY HP (psf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		LEAN CLAY WITH SAND (CL), with roots, dark brown, very stiff				8-8-8/-6"		13	27-17-10	85
2.0	256.5	**LEAN CLAY (CL)**, trace sand, light gray to brown, medium stiff to stiff				5-3-4/-6"		30		
4.0	254.5	-Hand auger refusal at about 4 feet.				5-6-6/-6"		27		
		Auger Refusal at 4 Feet								

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

Advancement Method:
0-4: Hand auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

Northing and Eastings and Surface Elevations obtained from survey conducted by NTB on 11-30-2017. Boring B-60BP was located at the direction of a Terracon representative on site.
Boring B-60BP was located in a planted field and therefore advanced with a hand auger. A dynamic cone penetrometer was used to approximate soil consistency and/or relative density

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 10-18-2017	Boring Completed: 10-18-2017
Drill Rig: Hand Auger	Driller: TF
Project No.: 35135121	Exhibit: A-6

BORING LOG NO. B-61BP

PROJECT: CA1003 Hwy 67 - Hwy 141 Light Bypass

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 633900.09 Easting: 1676764.41

Surface Elev.: 261.5 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY HP (psf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
SILTY CLAY (CL-ML), trace sand, gray, brown and reddish-brown, stiff									
					7-5-4 N=9	4000 (HP)	12	21-15-6	85
2.8	259								
3.5 **CLAYEY SAND (SC)**, gray and brown, medium dense	258				6-7-5 N=12		12		
POORLY GRADED SAND WITH CLAY (SP-SC), fine to medium grained, brown and gray, loose to medium dense					6-5-4 N=9		14		
		5			6-5-7 N=12		15		
			▽						
10.0	251.5	10			4-5-5 N=10		15		
Boring Terminated at 10 Feet									

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with auger cuttings, bentonite and spider plug.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

Northing and Eastings and Surface Elevations obtained from survey conducted by NTB on 11-30-2017.

WATER LEVEL OBSERVATIONS

▽ *9 ft While Dry Drilling*

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 10-16-2017 Boring Completed: 10-16-2017

Drill Rig: Acker Renagade #679 Driller: TF

Project No.: 35135121 Exhibit: A-7

BORING LOG NO. B-62BP

PROJECT: CA1003 Hwy 67 - Hwy 141 Light Bypass

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 633490.61 Easting: 1677589.9

Surface Elev.: 260.3 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY HP (psf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY CLAY (CL-ML), mottled, gray, brown to dark gray, stiff								
2.0	258.5				10-7-5 N=12	5000 (HP)	9	27-20-7	93
	SILTY CLAY (CL-ML), gray to light gray, medium stiff to stiff				5-5-4 N=9	3500 (HP)	14		
		5			5-6-7 N=13	4000 (HP)	22		
					7-7-6 N=13	3500 (HP)	22		
	- with sand seams at about 8.5 feet								
10.0	250.5				3-3-3 N=6	1500 (HP)	19		
	Boring Terminated at 10 Feet	10							

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with auger cuttings, bentonite and spider plug.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

Northing and Eastings and Surface Elevations obtained from survey conducted by NTB on 11-30-2017.

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 10-16-2017 Boring Completed: 10-16-2017

Drill Rig: Acker Renagade #679 Driller: TF

Project No.: 35135121 Exhibit: A-8

BORING LOG NO. B-63BP

PROJECT: CA1003 Hwy 67 - Hwy 141 Light Bypass

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 633098.03 Easting: 1678388.35

Surface Elev.: 260.8 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY HP (psf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
SILTY CLAY (CL-ML), mottled, gray and brown, stiff, Piece of wood									
2.0	259				6-5-5 N=10	1500 (HP)	8	23-17-6	89
LEAN CLAY (CL), mottled, trace sand, light gray and brown, soft									
3.5	257.5				3-2-2 N=4	2000 (HP)	12		
LEAN CLAY (CL), mottled, trace sand, light gray and brown, stiff		5			2-4-4 N=8	3000 (HP)	20		
					3-5-5 N=10		15		
6.8	254								
POORLY GRADED SAND (SP), fine to medium grained, light gray and reddish-brown, loose			▽		2-4-4 N=8		18		
10.0	251	10							
Boring Terminated at 10 Feet									

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with auger cuttings, bentonite and spider plug.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

Northing and Eastings and Surface Elevations obtained from survey conducted by NTB on 11-30-2017.

WATER LEVEL OBSERVATIONS

▽ *9 ft While Dry Drilling*

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 10-16-2017 Boring Completed: 10-16-2017

Drill Rig: Acker Renagade #679 Driller: TF

Project No.: 35135121 Exhibit: A-9

BORING LOG NO. B-64BP

PROJECT: CA1003 Hwy 67 - Hwy 141 Light Bypass

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 632944.73 Easting: 1678844.34

Surface Elev.: 262.1 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY HP (psf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
SILTY CLAY (CL-ML), with roots, gray and light gray, stiff									
2.0	260				7-7-5 N=12		8	24-17-7	87
SILT (ML), trace sand, gray, light gray and brown, medium stiff to stiff					6-5-4 N=9	5000 (HP)	12		
5.0	257				4-3-3 N=6	2000 (HP)	11		
POORLY GRADED SAND WITH CLAY (SP-SC), light gray and brown, loose		5			3-3-4 N=7		14		
8.5	253.5								
CLAYEY SAND (SC), gray and brown, loose			▽		4-4-5 N=9		15		
10.0	252	10							
Boring Terminated at 10 Feet									

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with auger cuttings, bentonite and spider plug.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

Northing and Eastings and Surface Elevations obtained from survey conducted by NTB on 11-30-2017.

WATER LEVEL OBSERVATIONS

▽ *9 ft While Dry Drilling*

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 10-16-2017 Boring Completed: 10-16-2017

Drill Rig: Acker Renagade #679 Driller: TF

Project No.: 35135121 Exhibit: A-10

BORING LOG NO. B-65BP

PROJECT: CA1003 Hwy 67 - Hwy 141 Light Bypass

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 632934.46 Easting: 1679782

Surface Elev.: 262.2 (Ft.)

DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY HP (psf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		LEAN CLAY (CL), with roots, light gray, gray and brown, stiff								
2.0	260					6-6-5 N=11	3000 (HP)	12	28-19-9	89
		LEAN CLAY WITH SAND (CL), light gray and brown, medium stiff to stiff				4-3-3 N=6	4000 (HP)	13		
5.0	257					4-5-8 N=13	7000 (HP)	22		
		CLAYEY SAND (SC), light gray, light brown and brown, medium dense	5			10-12-12 N=24		9		
8.5	253.5									
		POORLY GRADED SAND (SP), fine to medium grained, trace clay, brown and light brown, medium dense				4-5-5 N=10		15		
			10	▽						
						5-7-8 N=15 no recovery		12		
18.5	243.5		15							
		POORLY GRADED SAND (SP), medium grained, gray and brown, medium dense				4-6-8 N=14		10		
			20							
						8-13-13 N=26		7		
			25							

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

Hammer Type: Automatic

Advancement Method:
0-40: Hollow stem auger

Abandonment Method:
Boring backfilled with auger cuttings, bentonite and spider plug.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

Northing and Eastings and Surface Elevations obtained from survey conducted by NTB on 11-30-2017.

WATER LEVEL OBSERVATIONS

▽ *13.5 ft While Dry Drilling*

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 10-17-2017 Boring Completed: 10-17-2017

Drill Rig: Acker Renagade #679 Driller: TF

Project No.: 35135121 Exhibit: A-11

BORING LOG NO. B-65BP

PROJECT: CA1003 Hwy 67 - Hwy 141 Light Bypass

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 632934.46 Easting: 1679782

Surface Elev.: 262.2 (Ft.)

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY HP (psf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		POORLY GRADED SAND (SP), medium grained, gray and brown, medium dense *(continued)*	30			8-10-13 N=23		9		
			35			7-6-6 N=12		9		
	40.0	222	40			9-9-10 N=19		17		
		Boring Terminated at 40 Feet								

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

Hammer Type: Automatic

Advancement Method:
0-40: Hollow stem auger

Abandonment Method:
Boring backfilled with auger cuttings, bentonite and spider plug.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *13.5 ft While Dry Drilling*

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 10-17-2017 Boring Completed: 10-17-2017

Drill Rig: Acker Renagade #679 Driller: TF

Project No.: 35135121 Exhibit: A-11

BORING LOG NO. B-66BP

PROJECT: CA1003 Hwy 67 - Hwy 141 Light Bypass

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 632926.53 Easting: 1680596.62

Surface Elev.: 261.7 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY HP (psf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
SANDY LEAN CLAY (CL), with roots, brown, medium stiff									
2.0	259.5				2-3-3 N=6		19	42-14-28	55
SANDY LEAN CLAY (CL), dark brown, gray and brown, medium stiff					3-4-3 N=7 low recovery				
					3-4-3 N=7	2500 (HP)	24		
		5			6-8-10 N=18	3000 (HP)	22		
6.0	255.5								
POORLY GRADED SAND WITH CLAY (SP-SC), fine grained, brown and gray, medium dense									
					4-5-7 N=12		7		
10.0	251.5	10							
Boring Terminated at 10 Feet									

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with auger cuttings and bentonite.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

Northing and Eastings and Surface Elevations obtained from survey conducted by NTB on 11-30-2017.

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 10-17-2017 Boring Completed: 10-17-2017

Drill Rig: Acker Renagade #679 Driller: TF

Project No.: 35135121 Exhibit: A-12

BORING LOG NO. B-67BP

PROJECT: CA1003 Hwy 67 - Hwy 141 Light Bypass

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 632928.8 Easting: 1681461.2

Surface Elev.: 262.0 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY HP (psf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
LEAN CLAY WITH SAND (CL), with roots, brown and gray, stiff to very stiff									
					5-6-7 N=13		20	34-23-11	81
					6-7-10 N=17		13		
3.5	258.5								
LEAN CLAY WITH SAND (CL), light gray and brown, hard					20-22-25 N=47	5000 (HP)	24		
5.5	256.5	5							
SILTY SAND (SM), fine grained, light gray and brown, medium dense to loose					20-13-9 N=22		14		
					2-3-4 N=7		12		
10.0	252	10							
Boring Terminated at 10 Feet									

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with auger cuttings, bentonite and spider plug.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

Northing and Eastings and Surface Elevations obtained from survey conducted by NTB on 11-30-2017.

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 10-17-2017 Boring Completed: 10-17-2017

Drill Rig: Acker Renagade #679 Driller: TF

Project No.: 35135121 Exhibit: A-13

BORING LOG NO. B-68BP

PROJECT: CA1003 Hwy 67 - Hwy 141 Light Bypass

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 632847.12 Easting: 1682194.05

Surface Elev.: 261.0 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY HP (psf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		LEAN CLAY (CL), with roots and trace sand, brown and light gray, stiff to very stiff								
						7-6-6 N=12		14	27-17-10	92
						7-8-9 N=17		13		
3.5	257.5	**LEAN CLAY (CL)**, gray, brown and reddish-brown, hard				28-30-29 N=59		19		
5.3	255.5	**CLAYEY SAND (SC)**, fine grained, gray, dense	5			26-21-19 N=40		11		
8.5	252.5	**POORLY GRADED SAND WITH CLAY (SP-SC)**, light brown and dark brown, loose				3-3-2 N=5		11		
10.0	251	***Boring Terminated at 10 Feet***	10							

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with auger cuttings and bentonite.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

Northing and Eastings and Surface Elevations obtained from survey conducted by NTB on 11-30-2017. Boring B-68BP was located at the direction of a Terracon representative on site.

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 10-17-2017 Boring Completed: 10-17-2017

Drill Rig: Acker Renagade #679 Driller: TF

Project No.: 35135121 Exhibit: A-14

BORING LOG NO. B-69BP

PROJECT: CA1003 Hwy 67 - Hwy 141 Light Bypass

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 632996.13 Easting: 1682993.1

Surface Elev.: 262.5 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY HP (psf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
LEAN CLAY (CL), with roots, dark brown and light gray, medium stiff									
					3-3-3 N=6		14	27-16-11	90
3.5	259								
					3-3-4 N=7	5000 (HP)	22		
LEAN CLAY WITH SAND (CL), gray and light gray, very stiff									
5.0	257.5				6-9-13 N=22	5500 (HP)	17		
		5							
SANDY LEAN CLAY (CL), light gray, very stiff					13-14-15 N=29	4000 (HP)	22		
8.5	254								
POORLY GRADED SAND WITH CLAY (SP-SC), brown, light brown and dark brown, loose					3-3-3 N=6		14		
10.0	252.5	10							
Boring Terminated at 10 Feet									

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with auger cuttings, bentonite.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

Northing and Eastings and Surface Elevations obtained from survey conducted by NTB on 11-30-2017.

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 10-17-2017 Boring Completed: 10-17-2017

Drill Rig: Acker Renagade #679 Driller: TF

Project No.: 35135121 Exhibit: A-15

BORING LOG NO. B-70BP

PROJECT: CA1003 Hwy 67 - Hwy 141 Light Bypass

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 632942.89 Easting: 1683768.15

Surface Elev.: 263.5 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY HP (psf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
LEAN CLAY WITH SAND (CL), with roots, brown, very stiff									
2.0	261.5			X	13-14-7 N=21		8	25-11-14	77
SANDY LEAN CLAY (CL), mottled, gray and brown, very stiff to hard				X	6-7-8 N=15		11		
		5		X	6-7-9 N=16	6000 (HP)	8		
				X	12-14-17 N=31	8000 (HP)	19		
8.5	255								
POORLY GRADED SAND (SP), fine grained, light gray, medium dense				X	2-4-6 N=10		8		
		10							
13.5	250								
POORLY GRADED SAND WITH CLAY (SP-SC), fine grained, light gray and brown, medium dense				X	7-10-13 N=23		6		
		15							
				X	10-12-13 N=25		7		
		20							
23.5	240								
POORLY GRADED SAND (SP), fine to medium grained, brown, medium dense				X	4-6-7 N=13		5		
		25							

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

Hammer Type: Automatic

Advancement Method:
0-40: Hollow stem auger

Abandonment Method:
Boring backfilled with auger cuttings, bentonite and spider plug.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

Northing and Eastings and Surface Elevations obtained from survey conducted by NTB on 11-30-2017.

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 10-17-2017 Boring Completed: 10-17-2017

Drill Rig: Acker Renagade #679 Driller: TF

Project No.: 35135121 Exhibit: A-16

BORING LOG NO. B-70BP

PROJECT: CA1003 Hwy 67 - Hwy 141 Light Bypass

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 632942.89 Easting: 1683768.15

Surface Elev.: 263.5 (Ft.)

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY HP (psf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		POORLY GRADED SAND (SP), fine to medium grained, brown, medium dense *(continued)*	30			5-5-7 N=12		5		
	33.5	230								
		POORLY GRADED SAND (SP), coarse grained, brown and dark brown, medium dense	35			4-6-8 N=14		15		
	40.0	223.5	40			8-10-11 N=21		4		
		Boring Terminated at 40 Feet								

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

Hammer Type: Automatic

Advancement Method:
0-40: Hollow stem auger

Abandonment Method:
Boring backfilled with auger cuttings, bentonite and spider plug.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 10-17-2017 Boring Completed: 10-17-2017

Drill Rig: Acker Renagade #679 Driller: TF

Project No.: 35135121 Exhibit: A-16

BORING LOG NO. B-71BP

PROJECT: CA1003 Hwy 67 - Hwy 141 Light Bypass

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 632977.04 Easting: 1684602.25

Surface Elev.: 262.4 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY HP (psf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
LEAN CLAY (CL), with sand and roots, dark brown and gray, stiff									
					4-5-8 N=13	6000 (HP)	22	45-16-29	95
3.5	259				5-5-7 N=12		11		
SANDY LEAN CLAY (CL), brown and gray, soft		5			3-2-1 N=3		18		
					1-1-1 N=2		26		
8.5	254								
LEAN CLAY (CL), with wood piece, reddish-brown and dark gray, medium stiff					0-1-4 N=5		49		
10.0	252.5	10							
CLAYEY SAND (SC), brown and light gray, loose					2-2-3 N=5		7		
11.5	251								
Boring Terminated at 11.5 Feet									

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

Hammer Type: Automatic

Advancement Method:
0-11.5: Solid stem auger

Abandonment Method:
Boring backfilled with auger cuttings, bentonite and spider plug.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

Northing and Eastings and Surface Elevations obtained from survey conducted by NTB on 11-30-2017.

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 10-17-2017 Boring Completed: 10-17-2017

Drill Rig: Acker Renagade #679 Driller: TF

Project No.: 35135121 Exhibit: A-17

BORING LOG NO. B-72BP

PROJECT: CA1003 Hwy 67 - Hwy 141 Light Bypass

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 633003.65 Easting: 1685408.23

Surface Elev.: 261.9 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY HP (psf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
FAT CLAY (CH), with roots, brown, medium stiff									
2.0	260				2-3-3 N=6	2000 (HP)	19	54-14-40	92
LEAN CLAY (CL), light gray and brown, very stiff									
3.5	258.5				5-7-8 N=15	8000 (HP)	23		
LEAN CLAY (CL), with sand seams, light gray and brown, hard		5			14-15-16 N=31	7000 (HP)	21		
6.0	256				13-15-16 N=31	3000 (HP)	17		
CLAYEY SAND (SC), light gray and brown, loose									
10.0	252	10			3-4-3 N=7		8		
Boring Terminated at 10 Feet									

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with auger cuttings and bentonite.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

Northing and Eastings and Surface Elevations obtained from survey conducted by NTB on 11-30-2017.

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 10-18-2017 Boring Completed: 10-18-2017

Drill Rig: Acker Renagade #679 Driller: TF

Project No.: 35135121 Exhibit: A-18

BORING LOG NO. B-73BP

PROJECT: CA1003 Hwy 67 - Hwy 141 Light Bypass

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 633137.15 Easting: 1686041.54

Surface Elev.: 261.9 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY HP (psf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY (CL), brown, stiff							
2.0	260			4-4-5 N=9	4000 (HP)	18	43-12-31	88
	LEAN CLAY (CL), trace sand, brown, very stiff to hard			10-13-12 N=25	6000 (HP)	17		
5.0	257			25-20-21 N=41	8000 (HP)	18		
	CLAYEY SAND (SC), fine grained, light gray, dense to loose	5		25-18-13 N=31		12		
10.0	252	10		2-3-4 N=7		46		
	Boring Terminated at 10 Feet							

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with auger cuttings and bentonite.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

Northing and Eastings and Surface Elevations obtained from survey conducted by NTB on 11-30-2017.

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 10-18-2017 Boring Completed: 10-18-2017

Drill Rig: Acker Renagade #679 Driller: TF

Project No.: 35135121 Exhibit: A-19

BORING LOG NO. B-74BP

PROJECT: CA1003 Hwy 67 - Hwy 141 Light Bypass

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 633501.91 Easting: 1687007.75

Surface Elev.: 261.7 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY HP (psf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
LEAN CLAY (CL), mottled, gray and brown							26	48-15-33	97
							35		
4.0	257.5						36		
SILTY CLAY (CL-ML), light gray		5							
5.5	256						26		
Auger Refusal at 5.5 Feet									

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

Advancement Method:
0-5.5: Hand auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

Northing and Eastings and Surface Elevations obtained from survey conducted by NTB on 11-30-2017. Boring B-74BP was located at the direction of a Terracon representative on site.

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 10-18-2017	Boring Completed: 10-18-2017
Drill Rig: Hand Auger	Driller: TF
Project No.: 35135121	Exhibit: A-20

BORING LOG NO. B-75BP

PROJECT: CA1003 Hwy 67 - Hwy 141 Light Bypass

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 633810.66 Easting: 1687525.57

Surface Elev.: 262.1 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY HP (psf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
LEAN CLAY (CL), dark brown and gray									
							16	35-14-21	91
2.0	260								
LEAN CLAY (CL), trace silt, gray, light gray and brown							23		
3.5	258.5								
LEAN CLAY WITH SAND (CL), light gray and brown							22		
5.0	257	5							
Auger Refusal at 5 Feet									

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

Advancement Method:
0-5: Hand auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

Northing and Eastings and Surface Elevations obtained from survey conducted by NTB on 11-30-2017. Boring B-75BP was located at the direction of a Terracon representative on site.

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 10-18-2017 Boring Completed: 10-18-2017

Drill Rig: Hand Auger Driller: TF

Project No.: 35135121 Exhibit: A-21

BORING LOG NO. B-76BP

PROJECT: CA1003 Hwy 67 - Hwy 141 Light Bypass

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634113.33 Easting: 1688060.83

Surface Elev.: 263.2 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY HP (psf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		LEAN CLAY (CL), light gray and brown, very stiff						20		
		- first two samples hand augured to avoid nearby water line								
5.0	258					3-6-13 N=19	6000 (HP)	22	48-15-33	93
		LEAN CLAY WITH SAND (CL), brown and gray, very stiff	5			16-12-13 N=25	4000 (HP)	23		
6.5	256.5									
		CLAYEY SAND (SC), fine grained, light gray and brown, medium dense to dense				4-6-8 N=14		8		
			10							
						3-6-5 N=11		7		
			15							
						4-5-6 N=11		5		
			20							
						4-5-7 N=12		8		
			25							

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

Hammer Type: Automatic

Advancement Method:
0-40: Hollow stem auger

Abandonment Method:
Boring backfilled with auger cuttings and bentonite.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

Northing and Eastings and Surface Elevations obtained from survey conducted by NTB on 11-30-2017.

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 10-18-2017 Boring Completed: 10-18-2017

Drill Rig: Acker Renagade #679 Driller: TF

Project No.: 35135121 Exhibit: A-22

BORING LOG NO. B-76BP

PROJECT: CA1003 Hwy 67 - Hwy 141 Light Bypass

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634113.33 Easting: 1688060.83

Surface Elev.: 263.2 (Ft.)

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY HP (psf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		CLAYEY SAND (SC), fine grained, light gray and brown, medium dense to dense *(continued)*	30			11-13-17 N=30		8		
			35			5-8-9 N=17		3		
	38.5	224.5								
	40.0	**POORLY GRADED SAND (SP)**, medium grained, brown and gray, dense 223	40			13-18-21 N=39		16		
		Boring Terminated at 40 Feet								

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

Hammer Type: Automatic

Advancement Method:
0-40: Hollow stem auger

Abandonment Method:
Boring backfilled with auger cuttings and bentonite.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 10-18-2017 Boring Completed: 10-18-2017

Drill Rig: Acker Renagade #679 Driller: TF

Project No.: 35135121 Exhibit: A-22

APPENDIX B
LABORATORY TESTING

Laboratory Testing Description

Samples retrieved during the field exploration were taken to the laboratory for further observation by the project geotechnical engineer and were classified in accordance with the Unified Soil Classification System (USCS) and the AASHTO Classification System described in **Appendix C**. At that time, the field descriptions were confirmed or modified as necessary and a limited laboratory testing program was formulated.

Selected soil samples obtained from the site were tested for the following engineering properties:

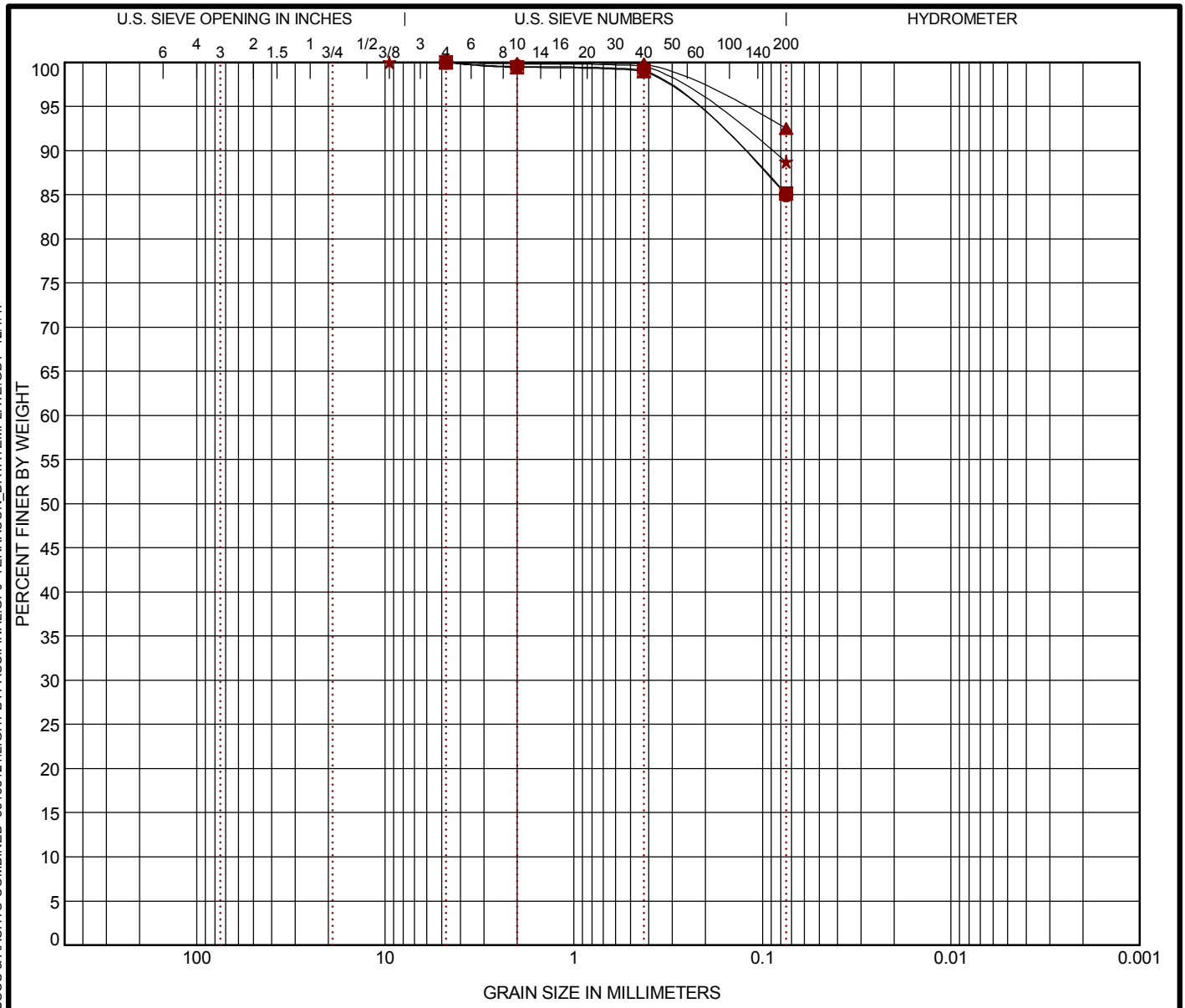
n	Water content	(ASTM D 2216)
n	Atterberg limits	(ASTM D 4318)
n	Sieve analysis	(ASTM D 422)
n	Standard Proctor	(AASHTO T-99)
n	Remolded resilient modulus	(AASHTO T-307)

The laboratory test results are reported on the boring logs and on report forms in this Appendix. They have been used for the geotechnical engineering analyses, and the development of recommendations for pavement subgrade.

Procedural Standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practices or professional judgment.

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



	Sample ID		USCS Classification	AASHTO Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-60BP	0.5 - 1.0	LEAN CLAY with SAND (CL)	A-4 (7)	13	27	17	10		
⊠	B-61BP	0.5 - 2.0	SILTY CLAY (CL-ML)	A-4 (2)	12	21	15	6		
▲	B-62BP	0.5 - 2.0	SILTY CLAY (CL-ML)	A-4 (5)	9	27	20	7		
★	B-63BP	0.5 - 2.0	SILTY CLAY (CL-ML)	A-4 (3)	8	23	17	6		

	Sample ID		D_{100}	D_{60}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-60BP	0.5 - 1.0	4.75				0.0	15.0	85.0		
⊠	B-61BP	0.5 - 2.0	4.75				0.0	14.9	85.1		
▲	B-62BP	0.5 - 2.0	4.75				0.0	7.5	92.5		
★	B-63BP	0.5 - 2.0	9.5				0.0	11.3	88.7		

PROJECT: CA1003 Hwy 67 - Hwy 141 Light Bypass

SITE: Highway 412, Lawrence & Greene Co. Light, Arkansas

Terracon
25809 I-30 South
Bryant, Arkansas

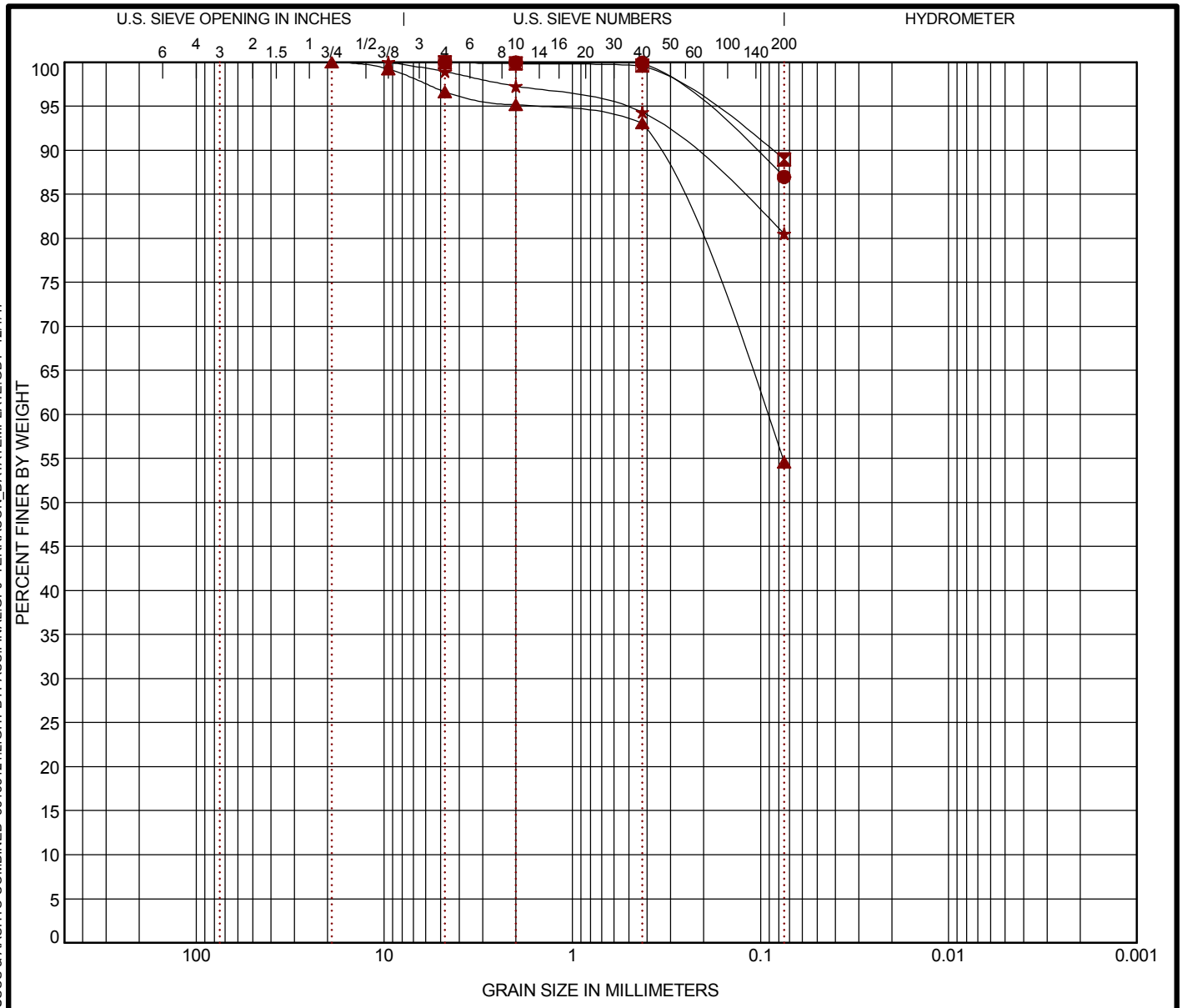
PROJECT NUMBER: 35135121

CLIENT: Atkins North America, Inc.
Dallas, Texas

EXHIBIT: B-2

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



	Sample ID		USCS Classification	AASHTO Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-64BP	0.5 - 2.0	SILTY CLAY (CL-ML)	A-4 (4)	8	24	17	7		
⊠	B-65BP	0.5 - 2.0	LEAN CLAY (CL)	A-4 (7)	12	28	19	9		
▲	B-66BP	0.5 - 2.0	SANDY LEAN CLAY (CL)	A-7-6 (11)	19	42	14	28		
★	B-67BP	0.5 - 2.0	LEAN CLAY with SAND (CL)	A-6 (8)	20	34	23	11		

	Sample ID		D_{100}	D_{60}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-64BP	0.5 - 2.0	4.75				0.0	13.0		87.0	
⊠	B-65BP	0.5 - 2.0	4.75				0.0	11.0		89.0	
▲	B-66BP	0.5 - 2.0	19	0.096			3.4	42.0		54.6	
★	B-67BP	0.5 - 2.0	9.5				1.1	18.4		80.5	

PROJECT: CA1003 Hwy 67 - Hwy 141 Light Bypass

SITE: Highway 412, Lawrence & Greene Co. Light, Arkansas

Terracon
25809 I-30 South
Bryant, Arkansas

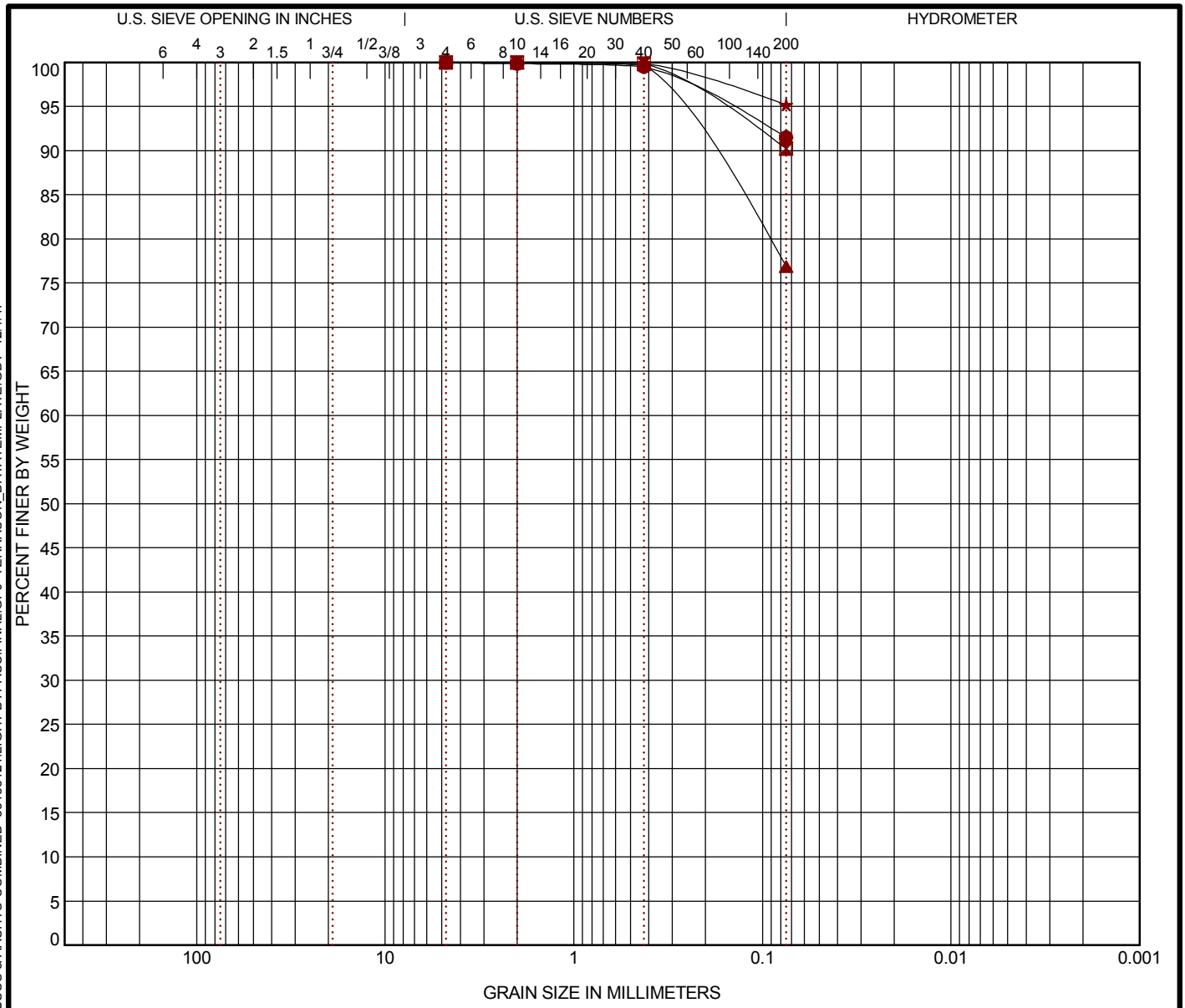
PROJECT NUMBER: 35135121

CLIENT: Atkins North America, Inc.
Dallas, Texas

EXHIBIT: B-3

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



Sample ID		USCS Classification	AASHTO Classification	WC (%)	LL	PL	PI	Cc	Cu
● B-68BP	0.5 - 2.0	LEAN CLAY (CL)	A-4 (8)	14	27	17	10		
⊠ B-69BP	0.5 - 2.0	LEAN CLAY (CL)	A-6 (8)	14	27	16	11		
▲ B-70BP	0.5 - 2.0	LEAN CLAY with SAND (CL)	A-6 (8)	8	25	11	14		
★ B-71BP	0.5 - 2.0	LEAN CLAY (CL)	A-7-6 (29)	22	45	16	29		

Sample ID		D_{100}	D_{60}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
● B-68BP	0.5 - 2.0	4.75				0.0	8.5	91.5		
⊠ B-69BP	0.5 - 2.0	4.75				0.0	9.8	90.2		
▲ B-70BP	0.5 - 2.0	4.75				0.0	23.1	76.9		
★ B-71BP	0.5 - 2.0	2				0.0	4.8	95.2		

PROJECT: CA1003 Hwy 67 - Hwy 141 Light Bypass

SITE: Highway 412, Lawrence & Greene Co. Light, Arkansas

Terracon
25809 I-30 South
Bryant, Arkansas

PROJECT NUMBER: 35135121

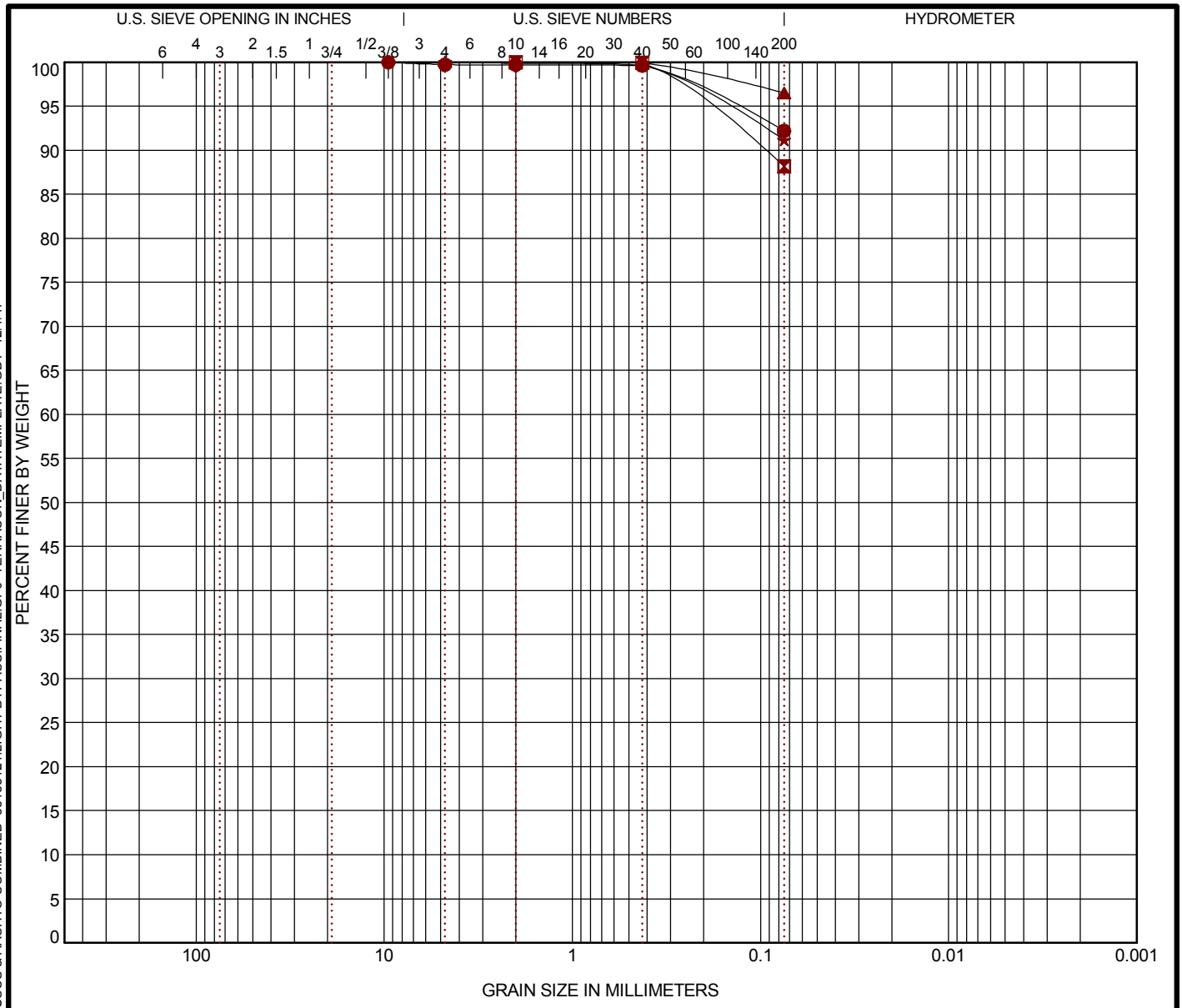
CLIENT: Atkins North America, Inc. Dallas, Texas

EXHIBIT: B-4

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS & AASHTO COMBINED 35135121.LIGHT BYPASS.FINAL.GPJ TERRACON_DATATEMPLATE.GDT 12/1/17

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



Sample ID		USCS Classification	AASHTO Classification	WC (%)	LL	PL	PI	Cc	Cu
● B-72BP	0.5 - 2.0	FAT CLAY (CH)	A-7-6 (38)	19	54	14	40		
⊠ B-73BP	0.5 - 2.0	LEAN CLAY (CL)	A-7-6 (27)	18	43	12	31		
▲ B-74BP	0.5 - 1.0	LEAN CLAY (CL)	A-7-6 (34)	26	48	15	33		
★ B-75BP	0.5 - 1.0	LEAN CLAY (CL)	A-6 (18)	16	35	14	21		

Sample ID		D_{100}	D_{60}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
● B-72BP	0.5 - 2.0	9.5				0.3	7.5	92.2		
⊠ B-73BP	0.5 - 2.0	2				0.0	11.8	88.2		
▲ B-74BP	0.5 - 1.0	2				0.0	3.5	96.5		
★ B-75BP	0.5 - 1.0	4.75				0.0	8.8	91.2		

PROJECT: CA1003 Hwy 67 - Hwy 141 Light Bypass

SITE: Highway 412, Lawrence & Greene Co. Light, Arkansas

Terracon
25809 I-30 South
Bryant, Arkansas

PROJECT NUMBER: 35135121

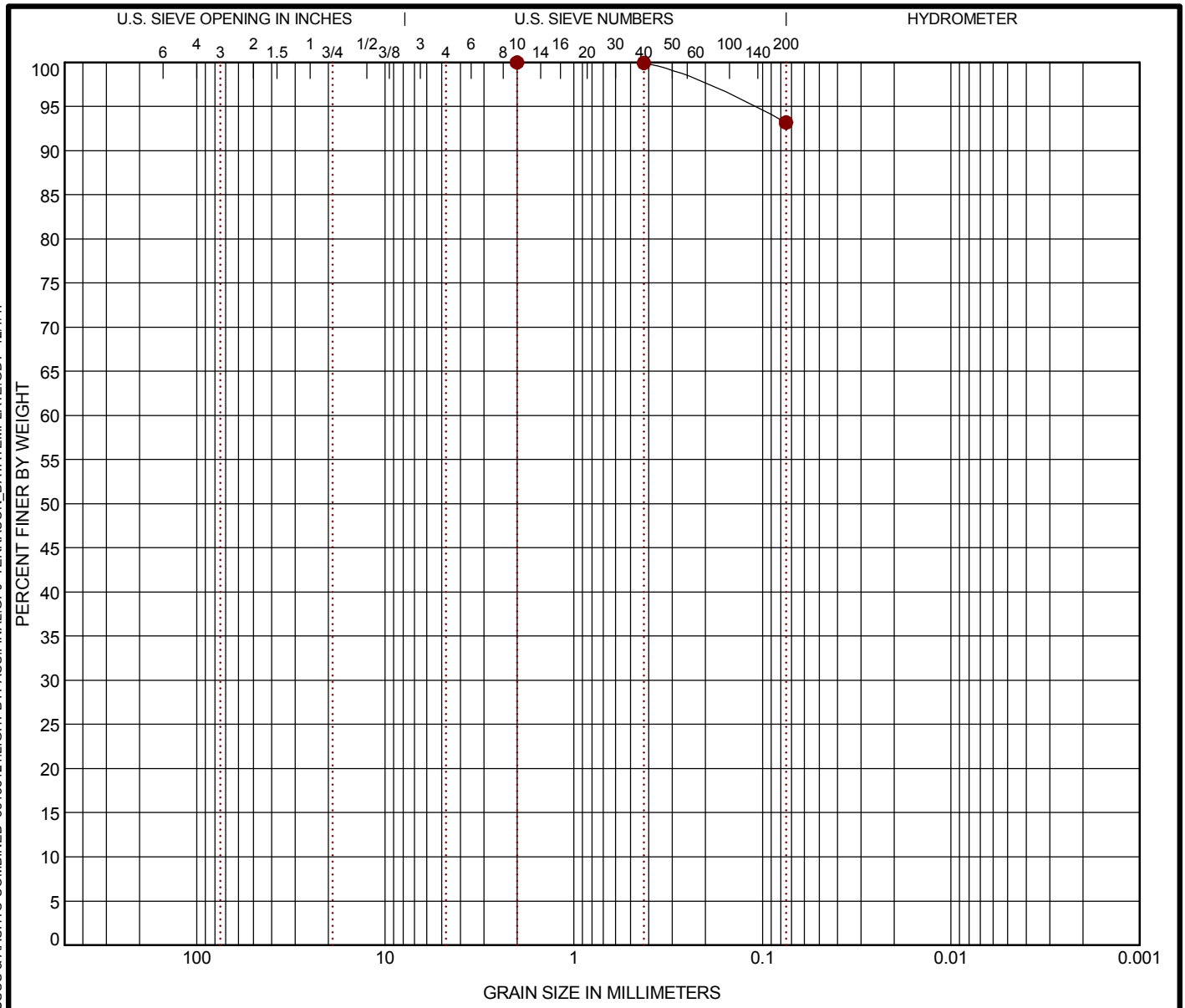
CLIENT: Atkins North America, Inc.
Dallas, Texas

EXHIBIT: B-5

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS & AASHTO COMBINED 35135121.LIGHT BYPASS.FINAL.GPJ TERRACON_DATATEMPLATE.GDT 12/1/17

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample ID		USCS Classification	AASHTO Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-76BP	3.5 - 5.0	LEAN CLAY (CL)	A-7-6 (32)	22	48	15	33		

	Sample ID	D_{100}	D_{60}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-76BP	2				0.0	6.8	93.2		

PROJECT: CA1003 Hwy 67 - Hwy 141 Light Bypass

SITE: Highway 412, Lawrence & Greene Co. Light, Arkansas

Terracon
25809 I-30 South
Bryant, Arkansas

PROJECT NUMBER: 35135121

CLIENT: Atkins North America, Inc. Dallas, Texas

EXHIBIT: B-6

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS & AASHTO COMBINED 35135121.LIGHT BYPASS.FINAL.GPJ TERRACON_DATATEMPLATE.GDT 12/1/17

Laboratory Compaction Characteristics of Soil

4701 North Stiles Ave.
Oklahoma City, OK 73105
(405) 525 0453

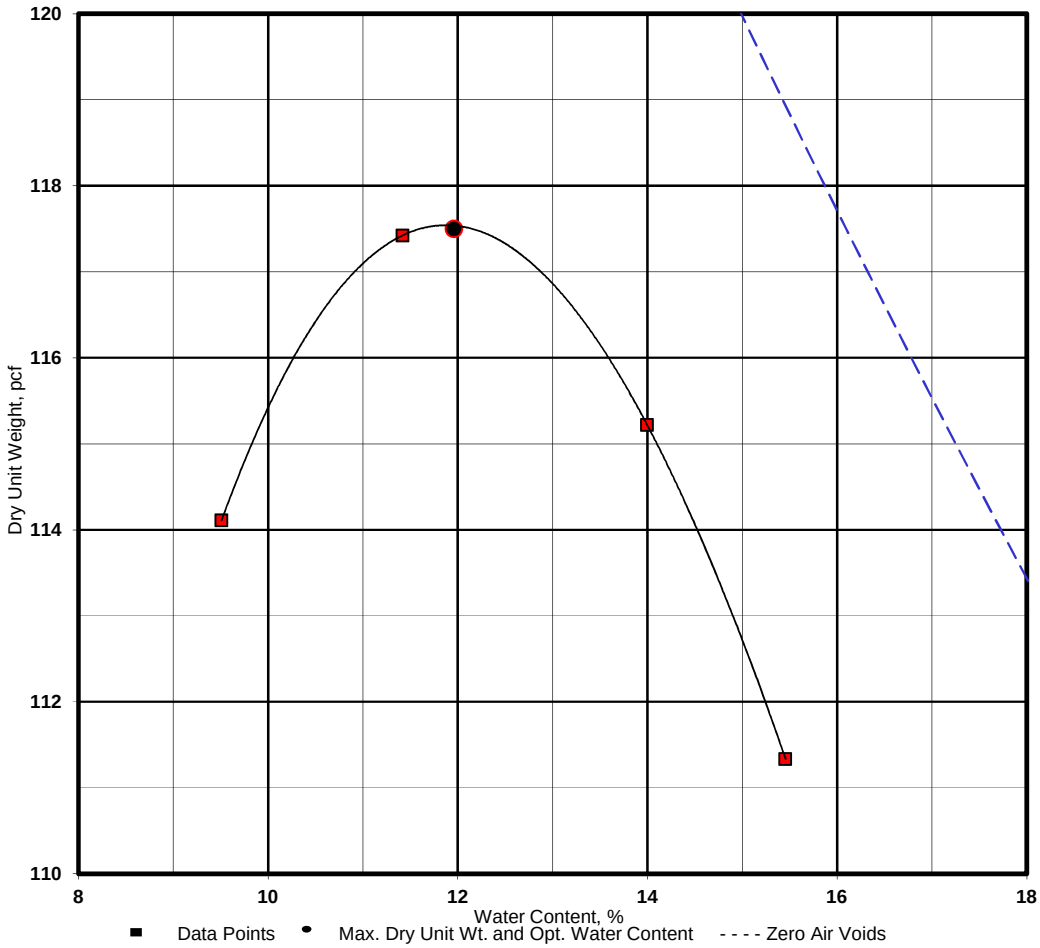
Client Name: Atkins North America, Inc.
Project No.: 35135121 Date: 11/06/17
Project Name: AHTD Job No. CA 1003, Hwy 412 Light Bypass
Location: Lawrence and Greene Counties, Arkansas
Source Material: Bulk 61BP (0.0 - 5.0')
Sample Description: Silty clay and poorly graded sand with clay mixture sample
Material Designation: Sample date:
Test Method:
Test Procedure: AASHTO T-99
Sample Preparation: Dry
Rammer: X Mechanical Manual

TEST RESULTS
Maximum Dry Unit Wt.: 117.5 pcf
Optimum Water Content: 12.0 %

Liquid Limit: 21 Plastic Limit: 15
Plasticity Index: 6
% passing # 200 sieve: 85
AASHTO Class. A-4 (2) USCS: CL-ML
Reviewed by:

Zero air voids for specific gravity of 2.70

The posted Atterberg Limits are appropriate for the silty clay portion of the bulk sample.



Terracon

Resilient Modulus Testing - AASHTO T 307-99 English Units

Report Date: 27-Nov-17
Lab No.: 35135121 lab#1418 RM#152omcRETE
Project No.: 35135121

Soil Map Unit:	Bulk 61BP OMC
Soil Symbol:	0
Depth (in.)	0 - 60
Compaction Method	Static
Max. Dry Density (pcf)	117.5
Opt. Moisture Content (%)	12.0
Inside Mold Diameter (in)	3.94

Weight of Wet Soil (lb)	6.93
Initial Sample Diameter (in)	3.94
Initial Sample Height (in)	7.87
Initial Sample Area (in^2)	12.17
Sample Volume (in^3)	95.86
Compacted Moisture Content(%)	12.1
Wet Density (pcf)	124.9
Dry Density (pcf)	111.4

Test Date: November 15, 2017

Final Sample Height (in)	7.9
Final Sample Wet Weight (lb)	6.93
Final Moisture Content (%)	12.0
Accumulated Strain (%)	0.18
Percent Passing No. 10	0
Percent Passing No. 200	0.0
Liquid Limit	0
Plasticity Index	0

Chamber Confining Pressure (S_3) psi	Nominal Maximum Axial Stress (S_{cyclic}) psi	Actual Applied Max. Axial Load (P_{max}) lb	Actual Applied Cyclic Load (P_{cyclic}) lb	Actual Applied Contact Load ($P_{contact}$) lb	Actual Applied Max. Axial Stress (S_{max}) psi	Actual Applied Cyclic Stress (S_{cyclic}) psi	Actual Applied Contact Stress ($S_{contact}$) psi	Recov. Def. LVDT #1 Reading (H_1) in	Recov. Def. LVDT #2 Reading (H_2) in	Average Recov. Def. LVDT 1 and 2 (H_{avg}) in	Resilient Strain (ϵ_r) in/in	Resilient Modulus (M_r) psi
6.00	2.00	24.0	20.7	3.3	1.97	1.70	0.274	0.0011	0.0011	0.0011	0.000142	11,951
6.00	4.00	48.1	42.4	5.7	3.95	3.48	0.470	0.0025	0.0025	0.0025	0.000314	11,083
6.00	6.00	72.5	64.1	8.4	5.96	5.26	0.693	0.0041	0.0041	0.0041	0.000517	10,184
6.00	8.00	97.0	86.1	10.9	7.96	7.07	0.896	0.0058	0.0059	0.0058	0.000738	9,576
6.00	10.00	121.2	107.3	13.8	9.95	8.81	1.136	0.0073	0.0074	0.0073	0.000933	9,452
4.01	2.00	23.8	20.2	3.7	1.96	1.66	0.302	0.0013	0.0013	0.0013	0.000166	9,970
4.01	4.00	48.1	42.1	6.0	3.95	3.46	0.494	0.0031	0.0031	0.0031	0.000396	8,735
4.00	6.00	72.4	64.0	8.4	5.95	5.26	0.690	0.0050	0.0051	0.0051	0.000642	8,196
4.01	8.00	96.8	85.9	10.9	7.95	7.05	0.894	0.0069	0.0069	0.0069	0.000874	8,073
4.01	10.00	121.0	107.6	13.4	9.94	8.84	1.102	0.0085	0.0085	0.0085	0.001079	8,190
2.00	2.00	23.6	20.3	3.3	1.94	1.67	0.274	0.0017	0.0016	0.0017	0.000210	7,913
2.00	4.00	47.9	42.2	5.7	3.93	3.47	0.465	0.0040	0.0040	0.0040	0.000507	6,838
2.00	6.00	72.3	64.4	8.0	5.94	5.29	0.654	0.0064	0.0064	0.0064	0.000812	6,509
2.00	8.00	96.6	86.0	10.6	7.94	7.07	0.869	0.0084	0.0084	0.0084	0.001067	6,625
2.00	10.00	121.0	107.8	13.2	9.93	8.85	1.081	0.0102	0.0102	0.0102	0.001294	6,844

Terracon

Resilient Modulus Testing - AASHTO T 307-99 English Units

Report Date: 27-Nov-17
Lab No.: 35135121 RM#152 omc+2 retest
Project No.: 35135121

Soil Map Unit: Bulk 61BP OMC+2%
Soil Symbol: 0
Depth (in.): 0 - 60
Compaction Method: Static
Max. Dry Density (pcf): 117.5
Opt. Moisture Content (%): 12.0
Inside Mold Diameter (in): 3.94

Weight of Wet Soil (lb): 7.06
Initial Sample Diameter (in): 3.94
Initial Sample Height (in): 7.87
Initial Sample Area (in^2): 12.17
Sample Volume (in^3): 95.86
Compacted Moisture Content(%): 14.4
Wet Density (pcf): 127.2
Dry Density (pcf): 111.2

Test Date: November 15, 2017

Final Sample Height (in): 7.8
Final Sample Wet Weight (lb): 7.05
Final Moisture Content (%): 14.3
Accumulated Strain (%): 0.92

Percent Passing No. 10: 0
Percent Passing No. 200: 0.0
Liquid Limit: 0
Plasticity Index: 0

Chamber Confining Pressure (S_3) psi	Nominal Maximum Axial Stress (S_{cyclic}) psi	Actual Applied Max. Axial Load (P_{max}) lb	Actual Applied Cyclic Load (P_{cyclic}) lb	Actual Applied Contact Load ($P_{contact}$) lb	Actual Applied Max. Axial Stress (S_{max}) psi	Actual Applied Cyclic Stress (S_{cyclic}) psi	Actual Applied Contact Stress ($S_{contact}$) psi	Recov. Def. LVDT #1 Reading (H_1) in	Recov. Def. LVDT #2 Reading (H_2) in	Average Recov. Def. LVDT 1 and 2 (H_{avg}) in	Resilient Strain (ϵ_r) in/in	Resilient Modulus (M_r) psi
6.00	2.00	23.7	20.8	2.9	1.95	1.71	0.241	0.0014	0.0014	0.0014	0.000181	9,441
6.00	4.00	47.4	42.2	5.2	3.89	3.47	0.424	0.0030	0.0031	0.0031	0.000388	8,933
6.00	6.00	71.5	63.8	7.7	5.87	5.24	0.634	0.0048	0.0049	0.0049	0.000619	8,457
6.00	8.00	96.3	86.2	10.1	7.91	7.08	0.829	0.0070	0.0069	0.0069	0.000879	8,050
6.00	10.00	120.5	107.3	13.1	9.89	8.81	1.080	0.0088	0.0086	0.0087	0.001108	7,957
4.01	2.00	23.9	20.6	3.3	1.97	1.70	0.271	0.0018	0.0018	0.0018	0.000232	7,322
4.01	4.00	48.0	42.4	5.6	3.95	3.49	0.460	0.0042	0.0042	0.0042	0.000531	6,568
4.00	6.00	72.4	64.4	8.0	5.94	5.29	0.656	0.0065	0.0064	0.0065	0.000823	6,428
4.01	8.00	96.6	85.9	10.7	7.93	7.05	0.879	0.0085	0.0084	0.0084	0.001070	6,595
4.01	10.00	120.2	107.2	13.0	9.87	8.80	1.069	0.0107	0.0104	0.0105	0.001337	6,585
2.00	2.00	23.8	20.7	3.1	1.95	1.70	0.253	0.0026	0.0025	0.0025	0.000320	5,310
2.00	4.00	47.9	42.4	5.5	3.93	3.48	0.455	0.0058	0.0057	0.0057	0.000728	4,780
2.00	6.00	71.9	63.8	8.1	5.90	5.24	0.666	0.0085	0.0084	0.0084	0.001068	4,904
2.00	8.00	95.9	85.6	10.4	7.88	7.03	0.850	0.0108	0.0106	0.0107	0.001363	5,155
2.00	10.00	119.6	106.8	12.8	9.82	8.77	1.053	0.0140	0.0135	0.0137	0.001746	5,024

Laboratory Compaction Characteristics of Soil

4701 North Stiles Ave.
Oklahoma City, OK 73105
(405) 525 0453

Client Name: Arkins North America, Inc.
Project Name: AHTD Job No. CA 1003, Hwy 412 Light Bypass
Location: Lawrence and Greene Counties, Arkansas

Source Material: Bulk 67BP (0.0 - 5.0')
Sample Description: Lean clay with sand

Material Designation: 1419 Sample date:
Test Method: Method A
Test Procedure: AASHTO T-99
Sample Preparation: Dry
Rammer: X Mechanical ____ Manual

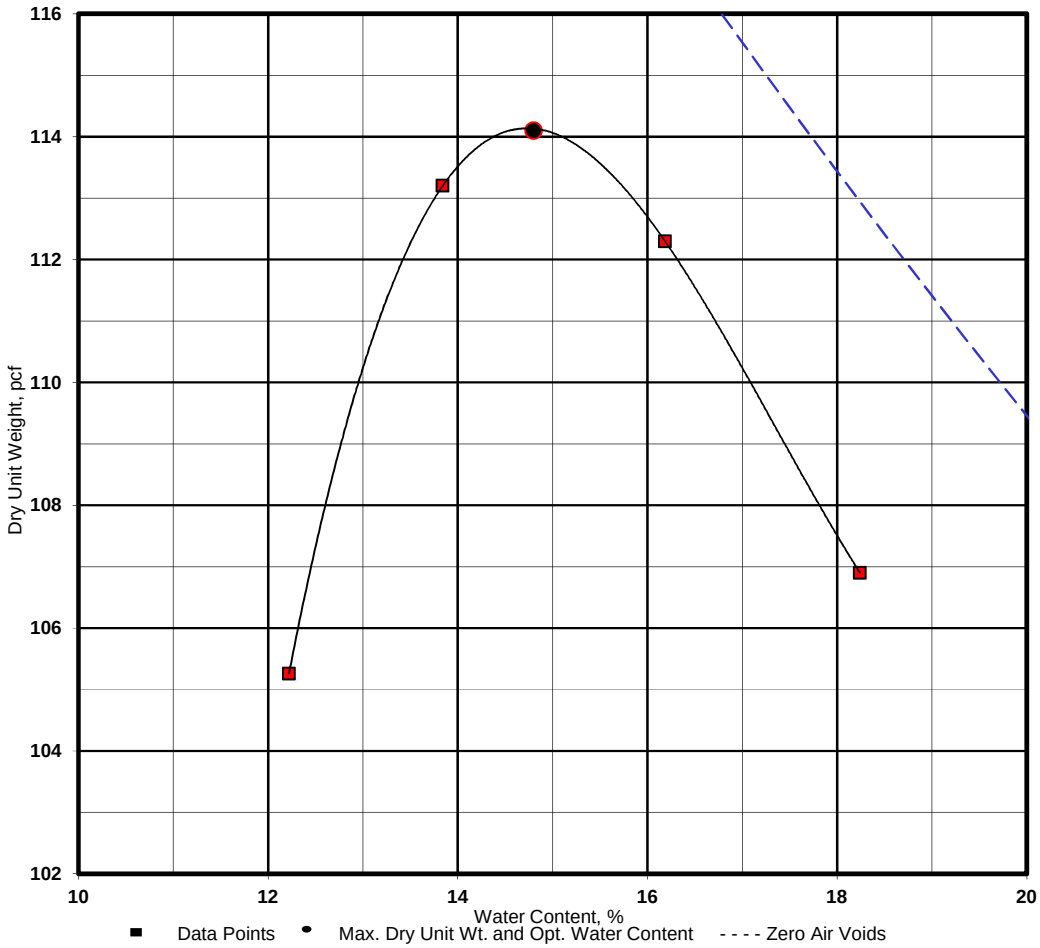
Project No.: 35135121 Date: 11/06/17

TEST RESULTS

Maximum Dry Unit Wt.: 114.1 pcf
Optimum Water Content: 14.8 %

Liquid Limit: 34 Plastic Limit: 23
Plasticity Index: 11
% passing # 200 sieve: 81
AASHTO Class. A-6 USCS: CL
Reviewed by:

Zero air voids for specific gravity of 2.70



Terracon

Resilient Modulus Testing - AASHTO T 307-99 English Units

Report Date: 27-Nov-17
Lab No.: 35135121 RM#153 omcretest
Project No.: 35135121

Soil Map Unit:	Bulk 67BP_OMC
Soil Symbol:	0
Depth (in.)	0 - 60
Compaction Method	Static
Max. Dry Density (pcf)	114.1
Opt. Moisture Content (%)	14.8
Inside Mold Diameter (in)	3.94

Weight of Wet Soil (lb)	6.90
Initial Sample Diameter (in)	3.94
Initial Sample Height (in)	7.87
Initial Sample Area (in^2)	12.17
Sample Volume (in^3)	95.86
Compacted Moisture Content(%)	14.8
Wet Density (pcf)	124.4
Dry Density (pcf)	108.3

Test Date: November 15, 2017

Final Sample Height (in)	7.8
Final Sample Wet Weight (lb)	6.90
Final Moisture Content (%)	14.7
Accumulated Strain (%)	0.31
Percent Passing No. 10	0
Percent Passing No. 200	0.0
Liquid Limit	0
Plasticity Index	0

Chamber Confining Pressure (S_3) psi	Nominal Maximum Axial Stress (S_{cyclic}) psi	Actual Applied Max. Axial Load (P_{max}) lb	Actual Applied Cyclic Load (P_{cyclic}) lb	Actual Applied Contact Load ($P_{contact}$) lb	Actual Applied Max. Axial Stress (S_{max}) psi	Actual Applied Cyclic Stress (S_{cyclic}) psi	Actual Applied Contact Stress ($S_{contact}$) psi	Recov. Def. LVDT #1 Reading (H_1) in	Recov. Def. LVDT #2 Reading (H_2) in	Average Recov. Def. LVDT 1 and 2 (H_{avg}) in	Resilient Strain (ϵ_r) in/in	Resilient Modulus (M_r) psi
6.00	2.00	23.4	19.8	3.6	1.92	1.63	0.292	0.0015	0.0015	0.0015	0.000190	8,583
6.00	4.00	47.2	41.3	5.8	3.87	3.39	0.480	0.0033	0.0033	0.0033	0.000415	8,169
6.00	6.00	71.5	62.9	8.7	5.87	5.16	0.710	0.0054	0.0054	0.0054	0.000684	7,549
6.00	8.00	95.9	84.4	11.5	7.88	6.93	0.947	0.0077	0.0078	0.0078	0.000987	7,020
6.00	10.00	120.1	105.9	14.2	9.86	8.69	1.165	0.0099	0.0101	0.0100	0.001273	6,830
4.01	2.00	23.6	19.5	4.2	1.94	1.60	0.343	0.0018	0.0017	0.0018	0.000223	7,153
4.01	4.00	47.6	41.4	6.2	3.91	3.40	0.512	0.0042	0.0042	0.0042	0.000534	6,368
4.00	6.00	71.7	63.0	8.7	5.89	5.17	0.716	0.0068	0.0068	0.0068	0.000863	5,994
4.01	8.00	95.9	84.5	11.4	7.88	6.94	0.938	0.0092	0.0093	0.0092	0.001175	5,906
4.01	10.00	120.0	106.0	13.9	9.85	8.71	1.145	0.0115	0.0118	0.0117	0.001480	5,882
2.00	2.00	23.5	19.9	3.6	1.93	1.64	0.295	0.0023	0.0023	0.0023	0.000294	5,569
2.00	4.00	47.3	41.3	6.0	3.89	3.39	0.494	0.0054	0.0054	0.0054	0.000690	4,920
2.00	6.00	71.7	63.1	8.6	5.89	5.18	0.705	0.0086	0.0086	0.0086	0.001093	4,742
2.00	8.00	95.8	84.7	11.1	7.87	6.96	0.910	0.0114	0.0115	0.0115	0.001455	4,783
2.00	10.00	119.9	106.2	13.6	9.84	8.72	1.120	0.0141	0.0144	0.0143	0.001812	4,813

Terracon

Resilient Modulus Testing - AASHTO T 307-99 English Units

Report Date: 27-Nov-17
Lab No.: 35135121 RM#153 omc+2 retest
Project No.: 35135121

Soil Map Unit: Bulk 67BP_OMC+2%
Soil Symbol: 0
Depth (in.): 0 - 60
Compaction Method: Static
Max. Dry Density (pcf): 114.1
Opt. Moisture Content (%): 14.8
Inside Mold Diameter (in): 3.94

Weight of Wet Soil (lb): 7.02
Initial Sample Diameter (in): 3.94
Initial Sample Height (in): 7.87
Initial Sample Area (in^2): 12.17
Sample Volume (in^3): 95.86
Compacted Moisture Content(%): 16.9
Wet Density (pcf): 126.5
Dry Density (pcf): 108.2

Test Date: November 15, 2017

Final Sample Height (in): 7.8
Final Sample Wet Weight (lb): 7.02
Final Moisture Content (%): 16.7
Accumulated Strain (%): 1.37

Percent Passing No. 10: 0
Percent Passing No. 200: 0.0
Liquid Limit: 0
Plasticity Index: 0

Chamber Confining Pressure (S_3) psi	Nominal Maximum Axial Stress (S_{cyclic}) psi	Actual Applied Max. Axial Load (P_{max}) lb	Actual Applied Cyclic Load (P_{cyclic}) lb	Actual Applied Contact Load ($P_{contact}$) lb	Actual Applied Max. Axial Stress (S_{max}) psi	Actual Applied Cyclic Stress (S_{cyclic}) psi	Actual Applied Contact Stress ($S_{contact}$) psi	Recov. Def. LVDT #1 Reading (H_1) in	Recov. Def. LVDT #2 Reading (H_2) in	Average Recov. Def. LVDT 1 and 2 (H_{avg}) in	Resilient Strain (ϵ_r) in/in	Resilient Modulus (M_r) psi
6.00	2.00	23.6	20.1	3.5	1.94	1.65	0.284	0.0018	0.0018	0.0018	0.000225	7,329
6.00	4.00	47.3	41.5	5.8	3.88	3.41	0.478	0.0039	0.0038	0.0038	0.000488	6,983
6.00	6.00	71.8	63.2	8.5	5.89	5.19	0.701	0.0064	0.0063	0.0064	0.000809	6,422
6.00	8.00	96.3	85.2	11.1	7.91	7.00	0.909	0.0093	0.0093	0.0093	0.001182	5,921
6.00	10.00	120.9	107.2	13.7	9.93	8.80	1.128	0.0122	0.0123	0.0123	0.001557	5,654
4.00	2.00	24.0	20.3	3.7	1.97	1.66	0.306	0.0024	0.0024	0.0024	0.000307	5,417
4.01	4.00	48.0	41.9	6.1	3.94	3.44	0.503	0.0055	0.0056	0.0055	0.000704	4,884
4.01	6.00	72.1	63.3	8.8	5.92	5.20	0.721	0.0086	0.0087	0.0086	0.001097	4,738
4.01	8.00	96.1	84.7	11.4	7.90	6.96	0.937	0.0113	0.0114	0.0114	0.001445	4,815
4.01	10.00	120.4	106.3	14.1	9.89	8.73	1.159	0.0146	0.0147	0.0147	0.001861	4,689
2.00	2.00	23.6	19.8	3.8	1.94	1.63	0.310	0.0033	0.0035	0.0034	0.000430	3,784
2.00	4.00	47.7	41.6	6.0	3.91	3.42	0.495	0.0077	0.0080	0.0079	0.000999	3,421
2.00	6.00	72.0	63.4	8.6	5.91	5.21	0.704	0.0116	0.0119	0.0118	0.001494	3,488
2.00	8.00	96.2	85.1	11.1	7.90	6.99	0.913	0.0149	0.0152	0.0151	0.001916	3,646
2.00	10.00	120.3	106.9	13.3	9.88	8.78	1.096	0.0197	0.0197	0.0197	0.002503	3,507

Laboratory Compaction Characteristics of Soil

4701 North Stiles Ave.
Oklahoma City, OK 73105
(405) 525 0453

Client Name: Atkins North America, Inc.
Project Name: AHTD Job No. CA 1003, Hwy 412 Light Bypass
Location: Lawrence and Greene Counties, Arkansas

Source Material: Bulk 76BP (0.0 - 5.0')
Sample Description: Lean clay

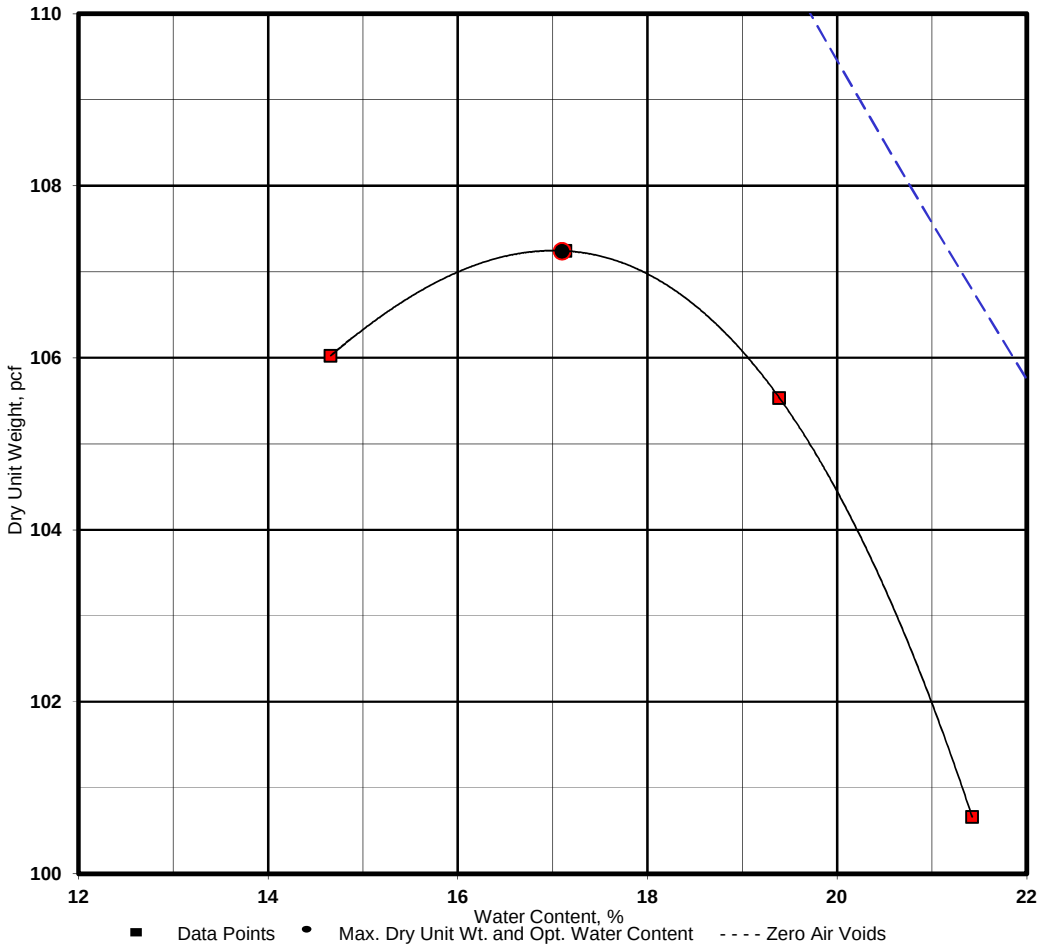
Material Designation: _____ Sample date: _____
Test Method: _____
Test Procedure: AASHTO T-99
Sample Preparation: Dry
Rammer: X Mechanical ____ Manual

Project No.: 35135121 Date: 11/06/17

TEST RESULTS
Maximum Dry Unit Wt.: 107.2 pcf
Optimum Water Content: 17.1 %

Liquid Limit: 48 Plastic Limit: 15
Plasticity Index: 33
% passing # 200 sieve: 93
AASHTO Class. A-7-6 USCS: CL
Reviewed by: _____

Zero air voids for specific gravity of 2.70



Terracon

Resilient Modulus Testing - AASHTO T 307-99 English Units

Report Date: 27-Nov-17
Lab No.: 35135121 RM#154 omc retest
Project No.: 35135121

Soil Map Unit: Bulk 76BP OMC
Soil Symbol: 0
Depth (in.) 0 - 60
Compaction Method Static
Max. Dry Density (pcf) 107.2
Opt. Moisture Content (%) 17.1
Inside Mold Diameter (in) 3.94

Weight of Wet Soil (lb) 6.42
Initial Sample Diameter (in) 3.94
Initial Sample Height (in) 7.87
Initial Sample Area (in^2) 12.17
Sample Volume (in^3) 95.86
Compacted Moisture Content(%) 17.6
Wet Density (pcf) 115.6
Dry Density (pcf) 98.3

Test Date: November 15, 2017

Final Sample Height (in) 7.9
Final Sample Wet Weight (lb) 6.41
Final Moisture Content (%) 17.3
Accumulated Strain (%) 0.15

Percent Passing No. 10 0
Percent Passing No. 200 0.0
Liquid Limit 0
Plasticity Index 0

Chamber Confining Pressure (S_3) psi	Nominal Maximum Axial Stress (S_{cyclic}) psi	Actual Applied Max. Axial Load (P_{max}) lb	Actual Applied Cyclic Load (P_{cyclic}) lb	Actual Applied Contact Load ($P_{contact}$) lb	Actual Applied Max. Axial Stress (S_{max}) psi	Actual Applied Cyclic Stress (S_{cyclic}) psi	Actual Applied Contact Stress ($S_{contact}$) psi	Recov. Def. LVDT #1 Reading (H_1) in	Recov. Def. LVDT #2 Reading (H_2) in	Average Recov. Def. LVDT 1 and 2 (H_{avg}) in	Resilient Strain (ϵ_r) in/in	Resilient Modulus (M_r) psi
6.00	2.00	23.7	20.4	3.3	1.95	1.67	0.275	0.0012	0.0013	0.0013	0.000160	10,473
6.00	4.00	47.6	41.9	5.6	3.91	3.44	0.464	0.0028	0.0029	0.0029	0.000368	9,369
6.00	6.00	72.0	63.7	8.3	5.91	5.23	0.682	0.0052	0.0053	0.0053	0.000667	7,842
6.00	8.00	96.7	85.1	11.6	7.94	6.99	0.955	0.0084	0.0086	0.0085	0.001079	6,477
6.00	10.00	121.0	106.6	14.4	9.94	8.76	1.183	0.0122	0.0122	0.0122	0.001546	5,663
4.01	2.00	23.9	20.0	3.9	1.96	1.64	0.317	0.0014	0.0014	0.0014	0.000175	9,392
4.01	4.00	48.1	41.7	6.4	3.95	3.43	0.525	0.0032	0.0033	0.0033	0.000415	8,253
4.01	6.00	72.4	63.4	8.9	5.94	5.21	0.733	0.0058	0.0059	0.0058	0.000738	7,061
4.01	8.00	96.6	85.2	11.4	7.94	7.00	0.936	0.0089	0.0090	0.0090	0.001140	6,142
4.01	10.00	120.7	106.7	14.0	9.91	8.76	1.147	0.0125	0.0125	0.0125	0.001584	5,533
2.00	2.00	23.8	20.2	3.6	1.95	1.66	0.295	0.0017	0.0016	0.0016	0.000208	7,959
2.00	4.00	48.0	41.8	6.1	3.94	3.44	0.503	0.0038	0.0037	0.0037	0.000472	7,278
2.00	6.00	72.2	63.7	8.5	5.93	5.23	0.697	0.0064	0.0064	0.0064	0.000816	6,415
2.00	8.00	96.4	85.2	11.2	7.92	7.00	0.920	0.0096	0.0096	0.0096	0.001221	5,734
2.00	10.00	120.6	106.9	13.6	9.90	8.78	1.121	0.0132	0.0132	0.0132	0.001677	5,237

Terracon

Resilient Modulus Testing - AASHTO T 307-99 English Units

Report Date: 27-Nov-17
Lab No.: 35135121 RM#154 omc+2 retest
Project No.: 35135121

Soil Map Unit: Bulk 76BP OMC+2%
Soil Symbol: 0
Depth (in.) 0 - 60
Compaction Method Static
Max. Dry Density (pcf) 107.2
Opt. Moisture Content (%) 17.1
Inside Mold Diameter (in) 3.94

Weight of Wet Soil (lb) 6.53
Initial Sample Diameter (in) 3.94
Initial Sample Height (in) 7.87
Initial Sample Area (in^2) 12.17
Sample Volume (in^3) 95.86
Compacted Moisture Content(%) 19.5
Wet Density (pcf) 117.6
Dry Density (pcf) 98.4

Test Date: November 15, 2017

Final Sample Height (in) 7.8
Final Sample Wet Weight (lb) 6.52
Final Moisture Content (%) 19.5
Accumulated Strain (%) 0.42

Percent Passing No. 10 0
Percent Passing No. 200 0.0
Liquid Limit 0
Plasticity Index 0

Chamber Confining Pressure (S_3) psi	Nominal Maximum Axial Stress (S_{cyclic}) psi	Actual Applied Max. Axial Load (P_{max}) lb	Actual Applied Cyclic Load (P_{cyclic}) lb	Actual Applied Contact Load ($P_{contact}$) lb	Actual Applied Max. Axial Stress (S_{max}) psi	Actual Applied Cyclic Stress (S_{cyclic}) psi	Actual Applied Contact Stress ($S_{contact}$) psi	Recov. Def. LVDT #1 Reading (H_1) in	Recov. Def. LVDT #2 Reading (H_2) in	Average Recov. Def. LVDT 1 and 2 (H_{avg}) in	Resilient Strain (ϵ_r) in/in	Resilient Modulus (M_r) psi
6.00	2.00	22.9	18.8	4.1	1.88	1.54	0.334	0.0016	0.0014	0.0015	0.000190	8,133
6.00	4.00	45.9	39.6	6.3	3.77	3.26	0.514	0.0038	0.0036	0.0037	0.000474	6,875
6.01	6.00	70.0	60.9	9.1	5.75	5.00	0.746	0.0075	0.0073	0.0074	0.000941	5,314
6.00	8.00	94.5	81.9	12.7	7.76	6.72	1.041	0.0124	0.0122	0.0123	0.001563	4,300
6.00	10.00	118.5	103.3	15.2	9.73	8.48	1.246	0.0183	0.0182	0.0183	0.002318	3,659
4.01	2.00	23.5	19.0	4.5	1.93	1.56	0.370	0.0018	0.0017	0.0017	0.000220	7,073
4.01	4.00	47.1	40.3	6.8	3.86	3.31	0.559	0.0046	0.0044	0.0045	0.000569	5,806
4.01	6.00	70.8	61.3	9.5	5.81	5.04	0.778	0.0086	0.0084	0.0085	0.001081	4,661
4.01	8.00	94.8	82.8	12.1	7.79	6.80	0.990	0.0136	0.0133	0.0134	0.001707	3,983
4.01	10.00	118.4	103.9	14.5	9.73	8.53	1.193	0.0193	0.0191	0.0192	0.002438	3,500
2.00	2.00	23.1	19.0	4.1	1.90	1.56	0.335	0.0020	0.0020	0.0020	0.000255	6,132
2.00	4.00	46.9	40.6	6.4	3.86	3.33	0.525	0.0053	0.0051	0.0052	0.000661	5,042
2.00	6.00	71.0	62.2	8.8	5.83	5.11	0.722	0.0097	0.0096	0.0096	0.001225	4,172
2.00	8.00	95.0	83.5	11.4	7.80	6.86	0.939	0.0150	0.0148	0.0149	0.001890	3,630
2.00	10.00	118.8	104.9	13.9	9.75	8.61	1.142	0.0210	0.0207	0.0209	0.002648	3,252

APPENDIX C
SUPPORTING DOCUMENTS

GENERAL NOTES

DRILLING & SAMPLING SYMBOLS:

SS:	Split Spoon - 1-3/8" I.D., 2" O.D., unless otherwise noted	HS:	Hollow Stem Auger
ST:	Thin-Walled Tube – 2" O.D., 3" O.D., unless otherwise noted	PA:	Power Auger (Solid Stem)
RS:	Ring Sampler - 2.42" I.D., 3" O.D., unless otherwise noted	HA:	Hand Auger
DB:	Diamond Bit Coring - 4", N, B	RB:	Rock Bit
BS:	Bulk Sample or Auger Sample	WB	Wash Boring or Mud Rotary

The number of blows required to advance a standard 2-inch O.D. split-spoon sampler (SS) the last 12 inches of the total 18-inch penetration with a 140-pound hammer falling 30 inches is considered the "Standard Penetration" or "N-value".

WATER LEVEL MEASUREMENT SYMBOLS:

WL:	Water Level	WS:	While Sampling	BCR:	Before Casing Removal
WCI:	Wet Cave in	WD:	While Drilling	ACR:	After Casing Removal
DCI:	Dry Cave in	AB:	After Boring	N/E:	Not Encountered

Water levels indicated on the boring logs are the levels measured in the boring at the times indicated. Groundwater levels at other times and other locations across the site could vary. In pervious soils, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of groundwater levels may not be possible with only short-term observations.

DESCRIPTIVE SOIL CLASSIFICATION: Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

CONSISTENCY OF FINE-GRAINED SOILS

Unconfined Compressive Strength, Qu,	Standard Penetration or N-value (SS)	Consistency
< 500	0 - 1	Very Soft
500 – 1,000	2 - 4	Soft
1,000 – 2,000	4 - 8	Medium Stiff
2,000 – 4,000	8 - 15	Stiff
4,000 – 8,000	15 - 30	Very Stiff
8,000+	> 30	Hard

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Standard Penetration or N-value (SS) Blows/Ft.	Relative Density
0 – 3	Very Loose
4 – 9	Loose
10 – 29	Medium Dense
30 – 50	Dense
> 50	Very Dense

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 – 29
Modifier	≥ 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to
Sand	#4 to #200 sieve (4.75 to
Silt or Clay	Passing #200 Sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 – 12
Modifier	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1-10
Medium	11-30
High	> 30

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	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 $1 > Cc > 3$ [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 $1 > Cc > 3$ [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" line [J]		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-in. (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] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 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 ≥ 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 ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

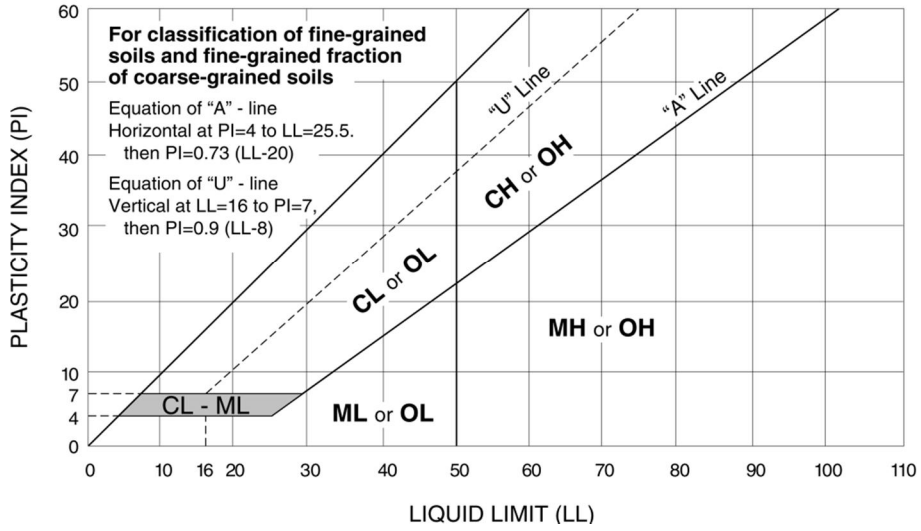
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 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.



AASHTO SOIL CLASSIFICATION SYSTEM

General classification	Silt-clay materials (more than 35% of total sample passing No. 200)			
Group classification	*A-4*	*A-5*	*A-6*	*A-7* *A-7-5** *A-7-6†*
Sieve analysis (percent passing)				
No. 10				
No. 40				
No. 200	36 min.	36 min.	36 min.	36 min.
Characteristics of fraction passing No. 40				
Liquid limit	40 max.	41 min.	40 max.	41 min.
Plasticity index	10 max.	10 max.	11 min.	11 min.
Usual types of significant constituent materials	Silty soils		Clayey soils	
General subgrade rating	Fair to poor			

*For A-7-5, $PI \leq LL - 30$
†For A-7-6, $PI > LL - 30$

General classification	Granular materials (35% or less of total sample passing No. 200)						
	A-1			*A-2*			
Group classification	*A-1-a*	*A-1-b*	*A-3*	*A-2-4*	*A-2-5*	*A-2-6*	*A-2-7*
Sieve analysis (percent passing)							
No. 10	50 max.						
No. 40	30 max.	50 max.	51 min.				
No. 200	15 max.	25 max.	10 max.	35 max.	35 max.	35 max.	35 max.
Characteristics of fraction passing No. 40							
Liquid limit				40 max.	41 min.	40 max.	41 min.
Plasticity index	6 max.		NP	10 max.	10 max.	11 min.	11 min.
Usual types of significant constituent materials	Stone fragments, gravel, and sand		Fine sand	Silty or clayey gravel and sand			
General subgrade rating	Excellent to good						

Shoulder Survey Report

Revision 1
AHTD Job No. CA 1003
Highway 67 – Highway 141 (Widening) (S)
FAP NO.9991
Highway 412, Lawrence and Greene Counties, Arkansas
January 22, 2018
Terracon Project No. 35135121

Prepared for:
Atkins North America, Inc.
Dallas, Texas

Prepared by:
Terracon Consultants, Inc.
Little Rock, Arkansas

January 22, 2017

Terracon

Atkins North America, Inc.
18383 Preston Road
Dallas, Texas 75252

Attn: Ms. Jenelle N. Romero, P.E.
P: [972] 588 3124
C: [214] 392 5438
F: [972] 380 2609
E: jenelle.romero@atkinsglobal.com

Re: Shoulder Survey Report, Revision 1
AHTD Job No. CA1003
Highway 67 – Highway 141 (Widening) (S)
FAP No. 9991
Highway 412, Lawrence and Greene Counties, Arkansas
Terracon Project No. 35135121

Dear Ms. Romero:

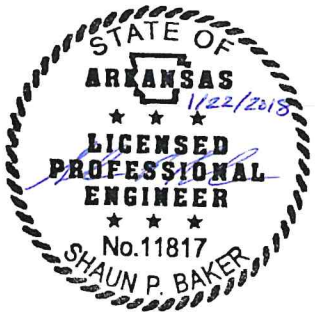
Terracon Consultants, Inc. (Terracon) has completed the shoulder survey services for the above-referenced project. The project was authorized per the Master Services Agreement signed December 16, 2011. This report presents the findings of the field exploration performed for AHTD Job No. CA1003, Highway 67 – Highway 141 (Widening) (S) project along Highway 412 in Lawrence and Greene Counties, Arkansas.

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 12/31/2019

Kimberly A. Daggitt, P.E.
Project Engineer

Shaun P. Baker, P.E.
Senior Project Engineer
Arkansas No. 11817



Daniel E. Pickett, P.E. (TX and LA)
Senior Geotechnical Engineer

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SHOULDER SURVEY REPORT, REVISION 1
AHTD JOB NO. CA 1003, HIGHWAY 67 – HIGHWAY 141 (WIDENING) (S)
HIGHWAY 412, LAWRENCE AND GREENE COUNTIES, ARKANSAS

Terracon Project No. 35135121

January 22, 2018

1.0 INTRODUCTION

This report presents the results of the shoulder survey performed for the AHTD CA 1003, Highway 67 – Highway 141 (Widening) (S) project along Highway 412 in Lawrence and Greene Counties, Arkansas. Geotechnical engineering reports for structures and the Light Bypass are issued separately of this report. Ninety-two exploratory borings extending to depths of approximately 10 feet below existing ground surface were drilled in the planned widening. The boring logs, site plan and boring location plan are appended.

2.0 PROJECT INFORMATION

2.1 Project Description

Item	Description
Site layout	See Appendix A, Exhibit A-1 Boring Location Plans, Exhibits A-2 through A-9
Structures	We understand the project involves widening about 14.4 miles of Highway 412 between Highway 67 and Highway 141 in Lawrence and Greene Counties, Arkansas. The planned widening will change the road configuration from a two-lane highway to a four-lane highway (two lanes each direction). Construction will include: n overlaying the existing asphalt pavement n constructing new asphaltic concrete pavement for the widening n widening or constructing new bridges n extending and/or replacing culverts

2.2 Site Location and Description

Item	Description
Location	See Appendix A, Exhibit A-1, Site Location Plan. Begin Sta. 93+50.00, End Sta. 853+01.68 Approximately 14.4 miles of Highway 412 between Highway 67 and Highway 141 in Lawrence and Greene Counties, Arkansas.
Existing improvements	Two-lane highway. The existing section is asphaltic concrete with paved shoulder on both sides of the highway.
Grading/Slopes	Based on the Final Submittal Plans, most of the highway will remain near existing grade. We estimate maximum cuts and fills of about 4 feet and 14 feet, respectively, based on the 90% Submittal Plans. Final slopes are designed at or flatter than 3H:1V, typically at 3H:1V and 6H:1V

3.0 SUBSURFACE CONDITIONS

3.1 Geology

Formation [1]	Description [2]
Terrace Deposits **Quaternary Period** **Pleistocene Epoch**	The terrace deposits include a complex sequence of unconsolidated gravels, sandy gravels, sands, silty sands, silts, clayey silts, and clays. The individual deposits are often lenticular and discontinuous. At least three terrace levels are recognized with the lowest being the youngest. Fossils are rare. The lower contact is unconformable and the thickness is variable.
Alluvium (Local Streams or Overbank Flow) **Quaternary Period** **Holocene Epoch**	These deposits are alluvial deposits of small streams, the overbank deposits of major streams, or older meander belt deposits of major streams. The partition of this unit from other Holocene alluvial deposits was based more on geomorphic considerations than lithology or age. Fossils are rare. The lower contact is unconformable and the thickness is variable.

Continued from page 2

Formation [1]	Description [2]
Dune Sand **Quaternary Period** **Pleistocene Epoch**	The sand dunes generally consist of homogeneous, massive, well-sorted, tan or buff to grayish- or reddish-brown, fine sands. Cross-stratification and bedding features are lacking in the interval, apparently due to extensive weathering and biogenic reworking. These sands are thought to be derived from glacial outwash originally deposited along major drainages during the initial stages of interglacial times. The dunes are best developed on the east sides of the White, Current, and Black Rivers. The dune sand fines with distance from these rivers. Dunes are present on all terrace levels, but not on present-day alluvium. No significant fossils have been discovered associated with these sands. The lower contact seems to be unconformable in most places.

1. "Geologic Map of Arkansas", published by the United States Geological Survey, 1993.
2. "Stratigraphic Summary of Arkansas", published by the Arkansas Geological Commission, 1998.

Based on the information published in the USDA Natural Resources Conservation Service "Soil Survey of Lawrence County, Arkansas" and "Soil Survey of Greene County, Arkansas" the site can be broadly divided into seventeen soil map units.

Lawrence County

Beulah Sandy Loam – This soil consists of excessively drained, undulating soils on the higher parts of older natural levees and on dunes of windblown sediments high in content of sand along creeks and abandoned river channels. They have moderately rapid permeability and water capacity is medium to low. These soils formed in stratified loamy and sandy sediments. The surface layer is brown sandy loam about 10 inches thick. The subsoil is brown and yellowish brown fine sandy loam 26 inches thick. The underlying material is yellowish brown loamy sand to a depth of 72 inches or more.

Bosket Fine Sandy Loam – This soil is found in alternating areas of long, narrow swales and low ridges. The soil is typically considered well drained with moderate permeability and medium water capacity. These soils formed in stratified beds of dominantly loamy alluvial sediments and some windblown sediments high in content of sand. The surface layer is about 8 inches of dark brown fine sandy loam over 6 inches of brown fine sandy loam. The upper 16 inches of the subsoil is brown loam, and the lower 7 inches is brown fine sandy loam. The underlying material is yellowish brown loamy sand to a depth of 72 inches or more.

Crowley Silty Loam – This consists of poorly drained, level soils on broad upland flats. These soils formed in a thin layer of loamy sediments of eolian or alluvial origin, high in content of silt, and the underlying clayey sediments. The surface layer is typically dark grayish brown silt loam about 7 inches thick. The subsurface layer is light brownish gray, mottled silt loam 2

inches thick. The upper 30 inches of the subsoil is grayish brown silty clay that is mottled in the upper 9 inches. The lower part is olive gray, mottled silty clay loam to a depth of 72 inches or more.

Dubbs Silt Loam – This series consists of well drained, level and undulating soils mainly on the tops and sides of natural levees. These soils formed in stratified beds of loamy sediments. The surface layer is brown silt loam about 8 inches thick. The upper 4 inches of the subsoil is brown silt loam; the next 15 inches is brown silty clay loam; and the lower 18 inches is brown, mottled silt loam. The underlying material is light brownish gray, mottled very fine sandy loam to a depth of 72 inches or more. They are moderately permeable with a high water capacity.

Foley-Calhoun Complex –This complex is typically located on broad flats and their profiles are described by their representative series. It is about 45 percent Foley silt loam, 35 percent Calhoun Silt loam, and 20 percent Crowley, Jackport, Lafe, and McCrory soils. The representative profile for the Foley series includes: dark grayish brown silt loam about 7 inches thick at the surface, grayish brown silt loam 4 inches thick and mottled with gray and dark grayish brown, the upper 12 inches of subsoil is grayish brown silt loam with tongues of the gray and grayish brown silt loam that extend down, olive gray silty clay loam for the next 31 inches, and olive gray mottled silt loam to a depth of 72 inches. Calhoun soils consist of the following profile: dark grayish brown silt loam about 7 inches thick, gray mottled silt loam 6 inches thick, gray mottled silt loam with tongues of gray silt about 6 inches thick, 14 inches of grayish brown silty clay loam, 17 inches of grayish brown, mottled siltly clay loam, finally gray mottled silt loam.

Hillemann Silt Loam – This soil consists of somewhat poorly drained, level soils at higher elevations on broad flats. These soils formed in dominantly loamy eolian or alluvial sediments that are high in content of silt. The surface layer is grayish brown, mottled silt loam 4 inches thick. The upper 5 inches of the subsoil is light brownish gray, mottled silt loam; the next 9 inches is grayish brown, mottled silty clay loam; the next 10 inches is grayish brown, mottled silty clay loam; and the lower 31 inches is light brownish gray, mottled silt loam. The underlying material is yellowish brown, mottled very fine sandy loam to a depth of 72 inches or more.

Jackport Silty Clay – the Jackport series consists of poorly drained, level soils in abandoned backswamps. These soils formed in beds of dominantly clayey sediments. In a representative profile the surface layer is 8 inches of dark grayish brown silty clay that is mottled in the lower 3 inches. The upper 8 inches of the subsoil is dark grayish brown silty clay, the next 10 inches is grayish brown, mottled clay. The lower 6 inches is grayish brown clay. The underlying material to a depth of 72 inches or more is olive gray mottled silty clay, silty clay loam, and fine sandy loam.

Lafe-Foley Complex – This complex consists of somewhat poorly drained soils on broad flats. They formed in beds of loamy eolian or alluvial sediments that are high in content of silt. The surface layer is brown silt loam about 7 inches thick. The subsurface layer is grayish brown, mottled silt loam 3 inches thick. The upper 10 inches of the subsoil is yellowish brown, mottled silt loam. The underlying material is light brownish gray, mottled silt loam that extends to a depth of 72 inches or more.

McCrory Fine Sandy Loam – consists of poorly drained, level soils on broad flats and lower parts of natural levees. These soils formed in beds of loamy alluvial sediments. In a representative profile the surface layer is dark grayish brown fine sandy loam about 8 inches thick. The subsurface layer is gray, mottled fine sandy loam about 4 inches thick. The upper 8 inches of the subsoil is dark gray mottled fine sandy loam, the next 12 inches is dark gray loam, and the underlying material is grayish brown loamy fine sand to a depth of 72 inches or more.

Greene County

Askew Series – The Askew series consists of somewhat poorly drained soils that formed in stratified beds of loamy alluvium on natural levees of the St. Francis and Cache Rivers and their tributaries. The slope ranges from 0 to 3 percent. The surface layer is dark-brown to grayish-brown fine sandy loam 6 to 11 inches thick. The subsoil is 18 to 25 inches of yellowish-brown to dark yellowish-brownish silty clay loam or clay loam mottled with shades of gray and brown. Below this is sandy loam to sand mottled in shades of brown and gray. Permeability is moderately slow and water capacity is moderate.

Bulltown Loamy Fine Sand – This soil consists of very deep, somewhat excessively drained, moderately rapidly permeable soils that formed in sandy, eolian deposits. These soils are on nearly level to moderately sloping dunes on terraces. The top 4 inches consist of dark yellowish brown loamy fine sand with the following 4 inches more brown in color. The subsoil is a dark yellowish brown loamy fine sand with a thickness of about 18 inches. From 26 to 37 inches there is a brown fine sandy loam which leads into the underlying material consisting of brown sandy clay loam from 37 to 51 inches. Permeability is moderately rapid.

Calloway Silt Loam – This soil consists of somewhat poorly drained soils that formed in a thick layer of silt. It can be found on broad flats and low ridges on the loessal plain adjacent to Crowley Ridge. The surface layer is dark-brown to light brownish-gray silt loam 4 to 10 inches thick. The subsoil is grayish-brown to light brownish-gray silty clay loam mottled with gray and yellowish brown. A gray and yellowish-brown, mottled fragipan begins at a depth of 16 to 22 inches and is 16 to 48 inches thick. The fragipan restricts the movement of water and excess water is a moderate hazard.

Foley-Bonn Complex – This complex is typically found along stream terraces. The surface layer is comprised of dark grayish brown silt loam about 3 inches thick. Gray silt loam with

iron accumulations underlie the surface layer and measures about 11 inches thick. From 14 to 23 inches, gray silty clay loam and light brownish gray silt loam is found. Gray silty clay loam with iron accumulations underlie this layer and is typically found between 23 to 37 inches. Finally at 37 to 72 inches lies grayish brown silt loam with iron accumulations.

Forestdale Silty Clay Loam – This soil consists of poorly drained soils that formed in the stratified beds of loamy and clayey alluvium. It is found on old natural levees. The surface layer is dark grayish-brown to light brownish-gray silt loam, 4 to 7 inches thick. The subsoil is gray or grayish-brown silty clay underlain by gray or light brownish-gray loam to sand. It has slow permeability and moderate water capacity.

Lafe Silt Loam – This soil consists of poorly drained to somewhat poorly drained soils that formed in a thick layer of silt. It is found on flats and low ridges of the loessal plain and on low flats within Crowley Ridge. The surface layer is dark grayish-brown or grayish-brown silt loam 3 to 5 inches thick. The upper part of the subsoil is grayish-brown to light brownish-gray silty clay loam mottled with yellowish brown and dark brown. The lower part is grayish-brown to light-gray, mottled silt loam or silty clay loam. The soil has very low water capacity and very slow permeability.

McCrory Fine Sandy Loam – consists of poorly drained, level soils on broad flats and lower parts of natural levees. These soils formed in beds of loamy alluvial sediments. In a representative profile the surface layer is dark grayish brown fine sandy loam about 8 inches thick. The subsurface layer is gray, mottled fine sandy loam about 4 inches thick. The upper 8 inches of the subsoil is dark gray mottled fine sandy loam, the next 12 inches is dark gray loam, and the underlying material is grayish brown loamy fine sand to a depth of 72 inches or more.

Wiville Fine Sandy Loam - The Wiville series consists of very deep, well drained, moderately permeable soils that formed in eolian deposits. In a representative profile the surface layer consists of 5 inches of dark yellowish brown fine sandy loam. From 5 to 11 inches; dark yellowish brown fine sandy loam. Underlying this layer, from 11 to 18 inches is brown fine sandy loam. Brown fine sandy loam is found at 18 to 27 inches. Beneath this layer from 27 to 56 inches brown sandy clay loam with a blocky structure is observed. From 56 to 64 inches dark yellowish brown fine sandy loam can be seen. Finally the underlying material consists of yellowish brown fine sand at a depth of 72 inches or more.

The soil map units described in this section were obtained by locating the subject site on available large-scale soil survey maps. Due to the scales involved, precise location of the borings can be difficult to determine. In addition, the large scale soil survey maps describe only general trends. Local variations are possible and site-specific soil conditions may differ from those described above. A site-specific detailed soil survey was not included in our scope of work for this project.

3.2 Typical Profile

Based on the results of the borings, subsurface conditions at the pavement borings are comprised of fat clays with variable amounts of sand, silty clays, clayey sands, silts, and poorly graded sands. Upper soil in a few borings was identified as fill soil. Conditions and details observed at the boring locations are indicated on the boring logs included in Appendix A. Stratification boundaries on the boring logs represent the approximate location of changes in soil types; in-situ, the transition between materials may be gradual.

Atterberg limits (liquid limit and plastic limit) tests were performed on representative samples of cohesive native soils. The tested native soils were classified as having very low to high plasticity with liquid limits ranging between 17 and 75 and plasticity indices ranging between 1 and 51. The laboratory test results are shown on the boring logs in Appendix A. A description of the laboratory testing program is provided in Appendix B.

3.3 Groundwater

The boreholes were observed while drilling and after completion for the presence and level of groundwater. Groundwater was not observed in the borings at these times. Water level observations in the boreholes can be found on the boring logs included in Appendix A. Though groundwater was not observed in the borings, perched water could develop at shallow depths, at or near the lean clay and fat clay interface. Apparent perched water was observed in the existing ditches at the time of the field exploration.

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 indicated on the boring logs. Longer observation in piezometers or observation wells sealed from the influence of surface water are often required to define groundwater levels in these soil types. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

3.4 Shoulder Soil Survey

Terracon drilled a total of 92 borings, designated as B-1 through B-92, for this project at the approximate locations shown on the attached boring location plans in Appendix A. The borings were drilled in the proposed widening areas and spaced approximately 800 feet apart on alternating sides of the road. The boring locations were selected in consultation with the client, and were generally near the edge of the outside slopes of the parallel drainage ditches on both sides of the existing highway.

Water content and classification tests were performed on selected soil samples obtained from the borings. Classification, moisture-density relationship (standard Proctor) and resilient

modulus tests were performed on the seven bulk samples representing the major pedological map units obtained from various locations. The results of these tests are in Appendix B. Based on the results of the laboratory testing, the anticipated upper subgrade soils in pavement areas represented by Borings B-1 through B-33 have AASHTO classifications predominantly of A-7 and A-6, while upper soils in areas represented by Borings B-34 through B-92 are predominantly A-6 and A-4 with a significant amount of A-7 soils.

4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

4.1 Geotechnical Considerations

Based upon the field penetration resistance values, moisture content values and the classification test results, it is our opinion that the native soils or new engineered fill should be able to support new pavements.

Low-strength (SPT N-values of 5 blows per foot or less) soils were encountered at several borings to depths of about 3.5 feet below the existing ground surface. A summary of the low-strength areas is presented in the following table:

Boring Locations	Stations	Weak Soil Thickness (ft)
B-2	98+00	0 to 2
B-6 and B-7	130+00 and 138+00	0 to 2
B-22	258+00	0 to 2
B-34	352+00	0 to 2
B-38	384+00	0 to 2
B-46	456+00	0 to 2
B-51	496+00	0 to 2
B-54	520+00	0 to 5
B-56	536+00	0 to 2
B-58	552+00	0 to 2
B-61	576+00	0 to 2 and 8 to 10
B-63 through B-69	592+00 through 640+00	0 to 2, 0 to 3.5, or 2 to 5
B-72	664+00	0 to 5
B-74	680+00	0 to 3.5
B-78	717+00	0 to 2
B-80	730+00	0 to 3.5
B-82 through B-85	749+00 to 773+00	0 to 2 or 0 to 3.5
B-90 through B-92	813+00 to 829+00	0 to 2 or 2 to 3.5

Borings B-61 through B-74 were drilled along the existing highway. The station values provided are based on the existing highway stations. Supplemental borings for the planned bypass around Light, Arkansas were drilled in October 2017, and these borings are issued in a separate report

Additionally, the lean clay/silty lean clay soils encountered at this site are susceptible to further strength loss with moisture content increases. In their present condition, the low-strength soils are not suitable for supporting new fill or pavements. We expect that ground improvement will be required to support fills and pavement layer and difficult construction conditions will exist during site preparation and grading due to the presence of the near-surface low-strength soils. Ground improvement alternatives are discussed in Section **4.2 Earthwork**. We strongly recommend the geotechnical engineer be retained to evaluate the site conditions during site grading and construction and provide ground improvement recommendations based on the actual conditions. The pavement subgrade soils should be evaluated, tested and improved as necessary as described in this report.

Fat clay soils were observed in many of the borings. The fat clays have high plasticity and are subject to shrinking and swelling with variations in moisture content. These shrink/swell movements can be detrimental to pavement surfaces. Although it may not be possible to eliminate all shrink/swell movement of the fat clay soils, we recommend replacing at least a 3.5-foot thickness of the fat clays with a low-volume change, engineered fill or chemically treating the native fat clays to reduce the amount of shrink/swell movement of the subsurface soils.

Highway construction for this project should be performed in accordance with applicable sections of the Arkansas Highway and Transportation Department (AHTD) Standard Specification for Highway Construction, 2014 edition.

4.2 Earthwork

Earthwork should be performed as required in the Arkansas State Highway and Transportation Department *"Standard Specifications for Highway Construction"*, 2014 edition. The following presents general recommendations for site preparation, excavation, subgrade preparation and placement of engineered fills on the project. The evaluation of earthwork should include overexcavation operations, observation and testing of engineered fills, subgrade preparation, and other geotechnical conditions exposed during construction of the project.

4.2.1 Site Preparation

Where new pavement is planned, all surface vegetation, topsoil, existing pavements, tree roots and stumps and any surface or subsurface structures from previous site use should be removed full-depth. Excavations resulting from the removal of any surface or subsurface structures should be cleaned of all loose and disturbed material before placing fill. Soils containing organic matter, debris or deleterious matter should not be used as engineered fill.

Existing drainage ditches that are disturbed during construction will need to be drained of any water and mucked out to remove all low-strength soils. All organic and deleterious material should be removed full-depth. Fills placed within the drainage ditch should be benched into the ditch side slopes as the fill placement progresses vertically. The benches should be cut at an equivalent 6H:1V slope. For example, each bench cut 1 foot deep should be at least 6 feet wide. Additionally, the benches should be wide enough for proof-rolling and compaction equipment to sufficiently compact new fill to meet the compaction requirements in Section **4.2.3 Compaction Requirements**.

Areas requiring new fill placement should be initially graded to create a relatively level surface to receive fill and to provide for a relatively uniform thickness of fill beneath the roadway. The exposed subgrade should be proof-rolled with heavy construction equipment such as a loaded tandem-axle dump truck weighing at least 25 tons to aid in locating unstable subgrade materials and prior to placing fills to confirm there are no unstable areas that could prevent proper compaction of additional fills. If unstable areas are noted, the geotechnical engineer should be notified to provide supplemental recommendations.

All exposed subgrade areas, once properly cleared and effectively proof-rolled, should be scarified to a maximum depth of 12 inches, conditioned to near optimum moisture content and compacted. Subgrade soils exposed to the elements for an extended period of time should be checked for density and moisture content prior to placing additional fill and/or constructing pavements. During construction of the subgrade, exposed surfaces should be graded to prevent water from ponding adjacent to the existing roadway pavement and on the exposed subgrade.

It is anticipated excavations for the proposed construction can be accomplished with conventional earthmoving equipment.

The stability of subgrade soils may also be affected by precipitation, repetitive construction traffic or other factors. If unstable conditions are encountered or develop during construction, workability can be improved by overexcavating the wet, unstable zones and moisture conditioning and recompacting them, or by removing and replacing full-depth with new engineered fill. Use of lime and fly ash could also be considered as a ground improvement alternative. Laboratory evaluation is recommended to determine the effect of chemical treatment on subgrade soils prior to construction. The use of lime is further discussed in Section 4.2.4 **Lime Treated Subgrade**.

4.2.2 Import Material Specifications

Fill materials should be free of organic matter and debris. Clean on-site soils or approved imported borrow materials may be used as fill material. Most of the natural soils observed at the boring locations appear to be suitable for use as engineered fill. The fat clay (CH) soils observed at the boring locations typically exhibited plasticity index values greater than 20. If

it is desired to use the on-site fat clay soils as engineered fill for this project, we recommend limiting their use to depths greater than 2 feet below finished pavement subgrade elevation. While the AHTD has no specific requirements for borrow materials, they do require that the materials must be capable of forming and maintaining a 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. Clay soils should exhibit well-defined moisture-density relationships.

We suggest that on-site and imported soils for borrow (if required) should meet the following material property requirements:

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

- Plasticity Index……..20 (max)

4.2.3 Compaction Requirements

Engineered fill should be placed and compacted in horizontal lifts, using equipment and procedures that will produce recommended moisture contents and densities throughout the lift.

Item	Description
Fill maximum lift thickness	10 inches or less in loose thickness
Compaction requirements [1]	At least 95% of the material’s standard Proctor maximum dry density (AASHTO T 99) This density will not be required immediately adjacent to wingwalls of box culverts
Moisture content of cohesive material [1]	Within ±2 percentage points of the material’s optimum moisture content value as determined by the standard Proctor test (AASHTO T 99) at the time of compaction
Moisture content of granular material [2]	Workable moisture levels

1. We recommend engineered fill be tested for moisture content and compaction during placement (AASHTO T-310 or AHTD Test Method 347 or 348). Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified moisture and compaction requirements are achieved.
2. Specifically, moisture levels should be maintained low enough to allow for satisfactory compaction to be achieved without the fill material pumping when proof-rolled.

4.2.4 Lime Treated Subgrade

Low-strength (SPT N-values of 5 blows per foot or less) soils were encountered at several borings to depths of about 2 to 5 feet below the existing ground surface. To improve the subgrade conditions, use of lime could be considered as a treatment technique, as outlined in Section 301 of AHTD – Standard Specifications for Highway Construction, 2014 edition. Laboratory evaluation is recommended to determine the effect of chemical treatment on subgrade soils prior to construction. Lime treatment is intended to improve weak subgrade soil, and the lime treatment subgrade is not considered a structural component of the pavement section.

The lime should be mixed into the upper 12 inches of the soils exposed at plan finished subgrade elevations. Using this chemical additive, the effectiveness of the chemical treatment will be dependent on 1) the amount of lime used, 2) how thoroughly the lime is mixed into the native soils, and 3) the contractor adhering to time constraints for the mixing and compaction of the soil/lime mixture. The contractor should consider performing a test section to evaluate their proposed process and methods.

Based on the exposed soils consisting of lean clays and fat clays, it is estimated that 6 to 8 percent lime, by dry weight of soil, will be required to lime-treat the on-site lean to fat clays. The actual amount should be evaluated in accordance with ASTM test method D 6276. The lime content determined by this test should be increased by 0.5 percentage point to allow for construction mixing. Additionally, the on-site clay soils could contain soluble sulfate sufficient to adversely react with the lime additive. Soluble sulfate tests run in accordance with TxDOT Test Method TEX 145-E should be performed to confirm soluble sulfate concentrations are less than 3,000 ppm.

Lime treatment of the subgrade soils should be completed in accordance with Section 301, “Lime Treated Subgrade,” Arkansas State Highway and Transportation Department (AHTD) Standard Specifications for Highway Construction, 2014 Edition. The lime additive should be thoroughly mixed into the native soils to a minimum depth of 12 inches below finished subgrade. Mixing of the soils with a rotary-type mixer is recommended to adequately combine the additive into the existing soils.

The mixing of the lime with the native soils is time-dependent due to the curing and hydration processes of the lime-treated soil material. A 48-hour hour cure time is recommended from when the lime is added to the soil, mixed, and compacted to realize the full strengthening properties of the lime-treated subgrade. Construction traffic on the lime-treated soils should be avoided during curing. After curing, the lime-treated subgrade should be protected with a layer of aggregate base for a construction working surface.

4.2.5 Excavation and Trench Construction

Excavations into the on-site fill materials and native soils may encounter caving soils and possibly groundwater, depending upon the final depth of excavation. The individual contractor(s) should be made responsible for designing and constructing stable, temporary excavations as required to maintain stability of both the excavation sides and bottom. All excavations should be sloped or shored in the interest of safety following local and federal regulations, including current OSHA excavation and trench safety standards.

Soils penetrated by the proposed excavations may vary significantly across the site. The soil classifications are based solely on the materials observed in the exploratory test borings. The contractor should verify that similar conditions exist throughout the proposed area of excavation. If different subsurface conditions are encountered at the time of construction, the actual conditions should be evaluated to determine any excavation modifications necessary to maintain safe conditions.

As a safety measure, we recommend that spoil piles be kept a minimum lateral distance from the crest of the slope equal to no less than the slope height. The exposed slope face should be protected against the elements.

4.2.6 Utility Trench Backfill

All trench excavations should be made with sufficient working space to permit construction including backfill placement and compaction. It is strongly recommended that a qualified person provide full-time observation and compaction testing of trench backfill within pavement areas.

4.3 Cut and Fill Slopes

We understand that final cut and fill slopes will typically be constructed at a 3H:1V or 6H:1V inclination as shown on the Final Plans. Slopes constructed at a 3H:1V inclination and less than 10 feet high in the types of soils at this site generally exhibit a factor of safety in excess of 1.5 against short- and long-term global stability. The planned slopes appear to be reasonable for construction.

Soil slopes should be covered for protection from rain, and surface runoff should be diverted away from the slopes. For erosion protection, a protective cover of grass or other vegetation should be established on permanent soil slopes as soon as possible.

4.4 Pavement Subgrade Preparation

Based on the subsurface conditions observed at the boring locations and considering the subgrade is prepared as recommended in Section **4.2 Earthwork**, the pavement subgrade materials should consist of tested and approved existing fill, native soils or new engineered fill.

We recommend the moisture content and density of the top 12 inches of the subgrade be re-evaluated and that it be proof-rolled within two days prior to placing aggregate base. Areas not in compliance with the required ranges of moisture or density should be moisture conditioned and recompacted. Particular attention should be paid to high traffic areas that were rutted and disturbed earlier and to areas where backfilled trenches are located. Areas where unsuitable conditions are located should be repaired by removing and replacing the materials with properly compacted fills.

4.5 Post-Construction Settlement of Pavement

Based on the planned grading shown in the Final Plans, the subsurface conditions observed at the boring locations, and by preparing the pavement subgrade per project specifications and this report, we expect that pavement settlement should be within project tolerance requirements.

5.0 GENERAL COMMENTS

Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to provide observation and testing services during grading, excavation, pavement construction and other earth-related construction phases of the project.

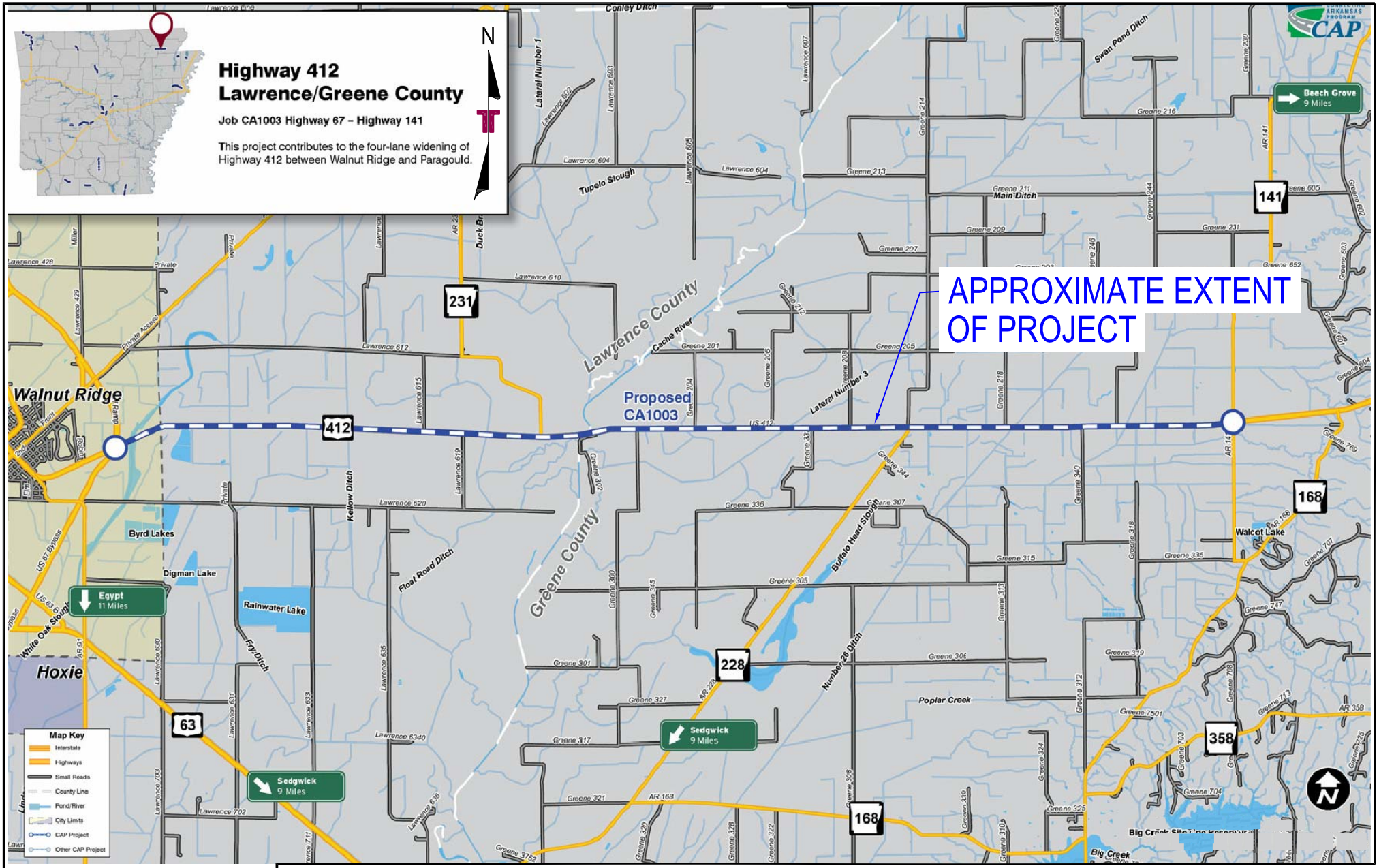
The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental 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.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report

are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

APPENDIX A
FIELD EXPLORATION



Project Mngr:	SPB
Drawn By:	PTG
Checked By:	DEP
Approved By:	SPB

Project No.	35135121
Scale:	AS SHOWN
File No.	35135121.SLP1
Date:	7/31/2014

Terracon
Consulting Engineers and Scientists
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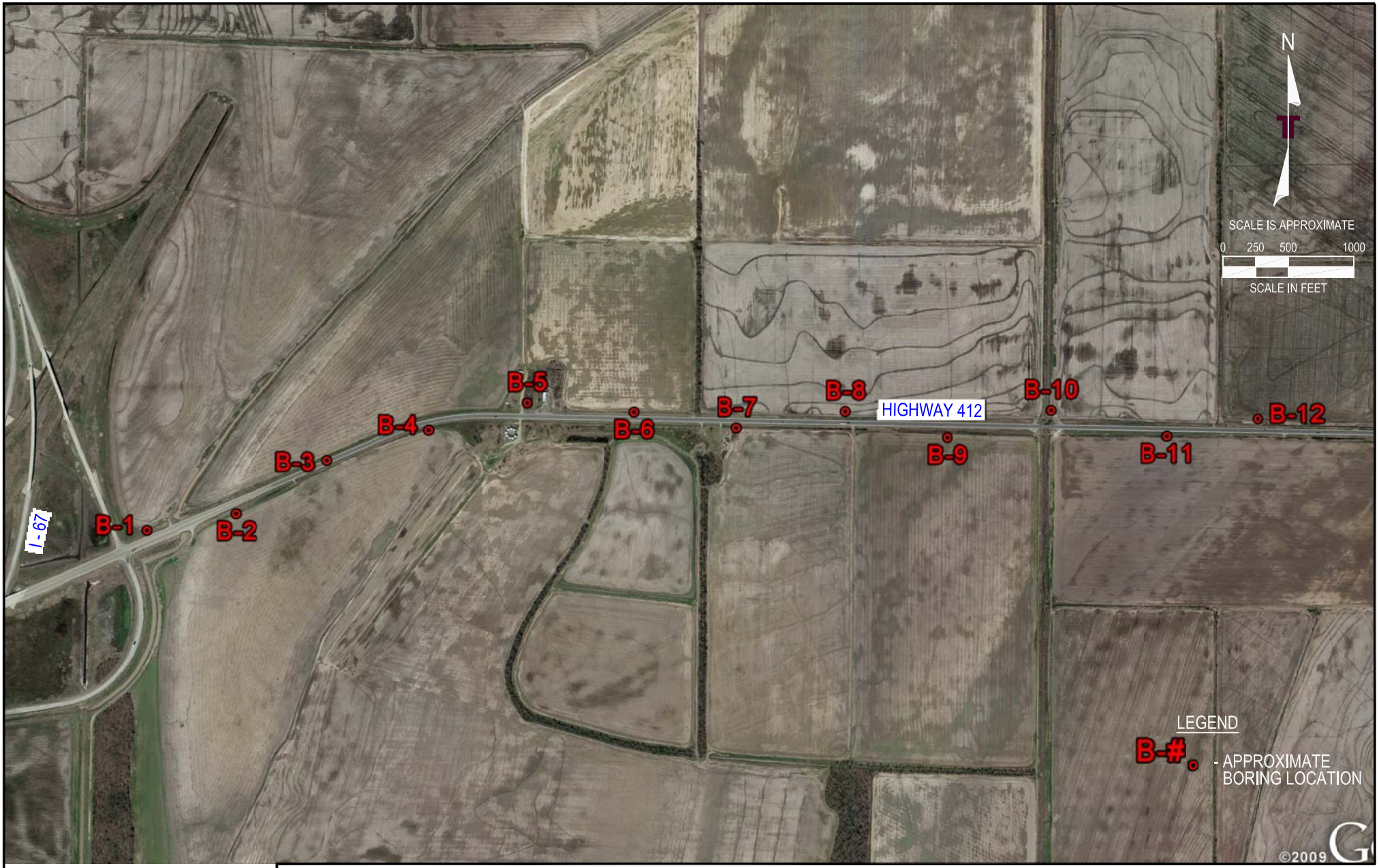
PH. (501) 847-9292 FAX. (501) 847-9210

SITE LOCATION PLAN

GEOTECHNICAL EXPLORATION
CA1003 HIGHWAY 67 - HIGHWAY 141 (WIDENING) (S)
LAWRENCE & GREENE COUNTIES, ARKANSAS

EXHIBIT
A-1



Project Mngr:	SPB
Drawn By:	PTG
Checked By:	DEP
Approved By:	SPB

Project No.	35135121
Scale:	AS SHOWN
File No.	35135121.BLP1
Date:	7/31/2014

Terracon
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BORING LOCATION PLAN

GEOTECHNICAL EXPLORATION

CA1003 HIGHWAY 67 - HIGHWAY 141 (WIDENING) (S)

LAWRENCE & GREENE COUNTIES, ARKANSAS

EXHIBIT

A-2

Project Mngr:	SPB
Drawn By:	PTG
Checked By:	DEP
Approved By:	SPB

Project No.	35135121
Scale:	AS SHOWN
File No.	35135121.BLP2
Date:	7/31/2014

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BORING LOCATION PLAN

GEOTECHNICAL EXPLORATION

CA1003 HIGHWAY 67 - HIGHWAY 141 (WIDENING) (S)

LAWRENCE & GREENE COUNTIES, ARKANSAS

EXHIBIT

A-3

Project Mngr:	SPB
Drawn By:	PTG
Checked By:	DEP
Approved By:	SPB

Project No.	35135121
Scale:	AS SHOWN
File No.	35135121.BLP3
Date:	7/31/2014

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BORING LOCATION PLAN

GEOTECHNICAL EXPLORATION

CA1003 HIGHWAY 67 - HIGHWAY 141 (WIDENING) (S)

LAWRENCE & GREENE COUNTIES, ARKANSAS

EXHIBIT

A-4

Project Mngr:	SPB
Drawn By:	PTG
Checked By:	DEP
Approved By:	SPB

Project No.	35135121
Scale:	AS SHOWN
File No.	35135121.BLP4
Date:	7/31/2014

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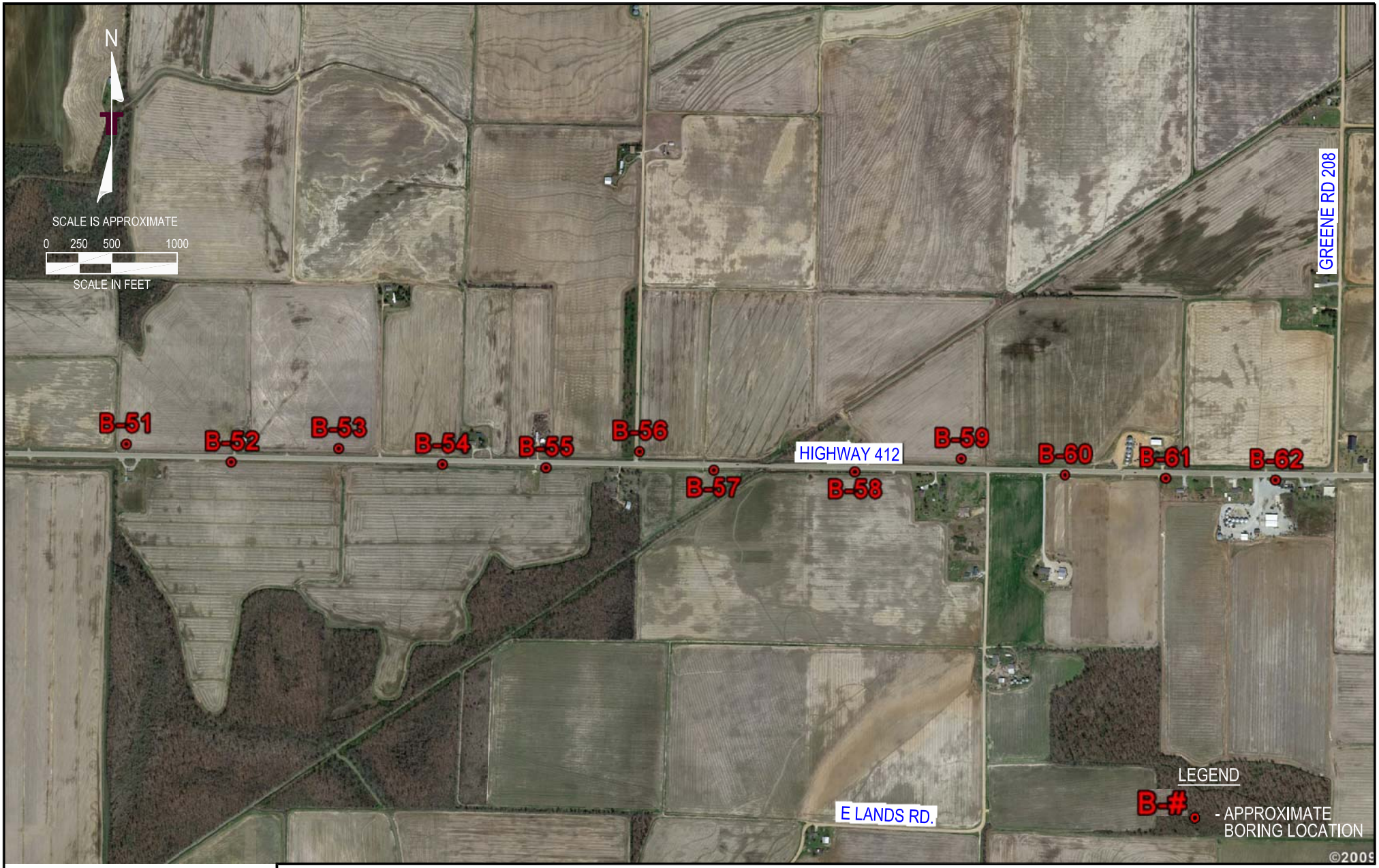
BORING LOCATION PLAN

GEOTECHNICAL EXPLORATION
CA1003 HIGHWAY 67 - HIGHWAY 141 (WIDENING) (S)
LAWRENCE & GREENE COUNTIES, ARKANSAS

EXHIBIT
A-5



Project Mngr:	SPB
Drawn By:	PTG
Checked By:	DEP
Approved By:	SPB

Project No.	35135121
Scale:	AS SHOWN
File No.	35135121.BLP5
Date:	7/31/2014

Terracon
Consulting Engineers and Scientists
25809 I-30 SOUTH BRYANT, AR 72022
PH. (501) 847-9292 FAX. (501) 847-9210

BORING LOCATION PLAN

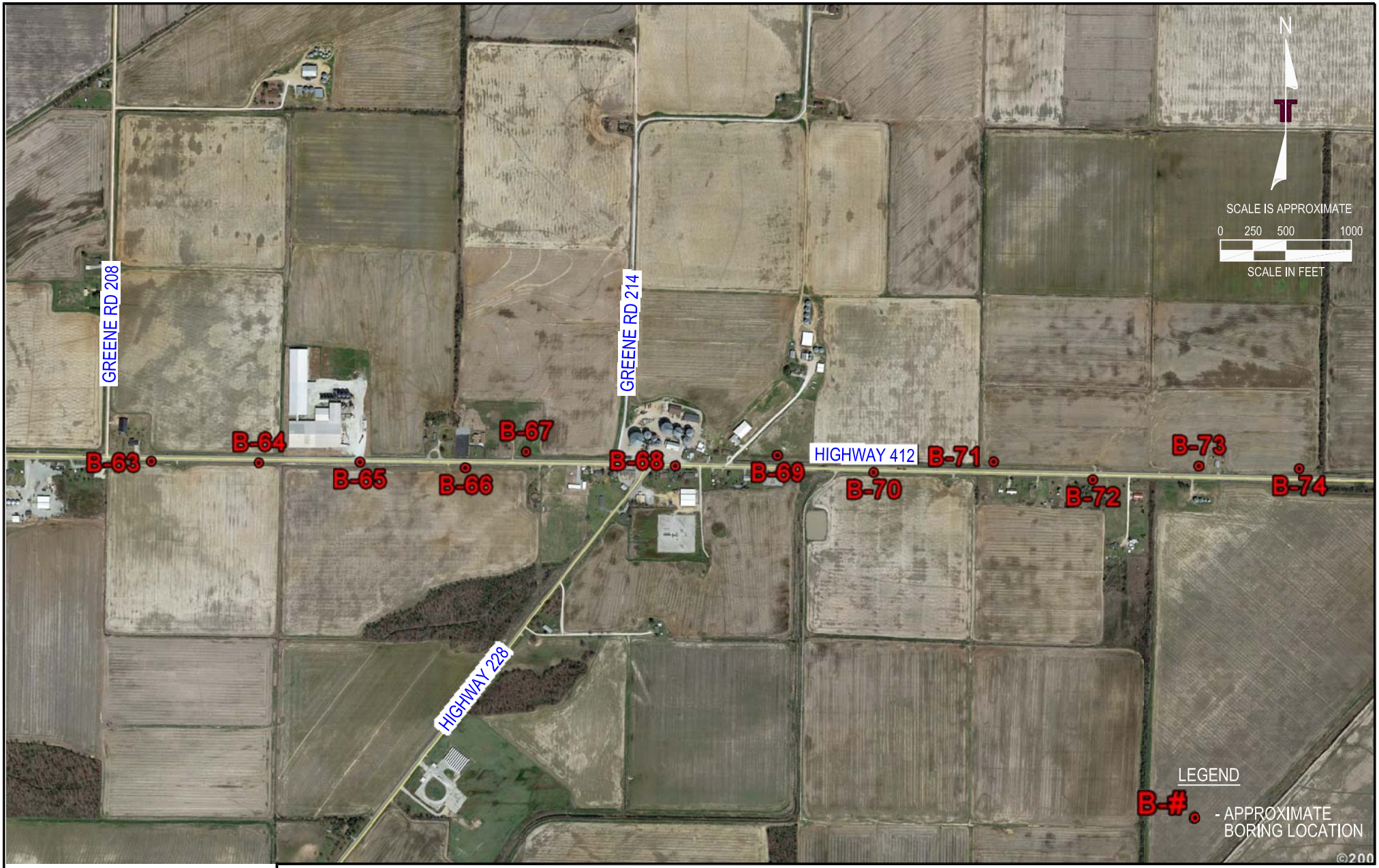
GEOTECHNICAL EXPLORATION

CA1003 HIGHWAY 67 - HIGHWAY 141 (WIDENING) (S)

LAWRENCE & GREENE COUNTIES, ARKANSAS

EXHIBIT

A-6



Project Mngr:	SPB
Drawn By:	PTG
Checked By:	DEP
Approved By:	SPB

Project No.	35135121
Scale:	AS SHOWN
File No.	35135121.BLP6
Date:	7/31/2014

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BORING LOCATION PLAN

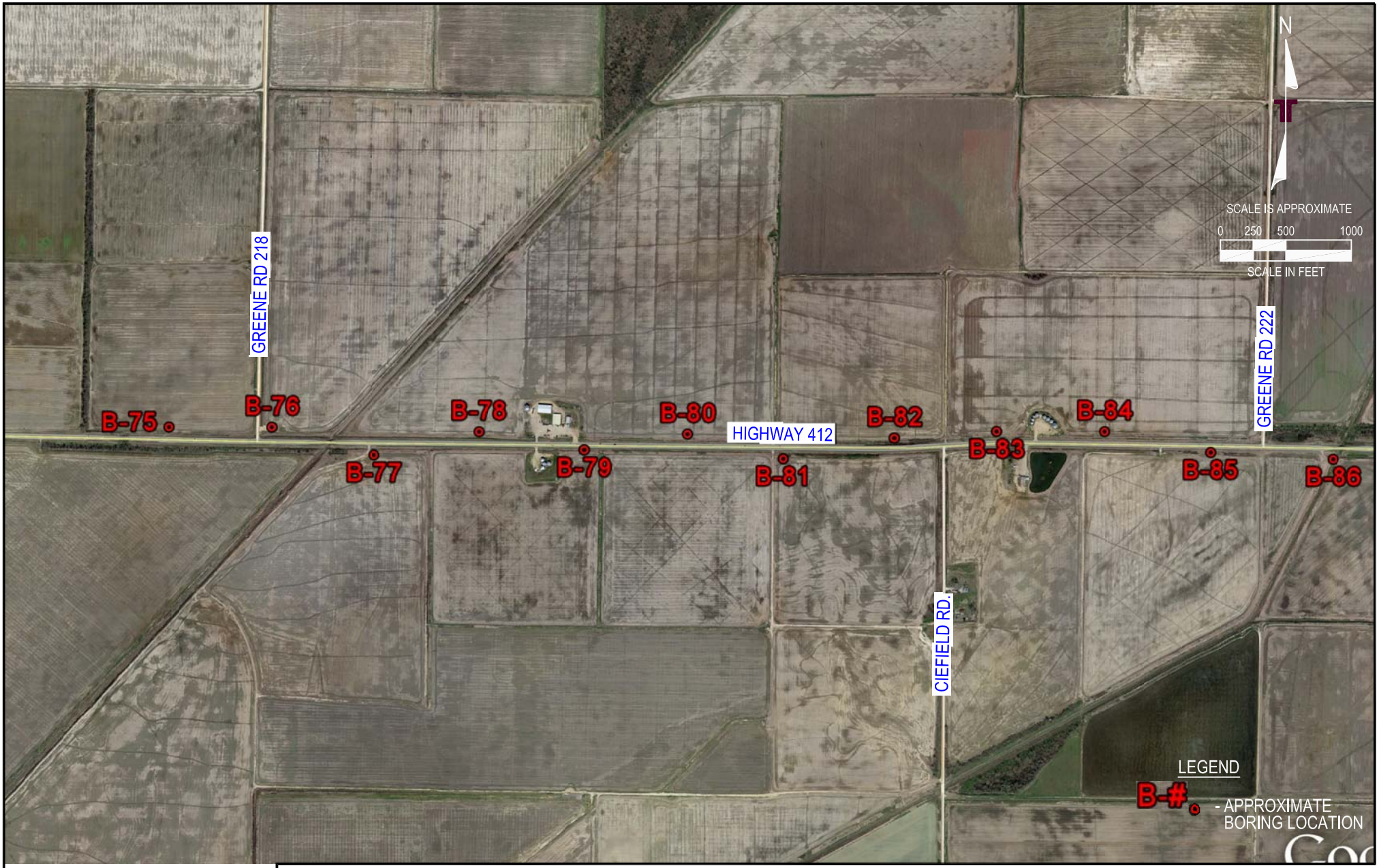
GEOTECHNICAL EXPLORATION

CA1003 HIGHWAY 67 - HIGHWAY 141 (WIDENING) (S)

LAWRENCE & GREENE COUNTIES, ARKANSAS

EXHIBIT

A-7



Project Mngr:	SPB
Drawn By:	PTG
Checked By:	DEP
Approved By:	SPB

Project No.	35135121
Scale:	AS SHOWN
File No.	35135121.BLP7
Date:	7/31/2014

Terracon
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BORING LOCATION PLAN

GEOTECHNICAL EXPLORATION

CA1003 HIGHWAY 67 - HIGHWAY 141 (WIDENING) (S)

LAWRENCE & GREENE COUNTIES, ARKANSAS

EXHIBIT

A-8

Project Mngr:	SPB
Drawn By:	PTG
Checked By:	DEP
Approved By:	SPB

Project No.	35135121
Scale:	AS SHOWN
File No.	35135121.BLP8
Date:	7/31/2014

Terracon
Consulting Engineers and Scientists
25809 I-30 SOUTH BRYANT, AR 72022
PH. (501) 847-9292 FAX. (501) 847-9210

BORING LOCATION PLAN

GEOTECHNICAL EXPLORATION
CA1003 HIGHWAY 67 - HIGHWAY 141 (WIDENING) (S)
LAWRENCE & GREENE COUNTIES, ARKANSAS

EXHIBIT
A-9

Field Exploration Description

Ninety-two borings were drilled at the site in December 2013 and January 2014. The borings were drilled to depths of about 10 feet below the ground surface at the approximate locations shown on the attached Boring Location Plans.

The boring locations were marked in the field by Terracon using a hand-held GPS at locations determined by Terracon. The borings were spaced approximately 800 feet apart in the proposed highway widening alignment on alternating sides of the existing highway. The Northings and Eastings of the locations are shown near the top of the boring logs. The locations of the borings should be considered accurate only to the degree implied by the methods used to define them. The final boring locations and elevations were surveyed by NTB Associates, Inc.

The boreholes were advanced with buggy-mounted CME-55 drill rigs using solid-stem flight augers. Standard penetration tests were performed to collect split-spoon samples. At the completion of the drilling activities, the boreholes were checked for the presence of groundwater and were backfilled with auger cuttings.

In the split-spoon sampling procedure, the number of blows required to advance a standard 2-inch O.D. split-spoon sampler the last 12 inches of the typical total 18-inch penetration by means of a 140-pound standard hammer with a free fall of 30 inches, is the standard penetration resistance value (SPT-N). This value is used to estimate the in-situ consistency of cohesive soils and relative density of granular soils.

A conventional safety hammer operated with a cathead and rope was used to advance the SPT sampler in Borings B-1 through B-53. An automatic SPT hammer was used to advance the split-barrel sampler in Borings B-54 through B-92. A significantly greater efficiency is achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. This higher efficiency has an appreciable effect on the SPT-N value. The effect of the automatic hammer's efficiency has been considered in the interpretation and analysis of the subsurface information for this report.

The samples were tagged for identification, sealed to reduce moisture loss, and taken to our laboratory for further examination, testing, and classification.

Field logs were prepared by the drill crew. The logs included visual classifications of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. The final boring logs included with this report represent the engineer's interpretation of the subsurface conditions at the boring locations based on field and laboratory data and observation of the samples.

Bulk samples of subgrade soils were obtained down to depths of about 2 feet at seven different locations. Those bulk samples were used for tests including laboratory compaction characteristics of soil and resilient modulus. Sample locations are shown on the respective test reports.

Our exploration services include storing the collected soil samples and making them available for inspection until after construction is completed. The samples will then be discarded unless requested otherwise.

Procedural standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practices or professional judgment.

SOIL BORING LOCATIONS, AHTD PROJECT CA1003, FOR TERRACON, INC.

DATA COLLECTED BY NTB ASSOCIATES, INC. UNDER THE SUPERVISION OF THOMAS ALEXANDER P.S.
End date of field data collection: 2/19/14

NOTES:

1. The coordinates and elevations provided hereon were collected utilizing AHTD control file "sca1003go.ctl" and are ground coordinates. To convert to grid multiply these coordinates by the project combined scale factor of 0.9999572089. All other meta data can be found on the header of the control file "sca1003go.ctl".

2. Boring numbers B3, B8, B10, B11, B13, B17, B18, B20, B22, B26, B32, and B37 were located at the direction of a Terracon representitive on site.

Boring No.	Northing (y)	Easting (x)	Elevation (z)	Comments
B-01	634038.33	1628848.67	261.9	
B-02	634171.19	1629528.75	263.3	
B-03	634584.90	1630216.91	267.7	See note 2
B-04	634823.33	1630995.86	265.6	
B-05	635038.64	1631747.30	266.4	
B-06	634977.95	1632563.53	266.2	
B-07	634865.48	1633348.34	265.5	
B-08	635000.85	1634182.48	265.6	See note 2
B-09	634810.54	1634962.93	264.9	
B-10	635025.87	1635753.57	267.1	See note 2
B-11	634839.43	1636640.89	264.4	See note 2
B-12	634978.62	1637336.43	265.5	
B-13	634828.48	1638332.25	266.1	See note 2
B-14	634951.11	1638935.66	264.4	
B-15	634801.44	1639753.20	266.0	
B-16	634939.80	1640569.40	265.5	
B-17	634745.78	1641341.68	265.8	See note 2
B-18	634845.51	1642146.00	265.0	See note 2
B-19	634809.99	1642931.18	264.5	
B-20	634772.84	1643796.00	264.5	See note 2
B-21	634556.65	1644600.52	263.5	
B-22	634664.80	1645372.38	263.8	See note 2
B-23	634452.96	1646128.99	264.6	
B-24	634578.59	1646771.08	265.0	
B-25	634373.46	1647593.84	263.2	
B-26	634342.51	1648362.15	262.4	See note 2
B-27	634462.17	1649142.81	264.2	
B-28	634212.33	1649895.46	256.1	
B-29	634396.36	1650754.19	256.1	
B-30	634332.08	1651541.64	255.8	

B-31	634295.87	1652413.49	255.8	
B-32	634077.28	1653134.45	254.9	See note 2
B-33	634192.85	1653956.56	262.1	
B-34	634035.50	1654724.62	264.3	
B-35	634114.01	1655485.78	264.8	
B-36	633898.64	1656364.81	257.7	
B-37	634057.97	1657054.44	263.7	See note 2
B-38	633861.82	1657897.13	259.0	
B-39	633822.17	1658721.96	259.0	
B-40	634050.37	1659554.75	257.1	
B-41	634120.29	1661087.26	259.7	
B-42	634480.60	1661855.05	260.0	
B-43	634309.01	1662672.83	260.1	
B-44	634472.99	1663475.92	256.5	
B-45	634465.73	1664266.21	257.9	
B-46	634294.01	1665125.28	259.7	
B-47	634467.56	1665906.16	257.9	
B-48	634321.47	1666717.22	259.6	
B-49	634448.61	1667508.59	257.8	
B-50	634323.71	1668321.75	258.8	
B-51	634434.81	1669098.84	261.0	
B-52	634306.79	1669906.04	261.6	
B-53	634419.33	1670727.04	260.3	
B-54	634306.59	1671519.79	260.2	
B-55	634290.10	1672314.19	260.4	
B-56	634421.71	1673028.57	258.9	
B-57	634285.91	1673595.49	259.6	
B-58	634285.45	1674678.67	260.4	
B-59	634393.71	1675492.90	258.6	
B-60	634279.52	1676287.54	260.1	
B-61	634262.90	1677058.33	262.3	
B-62	634257.80	1677900.31	262.4	
B-63	634271.49	1678695.72	262.6	
B-64	634268.95	1679519.15	262.6	
B-65	634284.11	1680292.01	263.7	
B-66	634248.34	1681100.19	262.7	
B-67	634375.83	1681565.37	261.7	
B-68	634280.78	1682707.54	264.7	
B-69	634370.48	1683489.80	261.2	
B-70	634247.69	1684228.54	260.5	
B-71	634338.93	1685146.16	263.0	
B-72	634211.23	1685902.62	264.4	
B-73	634323.22	1686719.41	263.3	
B-74	634311.89	1687486.73	263.4	
B-75	634318.72	1688293.12	263.3	
B-76	634326.26	1689085.83	264.2	
B-77	634123.20	1689867.07	263.8	

B-78	634308.49	1690668.63	263.6
B-79	634180.03	1691475.77	265.7
B-80	634308.04	1692266.49	264.7
B-81	634128.78	1693000.53	266.3
B-82	634295.49	1693848.97	266.2
B-83	634354.83	1694632.54	266.4
B-84	634362.02	1695456.88	267.1
B-85	634212.40	1696270.31	268.0
B-86	634170.75	1697207.25	268.9
B-87	634182.41	1698044.80	269.0
B-88	634375.24	1698686.93	270.5
B-89	634162.06	1699425.37	270.4
B-90	634365.08	1700301.04	269.2
B-91	634200.94	1701065.79	270.3
B-92	634346.87	1701951.12	272.7
BR-01	633938.85	1629211.54	264.3
BR-02	635010.61	1635746.68	267.1
BR-03	634590.05	1643934.37	266.8
BR-04	634192.33	1653518.86	257.0
BR-05	633948.57	1660228.83	265.5
BR-06	634464.48	1667061.06	258.3
BR-07	634273.78	1674026.98	260.8
BR-08	634165.33	1683903.27	261.8
BR-09	634311.82	1688045.90	263.9
BR-10	634133.73	1689628.39	264.7
BR-11	634172.36	1697325.16	269.3

BORING LOG NO. B-1

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634038.33 Easting: 1628848.67

Station: 91+00 Offset: 75' L Surface Elev.: 261.9 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY WITH SAND (CL), trace iron nodules, gray to grayish-brown, stiff to very stiff			2-3-5 N=8	1.0 (HP)		30		40-25-15	85
				6-8-9 N=17	2.0 (HP)		24			
3.5	258.5									
	LEAN CLAY (CL), gray to grayish-brown, stiff			6-6-8 N=14	0.5 (HP)		27			
5.0	257									
	SANDY LEAN CLAY (CL), gray, stiff to very stiff	5		6-7-10 N=17	1.0 (HP)		29			
				7-5-6 N=11	1.5 (HP)		29			
10.0	252	10								
	Boring Terminated at 10 Feet									

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 12/17/2013 Boring Completed: 12/17/2013

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-12

BORING LOG NO. B-2

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634171.19 Easting: 1629528.75

Station: 98+00 Offset: 75' R Surface Elev.: 263.3 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	FAT CLAY (CH), trace sand, gray to grayish-brown, soft										
2.0	261.5				1-2-2 N=4	0.5 (HP)		34		59-25-34	96
	FAT CLAY WITH SAND (CH), trace iron nodules, gray to grayish-brown, stiff				3-4-5 N=9	2.0 (HP)		32			
5.0	258.5				5-4-6 N=10	1.5 (HP)		23			
	CLAYEY SAND (SC), gray to grayish-brown, medium dense	5			8-9-12 N=21			25			
10.0	253.5				6-7-6 N=13			26			
	Boring Terminated at 10 Feet	10									

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 12/17/2013 Boring Completed: 12/17/2013

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-13

BORING LOG NO. B-3

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634584.9 Easting: 1630216.91

Station: 106+00 Offset: 75' L Surface Elev.: 267.7 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	FILL - FAT CLAY (CH), with sand and trace roots, gray to brown, medium stiff										
2.0	265.5				4-4-3 N=7			6		73-32-41	83
	LEAN CLAY (CL), trace gravel and iron nodules, gray to grayish-brown, medium stiff to very stiff				2-3-4 N=7	1.5 (HP)		33			
					3-3-4 N=7	1.25 (HP)		35			
		5			4-7-10 N=17	3.0 (HP)		21			
8.5	259										
10.0	**SANDY LEAN CLAY (CL)**, gray to grayish-brown, very stiff 257.5				12-14-16 N=30			24			
	Boring Terminated at 10 Feet	10									

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 12/17/2013 Boring Completed: 12/17/2013

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-14

BORING LOG NO. B-4

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634823.33 Easting: 1630995.86

Station: 114+00 Offset: 75' R Surface Elev.: 265.6 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
FAT CLAY (CH), gray to grayish-brown, medium stiff to stiff				2-3-3 N=6	1.25 (HP)		33		57-30-27	95
				4-5-5 N=10	2.5 (HP)		35			
very stiff				6-7-8 N=15	2.5 (HP)		22			
5.0	260.5	5								
SANDY LEAN CLAY (CL), with gravel, gray to grayish-brown, very stiff				6-9-12 N=21			24			
8.5	257									
CLAYEY SAND (SC), light brown to grayish-brown, dense				9-14-16 N=30			13			
10.0	255.5	10								
Boring Terminated at 10 Feet										

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 12/17/2013 Boring Completed: 12/17/2013

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-15

BORING LOG NO. B-5

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 635038.64 Easting: 1631747.3

Station: 122+00 Offset: 75' L Surface Elev.: 266.4 (Ft.)

DEPTH ELEVATION (Ft.)

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		LEAN CLAY (CL), light brown, very stiff						
2.0 / 264.5	X	6-10-12 N=22			13		32-19-13	94
	X	16-23-28 N=51			13			
	X	22-26-31 N=57			12			
5	X	20-22-26 N=48			8			
8.5 / 258		**FAT CLAY (CH)**, brown to gray, hard						
	X	9-11-12 N=23	1.5 (HP)		26			
10.0 / 256.5		**SILTY CLAY (CL-ML)**, gray to red, very stiff						
10		***Boring Terminated at 10 Feet***						

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 12/17/2013 Boring Completed: 12/17/2013

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-16

BORING LOG NO. B-6

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634977.95 Easting: 1632563.53

Station: 130+00 Offset: 75' L Surface Elev.: 266.2 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	FAT CLAY (CH), trace sand, gray to grayish-brown, medium stiff to stiff				2-2-3 N=5	3.0 (HP)		17		52-22-30	88
					3-4-10 N=14	4.0 (HP)		25			
3.5	262.5										
	FAT CLAY (CH), trace sand and iron nodules, gray to grayish-brown, very stiff				6-9-12 N=21	4.0 (HP)		23			
5.0	261	5									
	SANDY LEAN CLAY (CL), reddish-brown, very stiff				4-6-9 N=15	2.5 (HP)		20			
8.5	257.5										
	CLAYEY SAND (SC), grayish-brown, medium dense				6-9-12 N=21			20			
10.0	256	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 12/17/2013 Boring Completed: 12/17/2013

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-17

BORING LOG NO. B-7

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634865.48 Easting: 1633348.34

Station: 138+00 Offset: 75' R Surface Elev.: 265.5 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY (CL), brown to grayish-brown, soft										
2.0	263.5				2-2-1 N=3	2.0 (HP)		35		42-19-23	87
	LEAN CLAY (CL), brown to grayish-brown, medium stiff										
3.5	262				2-2-5 N=7	2.5 (HP)		29			
	FAT CLAY (CH), brown to grayish-brown, very stiff				6-8-9 N=17	4.0 (HP)		24			
		5			6-4-12 N=16	2.5 (HP)		30			
8.5	257										
	SANDY LEAN CLAY (CL), gray to grayish-brown, very stiff				10-11-14 N=25			25			
10.0	255.5	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 12/17/2013 Boring Completed: 12/17/2013

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-18

BORING LOG NO. B-8

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 635000.85 Easting: 1634182.48

Station: 146+00 Offset: 75' L Surface Elev.: 265.6 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY (CL), dark brown to reddish-brown, medium stiff										
2.0	263.5				2-3-4 N=7	1.5 (HP)		31		44-21-23	98
	LEAN CLAY (CL), grayish-brown to brown, medium stiff										
3.5	262				3-3-5 N=8	1.0 (HP)		35			
	FAT CLAY (CH), gray, stiff to very stiff				6-7-9 N=16	3.25 (HP)		27			
		5			6-7-6 N=13	2.25 (HP)		29			
8.5	257										
	CLAYEY SAND (SC), gray to grayish-brown, medium dense				6-11-10 N=21			27			
10.0	255.5	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 12/17/2013 Boring Completed: 12/17/2013

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-19

BORING LOG NO. B-9

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634810.54 Easting: 1634962.93

Station: 154+00 Offset: 75' R Surface Elev.: 264.9 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY (CL), trace roots, grayish-brown to red nodules, medium stiff										
2.0	263				3-4-4 N=8	3.0 (HP)		28		47-20-27	98
	LEAN CLAY (CL), grayish-brown, very stiff										
3.5	261.5				5-7-11 N=18	1.5 (HP)		26			
	LEAN CLAY (CL), trace sand, grayish-brown to brown, stiff to very stiff	5			6-9-10 N=19	2.5 (HP)		21			
					6-8-4 N=12			25			
8.5	256.5										
	CLAYEY SAND (SC), grayish-brown, medium dense				8-9-12 N=21			23			
10.0	255	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 12/19/2013 Boring Completed: 12/19/2013

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-20

BORING LOG NO. B-10

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 635025.87 Easting: 1635753.57

Station: 161+50 Offset: 75' L Surface Elev.: 267.1 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY (CL), trace sand, brown to light brown, very stiff		6-8-10 N=18			27		43-20-23	98
2.0	265								
	LEAN CLAY (CL), with iron nodules, dark brown, stiff		6-5-6 N=11	2.5 (HP)		34			
3.5	263.5								
	FAT CLAY (CH), gray to grayish-brown, stiff		5-6-8 N=14	3.0 (HP)		34			
5.0	262	5							
	SANDY LEAN CLAY (CL), gray to grayish-brown, stiff		5-6-4 N=10	3.5 (HP)		29			
10.0	257	10	6-7-6 N=13	2.5 (HP)		24			
	Boring Terminated at 10 Feet								

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 12/19/2013 Boring Completed: 12/19/2013

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-21

BORING LOG NO. B-11

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634839.43 Easting: 1636640.89

Station: 170+00 Offset: 75' R Surface Elev.: 264.4 (Ft.)

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		FAT CLAY (CH), grayish-brown, medium stiff to stiff				2-2-4 N=6			42		75-24-51	88
	3.5	261				4-5-6 N=11	1.75 (HP)		31			
		FAT CLAY (CH), with sand, gray to brown, stiff to very stiff	5			6-10-12 N=22	3.25 (HP)		28			
						9-6-4 N=10	3.0 (HP)		26			
	10.0	254.5				10-12-10 N=22	3.0 (HP)		30			
		Boring Terminated at 10 Feet	10									

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 12/19/2013 Boring Completed: 12/19/2013

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-22

BORING LOG NO. B-12

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634978.62 Easting: 1637336.43

Station: 178+00 Offset: 75' L Surface Elev.: 265.5 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY (CL), gray, stiff										
2.0	263.5				3-4-5 N=9			22		41-21-20	98
	FAT CLAY (CH), grayish-brown, stiff										
3.5	262				3-4-8 N=12	2.0 (HP)		34			
	FAT CLAY (CH), with iron staining, gray to brown, very stiff				8-12-16 N=28	4.5 (HP)		21			
		5			8-9-12 N=21	3.0 (HP)		20			
8.5	257										
	LEAN CLAY WITH SAND (CL), brown to light grayish brown, very stiff				9-11-14 N=25			26			
10.0	255.5	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 12/20/2013 Boring Completed: 12/20/2013

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-23

BORING LOG NO. B-13

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634828.48 Easting: 1638332.25

Station: 186+00 Offset: 75' R Surface Elev.: 266.1 (Ft.)

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		LEAN CLAY (CL), brown to light gray, stiff										
	2.0	264				6-4-6 N=10			20		30-14-16	86
		LEAN CLAY (CL), brown to brownish gray, hard				12-14-20 N=34	4.5 (HP)		21			
						16-14-22 N=36	4.5 (HP)		16			
			5			14-16-20 N=36	4.5 (HP)		16			
	8.5	257.5										
		FAT CLAY (CH), trace sand, gray to brown, hard, blocky				16-20-24 N=44	4.5 (HP)		29			
	10.0	256	10									
		Boring Terminated at 10 Feet										

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 12/19/2013 Boring Completed: 12/19/2013

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-24

BORING LOG NO. B-14

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634951.11 Easting: 1638935.66

Station: 194+00 Offset: 75' L Surface Elev.: 264.4 (Ft.)

DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0.0	264.4											
		FAT CLAY (CH), brown, stiff			X	4-8-4 N=12	2.0 (HP)		17		55-17-38	95
2.0	262.5											
		LEAN CLAY WITH SAND (CL), brown to gray, hard, dry			X	18-22-24 N=46	4.5 (HP)		3			
					X	14-17-22 N=39	4.5 (HP)		9			
5.0	259.5		5		X	10-10-10 N=20			15			
		SANDY LEAN CLAY (CL), brown to light gray, very stiff										
8.5	256											
		FAT CLAY (CH), with iron nodules and staining, gray, very stiff			X	6-7-12 N=19	2.5 (HP)		37			
10.0	254.5		10									
		Boring Terminated at 10 Feet										

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 12/20/2013 Boring Completed: 12/20/2013

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-25

BORING LOG NO. B-15

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634801.44 Easting: 1639753.2

Station: 202+00 Offset: 75' R Surface Elev.: 266.0 (Ft.)

DEPTH ELEVATION (Ft.)

DEPTH (Ft.)	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY (CL), brown, very stiff						
	11-12-14 N=26	3.5 (HP)		12		41-18-23	
	20-14-12 N=26			10			
5	12-14-11 N=25	4.0 (HP)		17			
	9-12-14 N=26	4.0 (HP)		20			
8.5 257.5							
	SANDY LEAN CLAY (CL), light brown to medium brown, hard						
	14-16-18 N=34	2.5 (HP)		26			
10.0 256							
10	***Boring Terminated at 10 Feet***						

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/2/2014 Boring Completed: 1/2/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-26

BORING LOG NO. B-16

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634939.8 Easting: 1640569.4

Station: 210+00 Offset: 75' L Surface Elev.: 265.5 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY (CL), brown to light brown, medium stiff										
2.0	263.5				2-3-3 N=6			17		36-22-14	86
	SANDY LEAN CLAY (CL), medium brown to light brown, very stiff				4-5-11 N=16	4.0 (HP)		22			
					7-8-10 N=18	1.5 (HP)		24			
		5			4-8-9 N=17	2.5 (HP)		23			
8.5	257										
	CLAYEY SAND (SC), medium brown, medium dense				8-9-11 N=20			8			
10.0	255.5	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/2/2014 Boring Completed: 1/2/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-27

BORING LOG NO. B-17

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634745.78 Easting: 1641341.68

Station: 218+00 Offset: 75' R Surface Elev.: 265.8 (Ft.)

DEPTH ELEVATION (Ft.)

GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
FAT CLAY (CH), brown, stiff to very stiff				4-4-4 N=8	2.0 (HP)		28		50-21-29	89
				8-7-10 N=17	2.5 (HP)		24			
gray				7-10-12 N=22	3.0 (HP)		24			
gray to brown, with gravel	5			8-9-11 N=20	3.0 (HP)		27			
8.5 257.5										
CLAYEY SAND (SC), medium brown, medium dense				6-7-8 N=15			21			
10.0 256	10									
Boring Terminated at 10 Feet										

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/2/2014 Boring Completed: 1/2/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-28

BORING LOG NO. B-18

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634845.51 Easting: 1642146

Station: 226+00 Offset: 75' L Surface Elev.: 265.0 (Ft.)

DEPTH ELEVATION (Ft.)

GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
FAT CLAY (CH), dark brown, medium stiff										
				4-3-4 N=7	0.5 (HP)		38		75-30-45	
3.5 261.5				2-3-3 N=6	1.0 (HP)		37			
FAT CLAY (CH), brown to gray, stiff				5-6-8 N=14	3.0 (HP)		26			
5.0 260	5									
SANDY FAT CLAY (CH), gray, stiff				5-7-8 N=15	2.5 (HP)		28			
10.0 255				7-8-4 N=12	1.5 (HP)		20			
Boring Terminated at 10 Feet	10									

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/3/2014 Boring Completed: 1/3/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-29

BORING LOG NO. B-19

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634809.99 Easting: 1642931.18

Station: 234+00 Offset: 75' L Surface Elev.: 264.5 (Ft.)

DEPTH ELEVATION (Ft.)

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		3-4-3 N=7	2.0 (HP)		24		53-21-32	
		3-5-6 N=11	3.0 (HP)		29			
		6-6-7 N=13	1.5 (HP)		28			
5		6-6-8 N=14	2.0 (HP)		28			
		6-8-8 N=16	3.0 (HP)		23			
10								

FAT CLAY (CH), gray to brown, medium stiff to stiff

with sand

8.5 256

SANDY LEAN CLAY (CL), grayish-brown, very stiff

10.0 254.5

Boring Terminated at 10 Feet

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/3/2014 Boring Completed: 1/3/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-30

BORING LOG NO. B-20

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634772.84 Easting: 1643796

Station: 242+00 Offset: 75' L Surface Elev.: 264.5 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY (CL), gray to dark gray, medium stiff									
				4-4-4 N=8	1.5 (HP)		31		44-21-23	
3.5	261			2-3-4 N=7	0.5 (HP)		38			
	LEAN CLAY (CL), brown to light brown, very stiff			6-8-8 N=16	1.0 (HP)		26			
	with sand	5		6-8-8 N=16	2.0 (HP)		31			
8.5	256									
	FAT CLAY (CH), medium brown to medium gray, stiff			5-5-6 N=11	1.5 (HP)		36			
10.0	254.5	10								
	Boring Terminated at 10 Feet									

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/3/2014 Boring Completed: 1/3/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-31

BORING LOG NO. B-21

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634556.65 Easting: 1644600.52

Station: 250+00 Offset: 75' R Surface Elev.: 263.5 (Ft.)

DEPTH ELEVATION (Ft.)

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		3-3-4 N=7	1.5 (HP)		38		67-23-44	
		3-4-4 N=8	1.0 (HP)		35			
		6-8-8 N=16	2.0 (HP)		30			
5		5-7-8 N=15	1.5 (HP)		28			
		7-7-8 N=15	2.0 (HP)		33			
10								

FAT CLAY (CH), medium brown, medium stiff to very stiff

medium brown to brown

brown to light gray, with sand

10.0 253.5

Boring Terminated at 10 Feet

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/3/2014 Boring Completed: 1/3/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-32

BORING LOG NO. B-22

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634664.8 Easting: 1645372.38

Station: 258+00 Offset: 75' L Surface Elev.: 263.8 (Ft.)

DEPTH ELEVATION (Ft.)

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		2-2-3 N=5	0.5 (HP)		35		68-21-47	
		2-4-4 N=8	1.5 (HP)		29			
		8-9-9 N=18	3.0 (HP)		28			
5		6-6-7 N=13	2.0 (HP)		37			
		6-7-8 N=15	2.0 (HP)		31			
10								

FAT CLAY (CH), medium brown, medium stiff to very stiff

gray to brown

10.0 254

Boring Terminated at 10 Feet

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/3/2014 Boring Completed: 1/3/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-33

BORING LOG NO. B-23

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634452.96 Easting: 1646128.99

Station: 266+00 Offset: 75' R Surface Elev.: 264.6 (Ft.)

DEPTH ELEVATION (Ft.)

GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
FAT CLAY (CH), dark brown, medium stiff 2.0 262.5				3-3-4 N=7	1.0 (HP)		32		62-22-40	
FAT CLAY (CH), medium brown, stiff to very stiff				5-6-8 N=14	2.0 (HP)		30			
grayish-brown				7-7-8 N=15	2.0 (HP)		32			
brown	5			7-8-11 N=19	1.0 (HP)		28			
10.0 254.5				7-9-10 N=19	1.5 (HP)		27			
Boring Terminated at 10 Feet	10									

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/3/2014 Boring Completed: 1/3/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-34

BORING LOG NO. B-24

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634578.59 Easting: 1646771.08

Station: 272+00 Offset: 75' L Surface Elev.: 265.0 (Ft.)

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
						3-3-4 N=7	2.0 (HP)		23		38-23-15	
						4-7-4 N=11	2.0 (HP)		25			
			5			9-12-12 N=24	2.5 (HP)		24			
						7-10-11 N=21	3.0 (HP)		27			
						8-9-12 N=21	3.0 (HP)		32			
			10									

LEAN CLAY (CL), brown, medium stiff to stiff

3.5 261.5

LEAN CLAY (CL), gray to brown, very stiff

10.0 255

Boring Terminated at 10 Feet

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/4/2014 Boring Completed: 1/4/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-35

BORING LOG NO. B-25

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634373.46 Easting: 1647593.84

Station: 280+00 Offset: 75' R Surface Elev.: 263.2 (Ft.)

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY (CL), brown to gray, medium stiff					6-3-5 N=8	3.0 (HP)		24		37-22-15	
	2.0	261										
	FAT CLAY (CH), grayish-brown, medium stiff to stiff					3-4-3 N=7	0.5 (HP)		38			
						4-4-5 N=9	1.0 (HP)		32			
			5			4-6-6 N=12	1.0 (HP)		33			
	8.5	254.5										
	SANDY FAT CLAY (CH), light gray, very stiff					6-8-8 N=16	2.0 (HP)		28			
	10.0	253	10									
	Boring Terminated at 10 Feet											

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/4/2014 Boring Completed: 1/4/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-36

BORING LOG NO. B-26

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634342.51 Easting: 1648362.15

Station: 288+00 Offset: 75' R Surface Elev.: 262.4 (Ft.)

DEPTH ELEVATION (Ft.)

GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
FAT CLAY WITH SAND (CH), gray to brown, stiff to very stiff				4-5-5 N=10	2.5 (HP)		32		55-25-30	
				4-5-7 N=12	1.5 (HP)		39			
				6-8-8 N=16	0.5 (HP)		27			
	5			8-10-11 N=21	1.5 (HP)		30			
8.5 254										
CLAYEY SAND (SC), gray to brown, medium dense				9-11-12 N=23	1.5 (HP)		29			
10.0 252.5	10									
Boring Terminated at 10 Feet										

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/4/2014 Boring Completed: 1/4/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-37

BORING LOG NO. B-27

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634462.17 Easting: 1649142.81

Station: 296+00 Offset: 75' L Surface Elev.: 264.2 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY (CL), brown, medium stiff									
2.0	262			3-3-3 N=6			24		41-24-17	95
	SANDY LEAN CLAY (CL), brown, medium stiff			2-3-3 N=6	1.0 (HP)		28			
3.5	260.5									
	SANDY FAT CLAY (CH), brown to gray, very stiff			5-7-9 N=16	1.5 (HP)		30			
		5		5-8-9 N=17	2.5 (HP)		26			
10.0	254			9-11-12 N=23	3.0 (HP)		34			
	Boring Terminated at 10 Feet	10								

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/4/2014 Boring Completed: 1/4/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-38

BORING LOG NO. B-28

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634212.33 Easting: 1649895.46

Station: 304+00 Offset: 75' R Surface Elev.: 256.1 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SANDY LEAN CLAY (CL), brown to gray, medium stiff to stiff				4-5-6 N=11			25		39-22-17	
	gray				4-3-3 N=6	3.0 (HP)		22			
3.5	252.5										
	SANDY FAT CLAY (CH), gray, stiff				4-6-7 N=13	2.0 (HP)		29			
		5			5-7-7 N=14	3.0 (HP)		25			
	dark gray				6-7-8 N=15	3.0 (HP)		30			
10.0	246	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/4/2014 Boring Completed: 1/4/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-39

BORING LOG NO. B-29

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634396.36 Easting: 1650754.19

Station: 312+00 Offset: 75' L Surface Elev.: 256.1 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SANDY LEAN CLAY (CL), gray to brown, stiff										
2.0	254				6-6-6 N=12	2.0 (HP)		18		24-16-8	
	FAT CLAY (CH), light brown to reddish-brown, stiff										
3.5	252.5				4-5-6 N=11	1.5 (HP)		28			
	SANDY FAT CLAY (CH), grayish-brown, very stiff										
5.0	251				8-9-11 N=20	4.0 (HP)		21			
	CLAYEY SAND (SC), light brown, medium dense	5			6-9-12 N=21			18			
8.5	247.5										
	POORLY GRADED SAND (SP), medium brown, medium dense				6-6-6 N=12			8			
10.0	246	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/8/2014 Boring Completed: 1/8/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-40

BORING LOG NO. B-30

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634332.08 Easting: 1651541.64

Station: 320+00 Offset: 75' L Surface Elev.: 255.8 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY (CL), with sand, gray to dark brown, stiff										
2.5	253.5				4-5-6 N=11	1.5 (HP)		18		30-15-15	
	POORLY GRADED SAND (SP), brown, loose to medium dense				4-5-4 N=9	2.0 (HP)		11			
5.0	251				6-6-7 N=13			9			
	CLAYEY SAND (SC), grayish-brown, loose	5			4-4-3 N=7			13			
8.5	247.5										
	POORLY GRADED SAND (SP), brown, medium dense				5-6-8 N=14			8			
10.0	246	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/8/2014 Boring Completed: 1/8/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-41

BORING LOG NO. B-31

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634295.87 Easting: 1652413.49

Station: 328+00 Offset: 75' L Surface Elev.: 255.8 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
LEAN CLAY (CL), gray to brown, stiff				11-5-4 N=9	1.0 (HP)		17		29-17-12	
2.0	254									
FAT CLAY (CH), gray, stiff				4-4-6 N=10	2.0 (HP)		22			
3.5	252.5									
POORLY GRADED SAND (SP), light brown, medium dense				6-8-9 N=17	1.5 (HP)		18			
brown		5		9-8-8 N=16			15			
10.0	246			6-8-8 N=16			10			
Boring Terminated at 10 Feet		10								

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/8/2014 Boring Completed: 1/8/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-42

BORING LOG NO. B-32

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634077.28 Easting: 1653134.45

Station: 336+00 Offset: 75' R Surface Elev.: 254.9 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY (CL), brownish gray, stiff				4-6-8 N=14	2.0 (HP)		17		42-17-25	
					6-5-4 N=9	1.5 (HP)		20			
3.5	251.5										
	CLAYEY SAND (SC), brownish gray, medium dense	5			12-11-10 N=21			10			
					9-11-12 N=23			17			
10.0	245				6-7-8 N=15			11			
	Boring Terminated at 10 Feet	10									

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/9/2014 Boring Completed: 1/9/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-43

BORING LOG NO. B-33

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634192.85 Easting: 1653956.56

Station: 344+00 Offset: 75' L Surface Elev.: 262.1 (Ft.)

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SANDY LEAN CLAY (CL), brown, stiff				3-4-6 N=10			18		35-17-18	
						4-6-6 N=12	2.0 (HP)		21			
						6-4-6 N=10	1.0 (HP)		21			
			5			6-5-5 N=10			19			
	8.5	253.5										
		POORLY GRADED SAND (SP), brown, medium dense				5-6-7 N=13			19			
	10.0	252	10									
		Boring Terminated at 10 Feet										

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/9/2014 Boring Completed: 1/9/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-44

BORING LOG NO. B-34

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634035.5 Easting: 1654724.62

Station: 352+00 Offset: 75' R Surface Elev.: 264.3 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY LEAN CLAY (CL-ML), with sand, dark brown, medium stiff				2-3-2 N=5	0.5 (HP)		21		23-18-5	
	brown				3-3-5 N=8	1.5 (HP)		21			
3.5	261										
	SANDY LEAN CLAY (CL), brown, stiff				7-7-8 N=15	1.0 (HP)		21			
		5			5-6-8 N=14	1.0 (HP)		20			
6.0	258.5										
	POORLY GRADED SAND (SP), brown, medium dense										
					6-5-6 N=11			10			
10.0	254.5	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/9/2014 Boring Completed: 1/9/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-45

BORING LOG NO. B-35

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634114.01 Easting: 1655485.78

Station: 360+00 Offset: 75' L Surface Elev.: 264.8 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SANDY LEAN CLAY (CL), light brown, medium stiff										
2.0	263				9-3-4 N=7			8		28-19-9	
	SANDY LEAN CLAY (CL), light gray to brown, very stiff				4-8-9 N=17	3.0 (HP)		18			
					11-12-16 N=28	4.0 (HP)		17			
		5			8-9-12 N=21	4.0 (HP)		16			
8.5	256.5										
	POORLY GRADED SAND (SP), brown, medium dense				7-8-9 N=17			9			
10.0	255	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/9/2014 Boring Completed: 1/9/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-46

BORING LOG NO. B-36

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 633898.64 Easting: 1656364.81

Station: 368+00 Offset: 75' R Surface Elev.: 257.7 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY (CL), light gray to brown, medium stiff										
2.0	255.5				3-4-4 N=8	2.0 (HP)		27		40-23-17	
	SANDY LEAN CLAY (CL), light gray to brown, medium stiff to stiff				3-4-4 N=8	1.0 (HP)		27			
					4-5-6 N=11	0.5 (HP)		26			
6.0	251.5	5			5-5-6 N=11			12			
	POORLY GRADED SAND (SP), light brown, loose										
	brownish gray				3-4-5 N=9			13			
10.0	247.5	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/10/2014 Boring Completed: 1/10/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-47

BORING LOG NO. B-37

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634057.97 Easting: 1657054.44

Station: 375+00 Offset: 75' L Surface Elev.: 263.7 (Ft.)

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
						8-7-5 N=12	1.0 (HP)		12		20-16-4	
						4-4-5 N=9	3.0 (HP)		18			
						6-8-10 N=18	2.5 (HP)		19			
			5			10-15-22 N=37	4.0 (HP)		17			
			10			7-6-6 N=12			27			

SILTY LEAN CLAY (CL-ML), gray to brown, stiff to very stiff

brownish gray, very stiff

5.0 258.5

SANDY FAT CLAY (CH), gray, stiff to hard

10.0 253.5

Boring Terminated at 10 Feet

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/10/2014 Boring Completed: 1/10/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-48

BORING LOG NO. B-38

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 633861.82 Easting: 1657897.13

Station: 384+00 Offset: 75' R Surface Elev.: 259.0 (Ft.)

DEPTH ELEVATION (Ft.)

GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
SANDY LEAN CLAY (CL), grayish-brown, medium stiff to stiff				3-2-3 N=5	1.0 (HP)		21		35-17-18	
3.5 255.5				3-4-7 N=11	1.0 (HP)		19			
FAT CLAY (CH), gray to brown, very stiff to hard	5			12-14-20 N=34	4.0 (HP)		17			
				10-12-16 N=28	3.0 (HP)		18			
9.0 250										
10.0 249 **POORLY GRADED SAND (SP)**, brown, medium dense				6-5-7 N=12			17			
Boring Terminated at 10 Feet	10									

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/13/2014 Boring Completed: 1/13/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-49

BORING LOG NO. B-39

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 633822.17 Easting: 1658721.96

Station: 392+00 Offset: 75' R Surface Elev.: 259.0 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SANDY LEAN CLAY (CL), light gray to brown, stiff			4-5-5 N=10	1.0 (HP)		16		31-18-13	
				5-6-8 N=14	3.0 (HP)		11			
3.5	255.5									
	CLAYEY SAND (SC), brown to light brown, medium dense			8-9-10 N=19			7			
5.0	254	5								
	SANDY LEAN CLAY (CL), brown to dark brown, very stiff			6-7-8 N=15	3.0 (HP)		11			
8.5	250.5									
	CLAYEY SAND (SC), light gray to brown, medium dense			6-6-7 N=13			7			
10.0	249	10								
	Boring Terminated at 10 Feet									

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/13/2014 Boring Completed: 1/13/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-50

BORING LOG NO. B-40

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634050.37 Easting: 1659554.75

Station: 400+00 Offset: 75' L Surface Elev.: 257.1 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
SANDY LEAN CLAY (CL), gray, stiff			4-5-4 N=9	2.5 (HP)		18		42-14-28	
			4-5-9 N=14	2.0 (HP)		19			
5.0	252		4-4-8 N=12	1.0 (HP)		21			
CLAYEY SAND (SC), gray to brown, medium dense		5	6-10-11 N=21			17			
8.5	248.5								
POORLY GRADED SAND (SP), dark brown, loose			3-3-5 N=8			23			
10.0	247	10							
Boring Terminated at 10 Feet									

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/13/2014 Boring Completed: 1/13/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-51

BORING LOG NO. B-41

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634120.29 Easting: 1661087.26

Station: 416+00 Offset: 75' R Surface Elev.: 259.7 (Ft.)

DEPTH ELEVATION (Ft.)

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		4-5-4 N=9	2.0 (HP)		15		33-14-19	
		3-3-4 N=7	1.5 (HP)		16			
		4-5-6 N=11	1.5 (HP)		17			
5		5-7-7 N=14	2.5 (HP)		19			
		7-7-8 N=15			17			
10								

SANDY LEAN CLAY (CL), gray to light brown, medium stiff to stiff

brownish gray

light gray

8.5 251

CLAYEY SAND (SC), gray to light brown, medium dense

10.0 249.5

Boring Terminated at 10 Feet

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/14/2014 Boring Completed: 1/14/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-52

BORING LOG NO. B-42

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634480.6 Easting: 1661855.05

Station: 424+00 Offset: 75' L Surface Elev.: 260.0 (Ft.)

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		FAT CLAY (CH), dark gray to dark brown, stiff				4-5-6 N=11	3.0 (HP)		24		54-18-36	
						3-4-5 N=9	1.0 (HP)		26			
	3.5	256.5										
		FAT CLAY (CH), gray to brown, very stiff	5			4-5-12 N=17	3.5 (HP)		23			
						7-12-14 N=26	4.0 (HP)		24			
	8.5	251.5										
		SANDY FAT CLAY (CH), gray, very stiff				7-8-10 N=18	2.0 (HP)		25			
	10.0	250	10									
		Boring Terminated at 10 Feet										

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/14/2014 Boring Completed: 1/14/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-53

BORING LOG NO. B-43

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634309.01 Easting: 1662672.83

Station: 432+00 Offset: 75' R Surface Elev.: 260.1 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY (CL), dark gray to dark brown, medium stiff								
2.0	258		4-4-4 N=8			17		42-16-26	
	FAT CLAY (CH), grayish-brown, stiff to very stiff		3-6-8 N=14	3.0 (HP)		23			
5.0	255		8-9-14 N=23	3.0 (HP)		24			
	SANDY FAT CLAY (CH), brownish gray, hard	5	12-14-18 N=32	3.5 (HP)		24			
8.5	251.5								
	FAT CLAY (CH), gray to brown, very stiff		7-8-9 N=17	1.5 (HP)		33			
10.0	250	10							
	Boring Terminated at 10 Feet								

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/14/2014 Boring Completed: 1/14/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-54

BORING LOG NO. B-44

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634472.99 Easting: 1663475.92

Station: 440+00 Offset: 75' L Surface Elev.: 256.5 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY (CL), light brown, stiff										
2.0	254.5			X	4-4-6 N=10	1.0 (HP)		20		42-17-25	
	CLAYEY SAND (SC), grayish-brown, medium dense			X	3-5-6 N=11			19			
				X	7-9-12 N=21			17			
		5		X	7-8-9 N=17			15			
8.5	248										
	POORLY GRADED SAND (SP), gray, medium dense			X	6-4-6 N=10			12			
10.0	246.5	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/14/2014 Boring Completed: 1/14/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-55

BORING LOG NO. B-45

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634465.73 Easting: 1664266.21

Station: 448+00 Offset: 75' L Surface Elev.: 257.9 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY (CL), gray to brown, medium stiff				3-4-4 N=8	2.0 (HP)		16		36-18-18	
					4-3-4 N=7	2.0 (HP)		15			
5.0	253				3-4-4 N=8	0.5 (HP)		24			
	SANDY FAT CLAY (CH), gray to light brown, stiff	5			5-5-7 N=12	1.0 (HP)		25			
8.5	249.5										
	CLAYEY SAND (SC), gray to brown, loose				4-3-4 N=7			19			
10.0	248	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/14/2014 Boring Completed: 1/14/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-56

BORING LOG NO. B-46

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634294.01 Easting: 1665125.28

Station: 456+00 Offset: 75' R Surface Elev.: 259.7 (Ft.)

DEPTH ELEVATION (Ft.)

GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
SANDY LEAN CLAY (CL), gray to brown, medium stiff				3-2-3 N=5	0.5 (HP)		16		28-15-13	
				3-3-3 N=6	1.5 (HP)		25			
5.0 254.5				3-4-4 N=8	1.5 (HP)		20			
FAT CLAY (CH), gray, stiff	5			4-5-6 N=11	1.5 (HP)		26			
8.5 251										
SANDY FAT CLAY (CH), gray to light brown, stiff				5-6-7 N=13	2.0 (HP)		25			
10.0 249.5	10									
Boring Terminated at 10 Feet										

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/14/2014 Boring Completed: 1/14/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-57

BORING LOG NO. B-47

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634467.56 Easting: 1665906.16

Station: 464+00 Offset: 75' L Surface Elev.: 257.9 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SANDY LEAN CLAY (CL), gray, stiff to very stiff				4-5-5 N=10	1.0 (HP)		18		46-24-22	
					5-9-12 N=21	1.5 (HP)		22			
3.5	254.5										
	SANDY FAT CLAY (CH), grayish-brown, very stiff				9-10-12 N=22	2.0 (HP)		23			
5.0	253	5									
	POORLY GRADED SAND (SP), gray to brown, medium dense				9-8-10 N=18			7			
					5-4-6 N=10			21			
10.0	248	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/15/2014 Boring Completed: 1/15/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-58

BORING LOG NO. B-48

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634321.47 Easting: 1666717.22

Station: 472+00 Offset: 75' R Surface Elev.: 259.6 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SANDY LEAN CLAY (CL), light brown, stiff to very stiff				4-4-6 N=10	1.5 (HP)		17		39-16-23	
					4-6-7 N=13	2.5 (HP)		20			
5.0	254.5				7-12-11 N=23	4.0 (HP)		18			
	CLAYEY SAND (SC), grayish-brown, medium dense	5			6-10-14 N=24			11			
8.5	251										
	POORLY GRADED SAND (SP), brown to light brown, medium dense				9-8-9 N=17			10			
10.0	249.5	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/15/2014 Boring Completed: 1/15/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-59

BORING LOG NO. B-49

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634448.61 Easting: 1667508.59

Station: 480+00 Offset: 75' L Surface Elev.: 257.8 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SANDY LEAN CLAY (CL), grayish-brown, stiff to very stiff				4-3-6 N=9	2.0 (HP)		16		36-13-23	
	gray to brown				3-5-6 N=11	2.0 (HP)		21			
5.0	253				7-9-14 N=23	3.0 (HP)		20			
	CLAYEY SAND (SC), grayish-brown, medium dense	5			9-12-14 N=26			14			
8.5	249.5										
	POORLY GRADED SAND (SP), brown, medium dense				8-7-8 N=15			8			
10.0	248	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/15/2014 Boring Completed: 1/15/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-60

BORING LOG NO. B-50

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634323.71 Easting: 1668321.75

Station: 488+00 Offset: 75' R Surface Elev.: 258.8 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SANDY LEAN CLAY (CL), brown to light brown, stiff to very stiff				4-5-6 N=11	2.5 (HP)		15		38-15-23	
					7-12-16 N=28	3.5 (HP)		12			
5.0	254				12-14-12 N=26	3.5 (HP)		15			
	CLAYEY SAND (SC), gray to light brown, medium dense	5			7-12-12 N=24			23			
8.5	250.5										
	POORLY GRADED SAND (SP), brownish-gray, medium dense				6-7-8 N=15			6			
10.0	249	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/15/2014 Boring Completed: 1/15/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-61

BORING LOG NO. B-51

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634434.81 Easting: 1669098.84

Station: 496+00 Offset: 75' L Surface Elev.: 261.0 (Ft.)

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SANDY LEAN CLAY (CL), brown, medium stiff to stiff				3-2-3 N=5	1.5 (HP)		16		29-19-10	
	3.5					3-4-5 N=9	2.0 (HP)		20			
	5.0	**CLAYEY SAND (SC)**, light brown to light gray, medium dense	5			5-5-6 N=11	3.0 (HP)		11			
		POORLY GRADED SAND (SP), brown, loose				4-4-4 N=8			10			
	10.0		10			4-3-4 N=7			10			
		Boring Terminated at 10 Feet										

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/15/2014 Boring Completed: 1/15/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-62

BORING LOG NO. B-52

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634306.79 Easting: 1669906.04

Station: 504+00 Offset: 75' R Surface Elev.: 261.6 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY CLAY (CL-ML), With sand, light gray to brown, medium stiff				4-3-4 N=7	1.0 (HP)		15		18-13-5	
2.0	259.5										
	SANDY FAT CLAY (CH), light gray to brown, stiff				4-3-5 N=8	2.0 (HP)		22			
					4-5-4 N=9	0.5 (HP)		24			
5.0	256.5	5									
	CLAYEY SAND (SC), grayish-brown, medium dense				9-14-12 N=26			18			
8.5	253										
	POORLY GRADED SAND (SP), brownish-gray, medium dense				10-9-11 N=20			18			
10.0	251.5	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/15/2014 Boring Completed: 1/15/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-63

BORING LOG NO. B-53

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634419.33 Easting: 1670727.04

Station: 512+00 Offset: 75' L Surface Elev.: 260.3 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SANDY LEAN CLAY (CL), gray to brown, stiff to very stiff				4-5-5 N=10	1.5 (HP)		18		42-14-28	
					4-5-4 N=9	1.5 (HP)		18			
					9-12-14 N=26	2.5 (HP)		24			
		5			9-12-15 N=27			24			
8.5	252										
	POORLY GRADED SAND (SP), brown, medium dense				6-5-8 N=13			18			
10.0	250.5	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Rope and Cathead

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/16/2014 Boring Completed: 1/16/2014

Drill Rig: CME 55 Driller: CT

Project No.: 35135121 Exhibit: A-64

BORING LOG NO. B-54

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634306.59 Easting: 1671519.79

Station: 520+00 Offset: 75' R Surface Elev.: 260.2 (Ft.)

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILT (ML), with clay and sand, gray to brown, soft to medium stiff					1-2-1 N=3			18		19-18-1	
						1-1-2 N=3			20			
						3-3-2 N=5			24			
	5.0	255	5									
	SANDY LEAN CLAY (CL), light gray to brown, stiff					3-4-7 N=11			20			
	8.5	251.5										
	CLAYEY SAND (SC), light gray, loose					3-3-3 N=6			17			
	10.0	250	10									
	Boring Terminated at 10 Feet											

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/15/2014 Boring Completed: 1/15/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-65

BORING LOG NO. B-55

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634290.1 Easting: 1672314.19

Station: 528+00 Offset: 75' R Surface Elev.: 260.4 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY CLAY (CL-ML), with sand, brown, medium stiff										
2.0	258.5				2-3-3 N=6	1.5 (HP)		15		19-15-4	
	FAT CLAY (CH), brownish-gray, stiff to very stiff				3-3-5 N=8	0.5 (HP)		21			
					5-6-6 N=12	2.0 (HP)		20			
		5			6-7-8 N=15	1.0 (HP)		28			
8.5	252										
	CLAYEY SAND (SC), medium brown, medium dense				5-5-6 N=11			9			
10.0	250.5	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/15/2014 Boring Completed: 1/15/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-66

BORING LOG NO. B-56

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634421.71 Easting: 1673028.57

Station: 536+00 Offset: 75' L Surface Elev.: 258.9 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY WITH SAND (CL), brown, soft									
2.0	257			2-1-2 N=3	1.0 (HP)		22		39-14-25	73
	FAT CLAY (CH), brownish-gray, stiff			2-4-5 N=9	0.5 (HP)		26			
3.5	255.5									
	SANDY FAT CLAY (CH), gray, stiff			6-6-7 N=13	1.5 (HP)		25			
5.0	254	5								
	CLAYEY SAND (SC), light brown, medium dense			8-9-9 N=18			16			
10.0	249			5-8-10 N=18			14			
	Boring Terminated at 10 Feet	10								

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/15/2014 Boring Completed: 1/15/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-67

BORING LOG NO. B-57

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634285.91 Easting: 1673595.49

Station: 544+00 Offset: 75' R Surface Elev.: 259.6 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SANDY LEAN CLAY (CL), brownish-gray, stiff to very stiff		2-3-6 N=9	1.5 (HP)		19		27-18-9	63
			6-6-13 N=19	3.5 (HP)		18			
3.5	256								
	CLAYEY SAND (SC), light brown, medium dense		15-12-11 N=23			13			
		5	11-10-7 N=17			10			
	brownish-gray, loose		3-4-3 N=7			15			
10.0	249.5	10							
	Boring Terminated at 10 Feet								

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/15/2014 Boring Completed: 1/15/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-68

BORING LOG NO. B-58

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634285.45 Easting: 1674678.67

Station: 552+00 Offset: 75' R Surface Elev.: 260.4 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	CLAYEY SAND (SC), with roots, brown, soft										
2.0	258.5				1-2-2 N=4	1.0 (HP)		16		49-16-33	13
	SANDY FAT CLAY (CH), brown to gray, medium stiff										
3.5	257				2-3-4 N=7	0.5 (HP)		21			
	FAT CLAY (CH), brownish-gray, stiff to very stiff				5-7-7 N=14	2.0 (HP)		21			
		5			7-9-10 N=19	3.0 (HP)		19			
8.5	252										
	CLAYEY SAND (SC), brown, loose										
10.0	250.5				3-3-3 N=6			18			
	Boring Terminated at 10 Feet	10									

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/15/2014 Boring Completed: 1/15/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-69

BORING LOG NO. B-59

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634393.71 Easting: 1675492.9

Station: 560+00 Offset: 75' L Surface Elev.: 258.6 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SANDY LEAN CLAY (CL), brown, medium stiff to stiff				2-2-4 N=6	1.5 (HP)		18		40-18-22	59
					3-4-7 N=11	1.5 (HP)		21			
5.0	253.5				6-7-7 N=14	1.5 (HP)		20			
	CLAYEY SAND (SC), medium brown, loose to medium dense	5			6-7-7 N=14			11			
	brown				4-4-4 N=8			13			
10.0	248.5	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/15/2014 Boring Completed: 1/15/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-70

BORING LOG NO. B-60

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634279.52 Easting: 1676287.54

Station: 568+00 Offset: 75' R Surface Elev.: 260.1 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SANDY SILTY CLAY (CL-ML), with sand and gravel, brown to gray, medium stiff				2-5-3 N=8	1.5 (HP)		14		20-16-4	54
2.0	258										
	SANDY LEAN CLAY (CL), light gray, medium stiff to stiff				2-3-3 N=6	1.0 (HP)		24			
					3-4-6 N=10	1.0 (HP)		20			
5.0	255	5									
	CLAYEY SAND (SC), medium brown, medium dense				6-7-7 N=14			18			
					3-5-6 N=11			13			
10.0	250	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/15/2014 Boring Completed: 1/15/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-71

BORING LOG NO. B-61

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634262.9 Easting: 1677058.33

Station: 576+00 Offset: 75' R Surface Elev.: 262.3 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SANDY LEAN CLAY (CL), light brown to brown, medium stiff										
2.0	260.5				2-2-2 N=4	1.0 (HP)		17		24-15-9	70
	SANDY FAT CLAY (CH), medium brown, very stiff				2-5-11 N=16	1.0 (HP)		23			
3.5	259				9-11-13 N=24			15			
	CLAYEY SAND (SC), medium brown, medium dense	5			15-13-13 N=26			17			
8.5	254										
	CLAYEY SAND (SC), brown, very loose				2-1-2 N=3			26			
10.0	252.5	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/15/2014 Boring Completed: 1/15/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-72

BORING LOG NO. B-62

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634257.8 Easting: 1677900.31

Station: 584+00 Offset: 75' R Surface Elev.: 262.4 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
2.0	260.5				6-5-4 N=9	2.0 (HP)		13		23-16-7	29
4.0	258.5				2-2-5 N=7	2.5 (HP)		20			
		5			6-8-12 N=20	2.5 (HP)		19			
					12-12-14 N=26	1.0 (HP)		23			
8.5	254										
10.0	252.5				6-7-7 N=14			9			
		10									

SILTY CLAYEY GRAVEL WITH SAND (GC-GM), brown, dense

SANDY LEAN CLAY (CL), medium brown, medium stiff to very stiff

CLAYEY SAND (SC), medium brown, medium dense

POORLY GRADED SAND (SP), medium brown, medium dense

Boring Terminated at 10 Feet

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/15/2014 Boring Completed: 1/15/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-73

BORING LOG NO. B-63

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634271.49 Easting: 1678695.72

Station: 592+00 Offset: 75' R Surface Elev.: 262.6 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
LEAN CLAY WITH SAND (CL), with sand, brown, medium stiff			2-2-2 N=4	1.0 (HP)		20		21-7-14	71
3.5	259		2-2-3 N=5	1.0 (HP)		19			
SANDY LEAN CLAY (CL), grayish-brown, stiff to very stiff		5	5-5-6 N=11	0.5 (HP)		15			
			5-8-12 N=20	3.0 (HP)		24			
8.5	254								
CLAYEY SAND (SC), brown, medium dense			4-5-6 N=11			15			
10.0	252.5	10							
Boring Terminated at 10 Feet									

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/15/2014 Boring Completed: 1/15/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-74

BORING LOG NO. B-64

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634268.95 Easting: 1679519.15

Station: 600+00 Offset: 75' R Surface Elev.: 262.6 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY WITH SAND (CL), with sand, medium brown, medium stiff									
2.0	260.5			1-2-3 N=5	1.0 (HP)		24		28-18-10	83
	SANDY LEAN CLAY (CL), light brown, very stiff									
3.5	259			4-7-17 N=24	3.5 (HP)		16			
	CLAYEY SAND (SC), medium brown, medium dense									
5.0	257.5			11-10-9 N=19			21			
	POORLY GRADED SAND (SP), medium brown, loose	5		8-5-4 N=9			12			
10.0	252.5			1-4-5 N=9			30			
	Boring Terminated at 10 Feet	10								

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/14/2014 Boring Completed: 1/14/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-75

BORING LOG NO. B-65

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634284.11 Easting: 1680292.01

Station: 608+00 Offset: 75' R Surface Elev.: 263.7 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SANDY SILT (ML), dark brown, soft		1-2-1 N=3	0.5 (HP)		20		30-26-4	52
2.0	261.5								
	SANDY LEAN CLAY (CL), medium brown, medium stiff to stiff		3-2-3 N=5	1.0 (HP)		22			
			3-6-4 N=10	1.0 (HP)		23			
5.0	258.5	5							
	CLAYEY SAND (SC), brown, medium dense		6-9-11 N=20	2.0 (HP)		22			
8.5	255								
	SANDY LEAN CLAY (CL), brown to gray, medium stiff		3-2-2 N=4			24			
10.0	253.5	10							
	Boring Terminated at 10 Feet								

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/14/2014 Boring Completed: 1/14/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-76

BORING LOG NO. B-66

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634248.34 Easting: 1681100.19

Station: 616+00 Offset: 75' R Surface Elev.: 262.7 (Ft.)

DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SANDY SILTY CLAY (CL-ML), dark brown, medium stiff				4-3-3 N=6	1.0 (HP)		14		23-18-5	53
		light gray to brown				2-2-3 N=5	0.5 (HP)		20			
3.5	259	**CLAYEY SAND (SC)**, brown to light brown, medium dense				4-6-6 N=12			17			
			5			5-5-6 N=11			13			
8.5	254	**POORLY GRADED SAND (SP)**, light brown, medium dense				5-6-6 N=12			16			
10.0	252.5	***Boring Terminated at 10 Feet***	10									

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/14/2014 Boring Completed: 1/14/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-77

BORING LOG NO. B-67

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634375.83 Easting: 1681565.37

Station: 624+00 Offset: 75' L Surface Elev.: 261.7 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SANDY LEAN CLAY (CL), brownish-gray, soft to stiff				1-2-1 N=3	0.5 (HP)		21		24-16-8	69
					6-8-6 N=14	1.0 (HP)		24			
3.5	258										
	CLAYEY SAND (SC), brownish-gray, medium dense				5-6-6 N=12			20			
5.0	256.5	5									
	POORLY GRADED SAND (SP), medium brown, loose to medium dense				4-5-5 N=10			17			
10.0	251.5				3-3-3 N=6			18			
	Boring Terminated at 10 Feet	10									

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/14/2014 Boring Completed: 1/14/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-78

BORING LOG NO. B-68

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634280.78 Easting: 1682707.54

Station: 632+00 Offset: 75' R Surface Elev.: 264.7 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	FILL - SANDY SILTY GRAVEL (GP-GM)										
2.0	262.5				8-7-8 N=15			11		19-12-7	14
	SANDY LEAN CLAY (CL), reddish-brown, medium stiff to stiff				7-2-2 N=4	1.0 (HP)		15			
					3-2-2 N=4	0.5 (HP)		19			
		5			3-5-7 N=12	1.5 (HP)		40			
8.5	256										
	POORLY GRADED SAND (SP), reddish-brown, loose				3-3-4 N=7			5			
10.0	254.5	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/14/2014 Boring Completed: 1/14/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-79

BORING LOG NO. B-69

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634370.48 Easting: 1683489.8

Station: 640+00 Offset: 75' L Surface Elev.: 261.2 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	CLAYEY SAND (SC), gray to brown, very loose										
2.0	259				2-1-1 N=2	0.5 (HP)		19		24-13-11	50
	SANDY LEAN CLAY (CL), gray, medium stiff to stiff				1-2-5 N=7	0.5 (HP)		19			
5.0	256				7-6-6 N=12	1.5 (HP)		16			
	CLAYEY SAND (SC), gray, medium dense	5			6-11-10 N=21			25			
8.5	252.5										
	POORLY GRADED SAND (SP), reddish-brown, loose				3-2-2 N=4			15			
10.0	251	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/14/2014 Boring Completed: 1/14/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-80

BORING LOG NO. B-70

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634247.69 Easting: 1684228.54

Station: 648+00 Offset: 75' R Surface Elev.: 260.5 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SANDY LEAN CLAY (CL), brown, medium stiff										
					2-3-3 N=6	2.0 (HP)		18		25-13-12	52
					2-3-5 N=8	0.5 (HP)		23			
3.5	257										
	SANDY LEAN CLAY (CL), gray, very stiff				11-14-12 N=26	1.5 (HP)		17			
5.0	255.5	5									
	CLAYEY SAND (SC), grayish-brown, medium dense				10-12-13 N=25			18			
8.5	252										
	POORLY GRADED SAND (SP), grayish-brown, loose				4-3-3 N=6			7			
10.0	250.5	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/14/2014 Boring Completed: 1/14/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-81

BORING LOG NO. B-71

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634338.93 Easting: 1685146.16

Station: 656+00 Offset: 75' L Surface Elev.: 263.0 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SANDY SILTY CLAY (CL-ML), brown, medium stiff										
2.0	261				1-3-3 N=6	1.0 (HP)		14		20-15-5	52
	SANDY LEAN CLAY (CL), brown to gray, stiff				4-4-7 N=11	1.5 (HP)		17			
3.5	259.5										
	CLAYEY SAND (SC), light gray, medium dense				17-15-13 N=28			17			
		5			11-11-11 N=22			10			
8.5	254.5										
	POORLY GRADED SAND (SP), gray, loose				6-4-4 N=8			16			
10.0	253	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/14/2014 Boring Completed: 1/14/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-82

BORING LOG NO. B-72

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634211.23 Easting: 1685902.62

Station: 664+00 Offset: 75' R Surface Elev.: 264.4 (Ft.)

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		CLAYEY SAND (SC), dark brown, soft			X	1-2-1 N=3	0.5 (HP)		15		34-21-13	45
		brown			X	1-1-2 N=3	0.5 (HP)		23			
	3.5	261										
		CLAYEY SAND (SC), medium brown, very loose to medium dense			X	2-2-1 N=3			12			
			5		X	2-4-6 N=10			18			
					X	4-6-7 N=13			19			
	10.0	254.5	10									
		Boring Terminated at 10 Feet										

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/14/2014 Boring Completed: 1/14/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-83

BORING LOG NO. B-73

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634323.22 Easting: 1686719.41

Station: 672+00 Offset: 75' L Surface Elev.: 263.3 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SANDY SILTY CLAY (CL-ML), brown, medium stiff to stiff				2-3-3 N=6	2.0 (HP)		14		17-12-5	56
	gray				4-5-4 N=9	2.5 (HP)		21			
3.5	260										
	CLAYEY SAND (SC), gray to brown, medium dense				6-7-11 N=18			19			
5.0	258.5	5									
	POORLY GRADED SAND (SP), grayish-brown, loose to medium dense				7-6-7 N=13			21			
10.0	253.5	10			4-3-3 N=6			22			
	Boring Terminated at 10 Feet										

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/14/2014 Boring Completed: 1/14/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-84

BORING LOG NO. B-74

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634311.89 Easting: 1687486.73

Station: 680+00 Offset: 75' L Surface Elev.: 263.4 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SANDY SILTY CLAY (CL-ML), dark brown, soft										
2.0	261.5				1-1-1 N=2	2.0 (HP)		18		20-13-7	58
	SANDY FAT CLAY (CH), gray to light brown, medium stiff				1-2-3 N=5	0.5 (HP)		19			
3.5	260										
	CLAYEY SAND (SC), light brown, loose				3-3-3 N=6			17			
5.0	258.5	5									
	POORLY GRADED SAND (SP), medium brown, medium dense				3-4-7 N=11			21			
10.0	253.5	10			3-6-7 N=13			21			
	Boring Terminated at 10 Feet										

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/13/2014 Boring Completed: 1/13/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-85

BORING LOG NO. B-75

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634318.72 Easting: 1688293.12

Station: 688+00 Offset: 75' L Surface Elev.: 263.3 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY WITH SAND (CL), with sand, grayish-brown, medium stiff			2-3-4 N=7	2.5 (HP)		19		36-15-21	73
2.0	261.5									
	FAT CLAY (CH), gray to reddish-brown, medium stiff			3-3-5 N=8	1.5 (HP)		18			
3.5	260									
	SANDY FAT CLAY (CH), gray, very stiff			4-7-12 N=19	2.5 (HP)		20			
	gray to brown, hard	5		11-15-19 N=34	3.0 (HP)		24			
8.5	255									
	POORLY GRADED SAND (SP), medium brown, medium dense			3-5-6 N=11			7			
10.0	253.5	10								
	Boring Terminated at 10 Feet									

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/13/2014 Boring Completed: 1/13/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-86

BORING LOG NO. B-76

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634326.26 Easting: 1689085.83

Station: 701+40 Offset: 75' L Surface Elev.: 264.2 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY (CL), trace sand, grayish-brown, stiff to very stiff				4-5-7 N=12	3.0 (HP)		14		38-18-20	86
	light gray				6-8-9 N=17	4.0 (HP)		15			
3.5	260.5										
	FAT CLAY (CH), light gray, hard	5			12-17-26 N=43	4.0 (HP)		11			
					26-25-24 N=49	4.0 (HP)		10			
8.5	255.5										
	POORLY GRADED SAND (SP), medium brown, loose				4-4-3 N=7			10			
10.0	254	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/13/2014 Boring Completed: 1/13/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-87

BORING LOG NO. B-77

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634123.2 Easting: 1689867.07

Station: 709+00 Offset: 75' R Surface Elev.: 263.8 (Ft.)

DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SILT (ML), light gray to light brown, stiff to hard				3-5-5 N=10	2.0 (HP)		16		36-27-9	88
						4-6-7 N=13	2.5 (HP)		18			
5.0	259					15-16-16 N=32	3.5 (HP)		19			
		CLAYEY SAND (SC), light brown, medium dense	5			14-13-14 N=27			16			
8.5	255.5											
		POORLY GRADED SAND (SP), brown, loose				4-4-4 N=8			7			
10.0	254		10									
		Boring Terminated at 10 Feet										

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/13/2014 Boring Completed: 1/13/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-88

BORING LOG NO. B-78

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634308.49 Easting: 1690668.63

Station: 717+00 Offset: 75' L Surface Elev.: 263.6 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY (CL), with sand, grayish-brown, medium stiff										
2.0	261.5			X	2-2-2 N=4	0.5 (HP)		23		36-17-19	85
	SANDY FAT CLAY (CH), gray, very stiff			X	4-6-10 N=16	2.0 (HP)		26			
				X	12-15-14 N=29	4.0 (HP)		25			
		5		X	12-12-16 N=28	2.5 (HP)		27			
8.5	255										
	POORLY GRADED SAND (SP), medium brown, loose			X	4-4-5 N=9			8			
10.0	253.5	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/13/2014 Boring Completed: 1/13/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-89

BORING LOG NO. B-79

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634180.03 Easting: 1691475.77

Station: 725+25 Offset: 75' R Surface Elev.: 265.7 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY WITH SAND (CL), with sand and roots, dark brown, medium stiff										
2.0	263.5				2-3-3 N=6	1.5 (HP)		23		42-20-22	73
	FAT CLAY (CH), dark gray to dark brown, stiff										
3.5	262				4-5-6 N=11	1.5 (HP)		26			
	SANDY FAT CLAY (CH), gray, very stiff to hard				7-9-12 N=21	3.5 (HP)		16			
		5			13-16-18 N=34	4.0 (HP)		18			
8.5	257										
	POORLY GRADED SAND (SP), medium brown, loose				3-4-4 N=8			8			
10.0	255.5	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/13/2014 Boring Completed: 1/13/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-90

BORING LOG NO. B-80

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634308.04 Easting: 1692266.49

Station: 730+50 Offset: 75' L Surface Elev.: 264.7 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY WITH SAND (CL), trace sand, dark gray to dark brown, medium stiff				2-3-2 N=5	0.5 (HP)		28		49-19-30	77
					2-3-2 N=5	0.5 (HP)		36			
3.5	261										
	FAT CLAY (CH), gray to brown, stiff	5			3-4-6 N=10	1.0 (HP)		46			
					4-4-7 N=11	1.0 (HP)		26			
8.5	256										
	POORLY GRADED SAND (SP), brown, loose				3-4-5 N=9			9			
10.0	254.5	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/13/2014 Boring Completed: 1/13/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-91

BORING LOG NO. B-81

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634128.78 Easting: 1693000.53

Station: 741+00 Offset: 75' R Surface Elev.: 266.3 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY WITH SAND (CL), with sand, light brown to reddish-brown, stiff				3-4-6 N=10	3.0 (HP)		17		40-17-23	71
					6-6-7 N=13	3.5 (HP)		17			
3.5	263										
	SANDY LEAN CLAY (CL), light gray, very stiff to hard				7-12-14 N=26	4.0 (HP)		18			
	light brown	5			12-17-23 N=40	4.5 (HP)		11			
8.5	258										
	CLAYEY SAND (SC), grayish-brown, loose				4-4-5 N=9			22			
10.0	256.5	10									
	Boring Terminated at 10 Feet										

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/13/2014 Boring Completed: 1/13/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-92

BORING LOG NO. B-82

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634295.49 Easting: 1693848.97

Station: 749+00 Offset: 75' L Surface Elev.: 266.2 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
LEAN CLAY WITH SAND (CL), with sand, dark gray to dark brown, medium stiff					2-3-2 N=5	1.5 (HP)		23		41-18-23	79
					2-3-5 N=8	1.0 (HP)		21			
3.5	262.5										
FAT CLAY (CH), brownish-gray, stiff to very stiff					6-6-8 N=14	2.0 (HP)		5921			
		5			7-8-9 N=17	3.0 (HP)		22			
8.5	257.5										
POORLY GRADED SAND (SP), brown, loose								7			
10.0	256	10									
Boring Terminated at 10 Feet											

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/13/2014 Boring Completed: 1/13/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-93

BORING LOG NO. B-83

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634354.83 Easting: 1694632.54

Station: 757+00 Offset: 75' L Surface Elev.: 266.4 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0.0	266.4									
LEAN CLAY WITH SAND (CL), with sand, dark brown to dark gray, medium stiff				2-3-2 N=5	1.0 (HP)		21		32-18-14	78
2.0	264.5									
FAT CLAY (CH), gray, very stiff				4-6-9 N=15	1.5 (HP)		19			
				10-10-10 N=20	2.5 (HP)		21			
dark brown		5		12-8-6 N=14	0.5 (HP)		22			
6.0	260.5									
CLAYEY SAND (SC), brownish-gray, medium dense										
8.5	258									
POORLY GRADED SAND (SP), brownish-gray, loose				3-3-5 N=8			14			
10.0	256.5	10								
Boring Terminated at 10 Feet										

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/11/2014 Boring Completed: 1/11/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-94

BORING LOG NO. B-84

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634362.02 Easting: 1695456.88

Station: 765+00 Offset: 75' L Surface Elev.: 267.1 (Ft.)

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		FAT CLAY (CH), gray to brown, medium stiff to stiff				2-2-2 N=4	1.5 (HP)		35		51-20-31	85
		gray to reddish-brown				2-2-2 N=4	0.5 (HP)		36			
		grayish-brown				2-2-6 N=8	0.5 (HP)		22			
			5			7-7-7 N=14	1.0 (HP)		43			
	8.5	258.5										
		LEAN CLAY (CL), gray to reddish-brown, medium stiff				3-3-4 N=7			26			
	10.0	257	10									
		Boring Terminated at 10 Feet										

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/11/2014 Boring Completed: 1/11/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-95

BORING LOG NO. B-85

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634212.4 Easting: 1696270.31

Station: 773+00 Offset: 75' R Surface Elev.: 268.0 (Ft.)

DEPTH ELEVATION (Ft.)

GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
LEAN CLAY (CL), trace sand, gray to reddish-brown, medium stiff to hard				2-2-3 N=5	1.0 (HP)		25		42-19-23	96
				4-5-7 N=12	1.5 (HP)		26			
				6-6-9 N=15	2.5 (HP)		5			
	5			8-11-21 N=32	4.0 (HP)		19			
8.5 259.5										
CLAYEY SAND (SC), light gray, medium dense				3-6-5 N=11			21			
9.5 258.5										
10.0 258 **POORLY GRADED SAND (SP)**, light gray to light brown, medium dense	10									
Boring Terminated at 10 Feet										

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/11/2014 Boring Completed: 1/11/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-96

BORING LOG NO. B-86

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634170.75 Easting: 1697207.25

Station: 781+00 Offset: 75' R Surface Elev.: 268.9 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY (CL), trace sand, brown to reddish-brown, stiff		3-4-6 N=10	2.0 (HP)		21		34-15-19	98
2.0	267								
	FAT CLAY WITH SILT (CH), gray to reddish-brown, stiff to very stiff		5-5-8 N=13	2.5 (HP)		18			
			7-6-7 N=13	3.0 (HP)		24			
		5	7-6-11 N=17	3.5 (HP)		22			
8.5	260.5								
	SANDY LEAN CLAY (CL), gray, stiff		4-5-7 N=12	3.0 (HP)		24			
10.0	259	10							
	Boring Terminated at 10 Feet								

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/11/2014 Boring Completed: 1/11/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-97

BORING LOG NO. B-87

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634182.41 Easting: 1698044.8

Station: 789+30 Offset: 75' R Surface Elev.: 269.0 (Ft.)

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
						3-6-8 N=14	3.0 (HP)		18		28-14-14	92
						7-8-6 N=14	1.5 (HP)		24			
						7-7-7 N=14	2.0 (HP)		24			
			5			6-6-6 N=12	1.5 (HP)		27			
	8.5	260.5										
	10.0	259	10			3-5-5 N=10	2.5 (HP)		18			

LEAN CLAY (CL), with silt and trace sand, dark gray to dark brown, stiff

gray to reddish-brown

SANDY FAT CLAY (CH), gray to reddish-brown, stiff

Boring Terminated at 10 Feet

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/11/2014 Boring Completed: 1/11/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-98

BORING LOG NO. B-88

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634375.24 Easting: 1698686.93

Station: 797+00 Offset: 75' L Surface Elev.: 270.5 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
LEAN CLAY WITH SAND (CL), gray to brown, very stiff					9-11-9 N=20	4.0 (HP)		14			84
					11-9-11 N=20	4.0 (HP)		16			
3.5	267										
FAT CLAY WITH SILT (CH), gray to brown, stiff to very stiff		5			6-6-6 N=12	3.0 (HP)		19			
					6-7-8 N=15	3.0 (HP)		24			
8.5	262										
FAT CLAY (CH), gray to light brown, medium stiff					2-2-4 N=6	0.5 (HP)		26			
10.0	260.5	10									
Boring Terminated at 10 Feet											

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/11/2014 Boring Completed: 1/11/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-99

BORING LOG NO. B-89

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634162.06 Easting: 1699425.37

Station: 805+30 Offset: 75' R Surface Elev.: 270.4 (Ft.)

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY (CL), brown to dark brown, stiff					3-4-9 N=13	3.0 (HP)		17		37-19-18	97
	2.0	268.5										
	FAT CLAY (CH), grayish-brown to reddish-brown, stiff to very stiff					7-8-8 N=16	3.5 (HP)		24			
						5-5-5 N=10	1.0 (HP)		28			
			5			5-6-8 N=14	2.5 (HP)		25			
	gray to reddish-brown, medium stiff					3-3-4 N=7	1.5 (HP)		22			
	10.0	260.5	10									
	Boring Terminated at 10 Feet											

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/10/2014 Boring Completed: 1/10/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-100

BORING LOG NO. B-90

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634365.08 Easting: 1700301.04

Station: 813+30 Offset: 75' L Surface Elev.: 269.2 (Ft.)

DEPTH ELEVATION (Ft.)

GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
LEAN CLAY (CL), brown to dark brown, soft				3-2-2 N=4	1.5 (HP)		26		40-17-23	97
light gray to light brown, medium stiff				4-3-3 N=6	0.5 (HP)		37			
				2-3-3 N=6	0.5 (HP)		36			
gray to reddish-brown, stiff	5			5-6-7 N=13	1.5 (HP)		34			
10.0 259				3-4-5 N=9	1.5 (HP)		26			
Boring Terminated at 10 Feet	10									

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/10/2014 Boring Completed: 1/10/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-101

BORING LOG NO. B-91

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634200.94 Easting: 1701065.79

Station: 821+30 Offset: 75' R Surface Elev.: 270.3 (Ft.)

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY (CL), light gray to reddish-brown, medium stiff		2-2-2 N=4	1.0 (HP)		27		35-17-18	95
3.5	267		3-3-3 N=6	2.0 (HP)		30			
	FAT CLAY (CH), brown to reddish-brown, stiff	5	5-5-5 N=10	1.5 (HP)		32			
			5-5-5 N=10	2.0 (HP)		32			
10.0	light gray to reddish-brown, stiff 260.5	10	5-5-6 N=11	1.5 (HP)		25			
	Boring Terminated at 10 Feet								

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/10/2014 Boring Completed: 1/10/2014

Drill Rig: CME 55 Driller: GH

Project No.: 35135121 Exhibit: A-102

BORING LOG NO. B-92

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

CLIENT: Atkins North America, Inc.
Dallas, Texas

SITE: Highway 412, Lawrence & Greene Co.
Light, Arkansas

LOCATION See Exhibit A-2

Northing: 634346.87 Easting: 1701951.12

Station: 829+30 Offset: 75' L Surface Elev.: 272.7 (Ft.)

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SANDY LEAN CLAY WITH GRAVEL (CL), gray to reddish-brown, stiff					15-6-4 N=10	2.0 (HP)		10		25-12-13	52
	2.0	270.5										
	LEAN CLAY (CL), gray to brown, medium stiff to stiff					2-2-2 N=4	0.5 (HP)		26			
						3-4-5 N=9	1.5 (HP)		24			
			5			5-5-6 N=11	0.5 (HP)		25			
	8.5	264										
	FAT CLAY (CH), light gray to reddish-brown, medium stiff					2-3-3 N=6	1.0 (HP)		23			
	10.0	262.5	10									
	Boring Terminated at 10 Feet											

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

Hammer Type: Automatic

Advancement Method:
0-10: Solid stem auger

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
25809 I-30 South
Bryant, Arkansas

Boring Started: 1/10/2014 Boring Completed: 1/10/2014

Drill Rig: DR009 Driller: GH

Project No.: 35135121 Exhibit: A-103

APPENDIX B
LABORATORY TESTING

Laboratory Testing Description

Samples retrieved during the field exploration were taken to the laboratory for further observation by the project geotechnical engineer and were classified in accordance with the Unified Soil Classification System (USCS) and the AASHTO Classification System described in **Appendix C**. At that time, the field descriptions were confirmed or modified as necessary and a limited laboratory testing program was formulated.

Selected soil samples obtained from the site were tested for the following engineering properties:

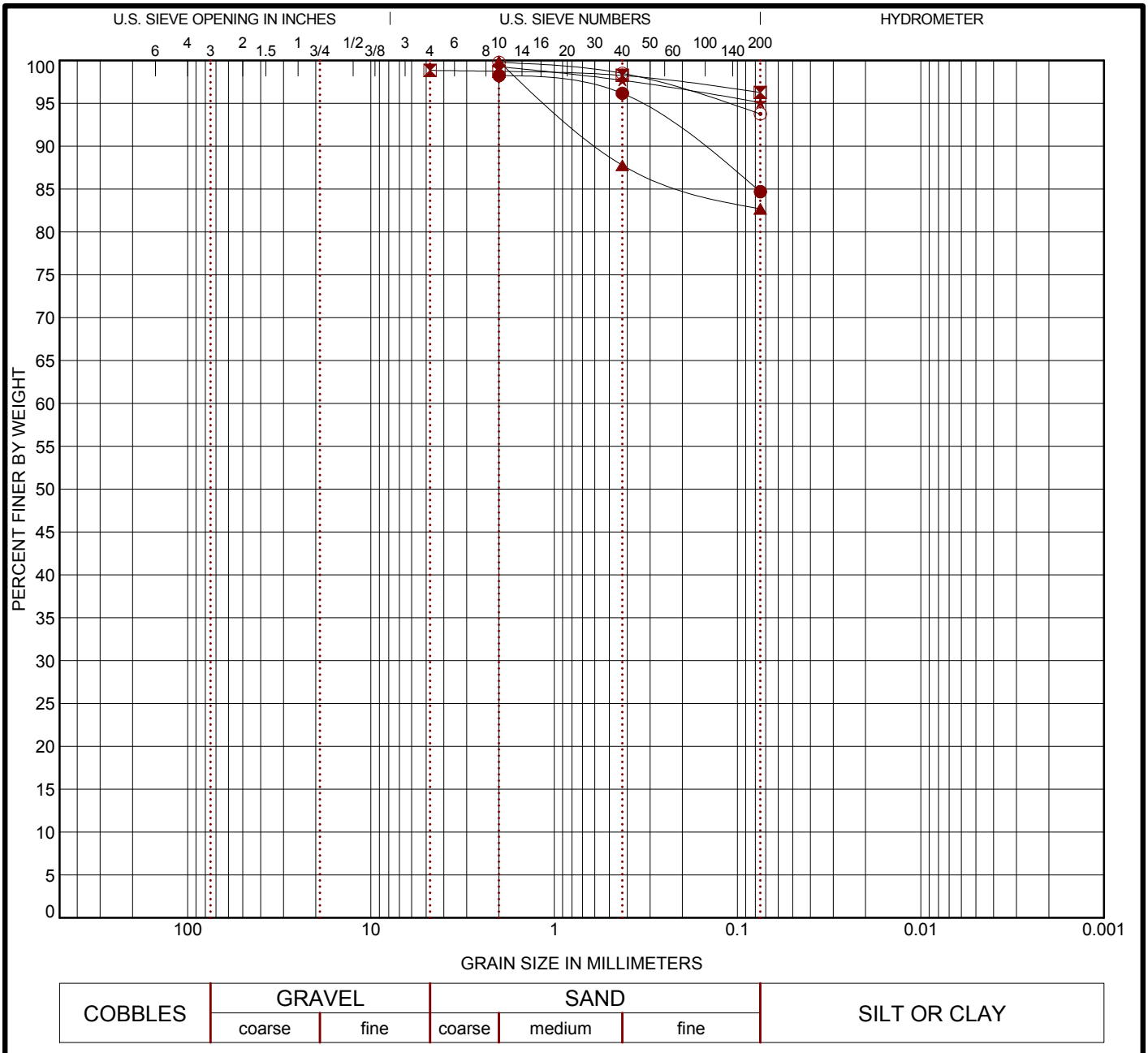
n	Water content	(ASTM D 2216)
n	Atterberg limits	(ASTM D 4318)
n	Sieve analysis	(ASTM D 422)
n	Standard Proctor	(AASHTO T-99)
n	Remolded resilient modulus	(AASHTO T-307)

The laboratory test results are reported on the boring logs and on report forms in this Appendix. They have been used for the geotechnical engineering analyses, and the development of pavement recommendations.

Procedural Standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practices or professional judgment.

GRAIN SIZE DISTRIBUTION

ASTM D422



Sample ID	USCS Classification	LL	PL	PI	Cc	Cu
● B-1	LEAN CLAY with SAND(CL)	40	25	15		
⊠ B-2	FAT CLAY(CH)	59	25	34		
▲ B-3	FAT CLAY with SAND(CH)	73	32	41		
★ B-4	FAT CLAY (CH)	57	30	27		
⊙ B-5	LEAN CLAY(CL)	32	19	13		

Sample ID	D_{100}	D_{50}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Clay
● B-1	2				0.0	13.5	84.7	
⊠ B-2	4.75				0.0	2.6	96.3	
▲ B-3	2				0.0	17.2	82.7	
★ B-4	2				0.0	4.2	95.1	
⊙ B-5	2				0.0	6.0	93.8	

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

SITE: Highway 412, Lawrence & Greene Co. Light, Arkansas

Terracon
25809 I-30 South
Bryant, Arkansas

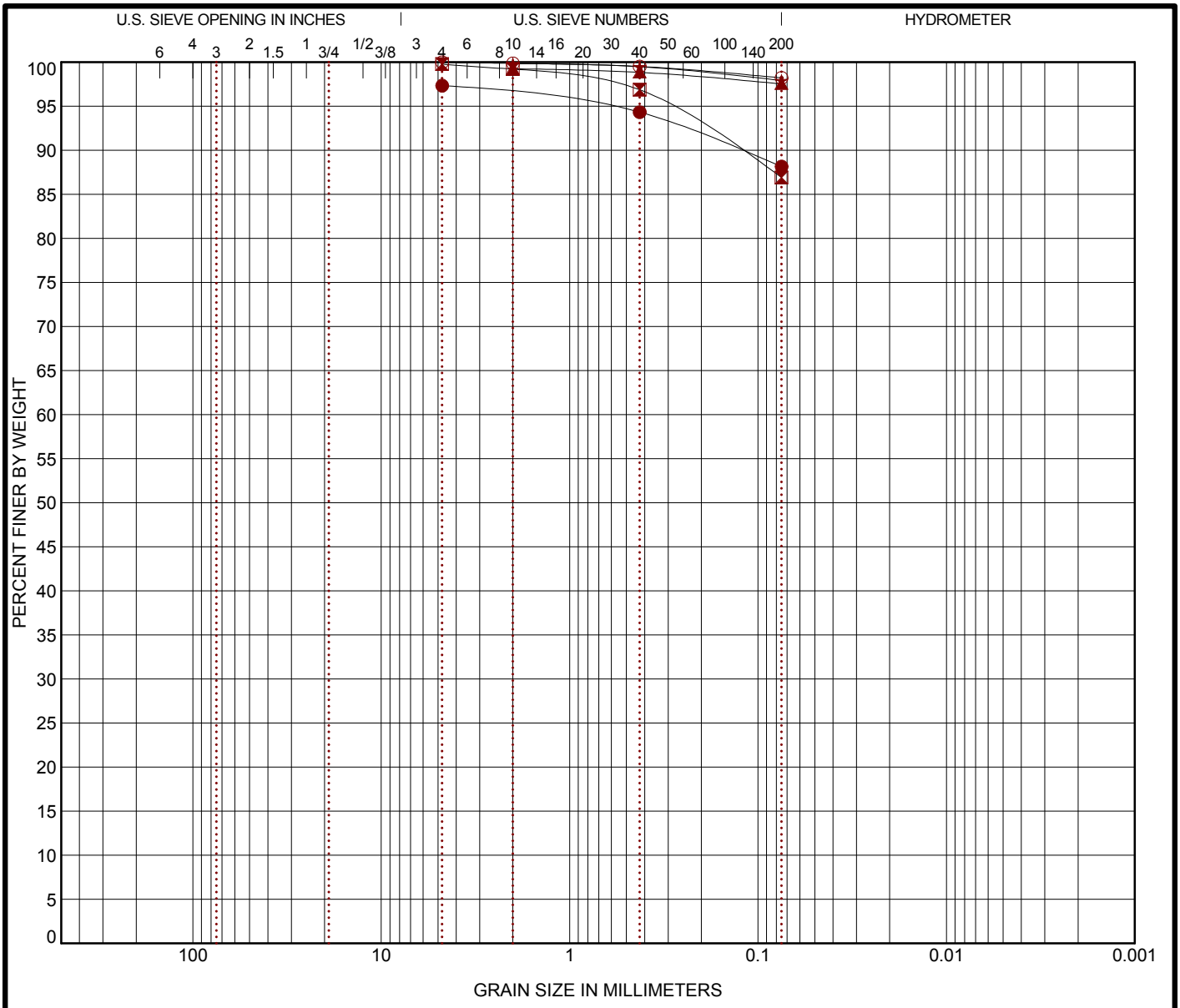
PROJECT NUMBER: 35135121

CLIENT: Atkins North America, Inc.
Dallas, Texas

EXHIBIT: B-2

GRAIN SIZE DISTRIBUTION

ASTM D422



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample ID	USCS Classification	LL	PL	PI	Cc	Cu
● B-6	FAT CLAY(CH)	52	22	30		
⊠ B-7	LEAN CLAY(CL)	42	19	23		
▲ B-8	LEAN CLAY(CL)	44	21	23		
★ B-9	LEAN CLAY(CL)	47	20	27		
⊙ B-10	LEAN CLAY(CL)	43	20	23		

Sample ID	D_{100}	D_{50}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Clay
● B-6	4.75				0.0	9.2	88.1	
⊠ B-7	4.75				0.0	12.9	86.9	
▲ B-8	2				0.0	1.7	97.5	
★ B-9	2				0.0	1.9	97.9	
⊙ B-10	4.75				0.0	1.8	98.2	

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

SITE: Highway 412, Lawrence & Greene Co. Light, Arkansas

Terracon
25809 I-30 South
Bryant, Arkansas

PROJECT NUMBER: 35135121

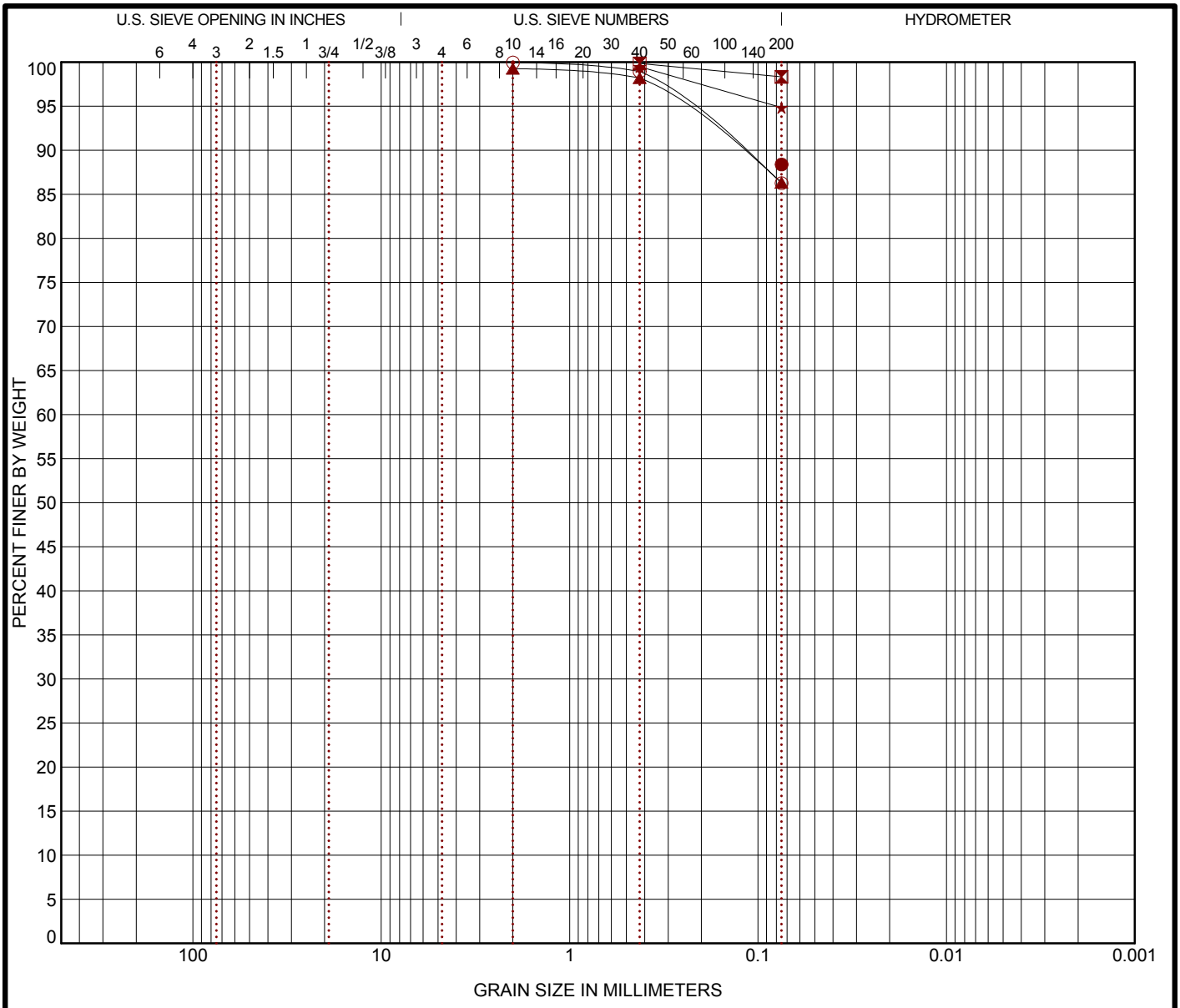
CLIENT: Atkins North America, Inc.
Dallas, Texas

EXHIBIT: B-3

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2-D50 35135121.CA1003-HWY412.8-5-2014.GPJ TERRACON2012.GDT 9/26/14

GRAIN SIZE DISTRIBUTION

ASTM D422



Sample ID	USCS Classification	LL	PL	PI	Cc	Cu
● B-11	FAT CLAY(CH)	75	24	51		
⊠ B-12	LEAN CLAY(CL)	41	21	20		
▲ B-13	LEAN CLAY(CL)	30	14	16		
★ B-14	FAT CLAY(CH)	55	17	38		
⊙ B-16	LEAN CLAY(CL)	36	22	14		

Sample ID	D_{100}	D_{50}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Clay
● B-11	0.075				0.0	0.0	88.4	
⊠ B-12	0.425				0.0	1.5	98.3	
▲ B-13	2				0.0	12.9	86.3	
★ B-14	0.425				0.0	4.6	94.8	
⊙ B-16	2				0.0	13.7	86.3	

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

SITE: Highway 412, Lawrence & Greene Co. Light, Arkansas

Terracon
25809 I-30 South
Bryant, Arkansas

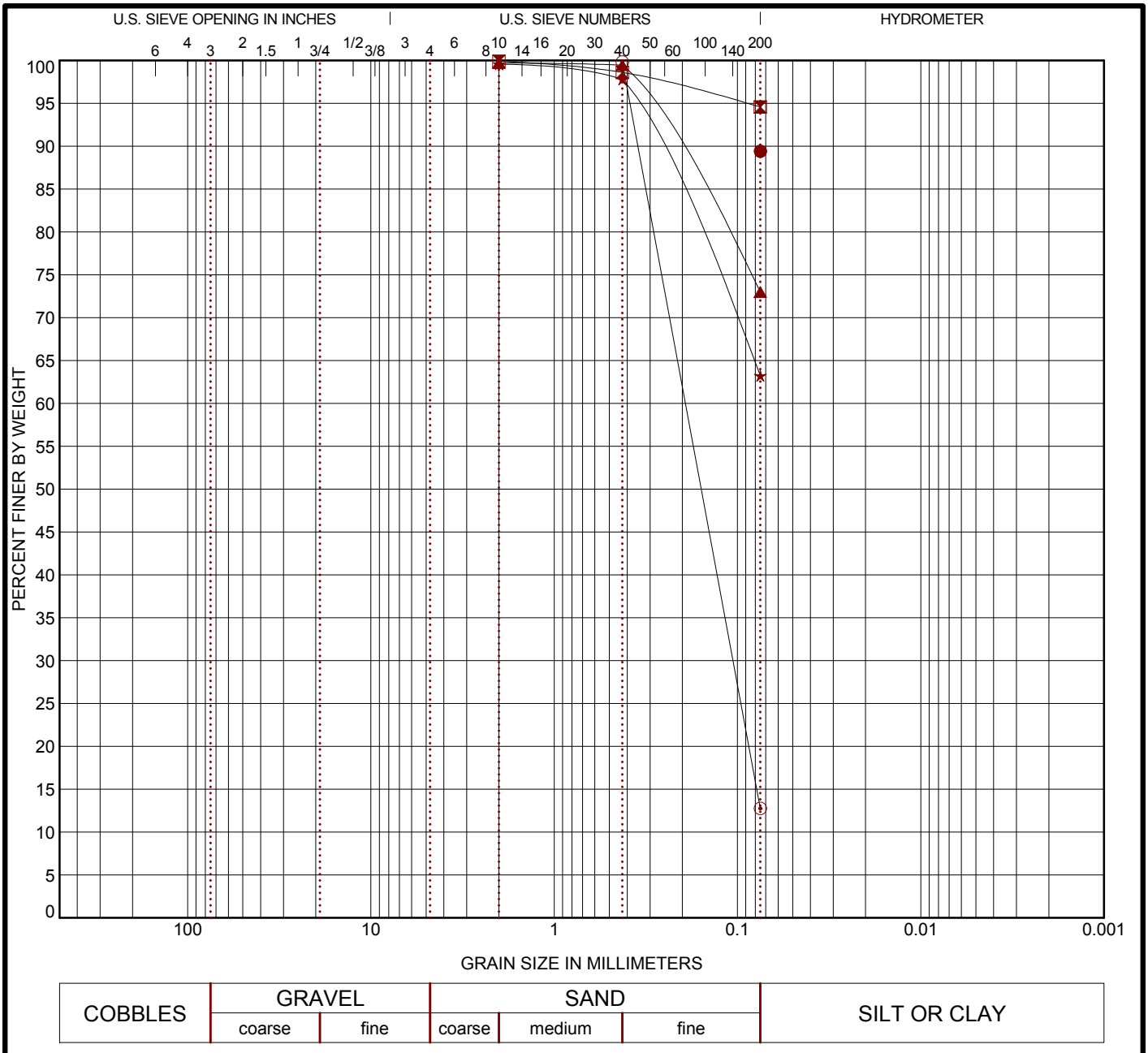
PROJECT NUMBER: 35135121

CLIENT: Atkins North America, Inc.
Dallas, Texas

EXHIBIT: B-4

GRAIN SIZE DISTRIBUTION

ASTM D422



Sample ID	USCS Classification	LL	PL	PI	Cc	Cu
● B-17	FAT CLAY(CH)	50	21	29		
⊠ B-27	LEAN CLAY(CL)	41	24	17		
▲ B-56	LEAN CLAY with SAND(CL)	39	14	25		
★ B-57	SANDY LEAN CLAY(CL)	27	18	9		
⊙ B-58	CLAYEY SAND(SC)	49	16	33		

Sample ID	D_{100}	D_{50}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Clay
● B-17	0.075				0.0	0.0	89.4	
⊠ B-27	2				0.0	5.3	94.6	
▲ B-56	2				0.0	26.7	73.0	
★ B-57	2				0.0	36.3	63.2	
⊙ B-58	0.425	0.158	0.106		0.0	87.1	12.8	

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

SITE: Highway 412, Lawrence & Greene Co. Light, Arkansas

Terracon
25809 I-30 South
Bryant, Arkansas

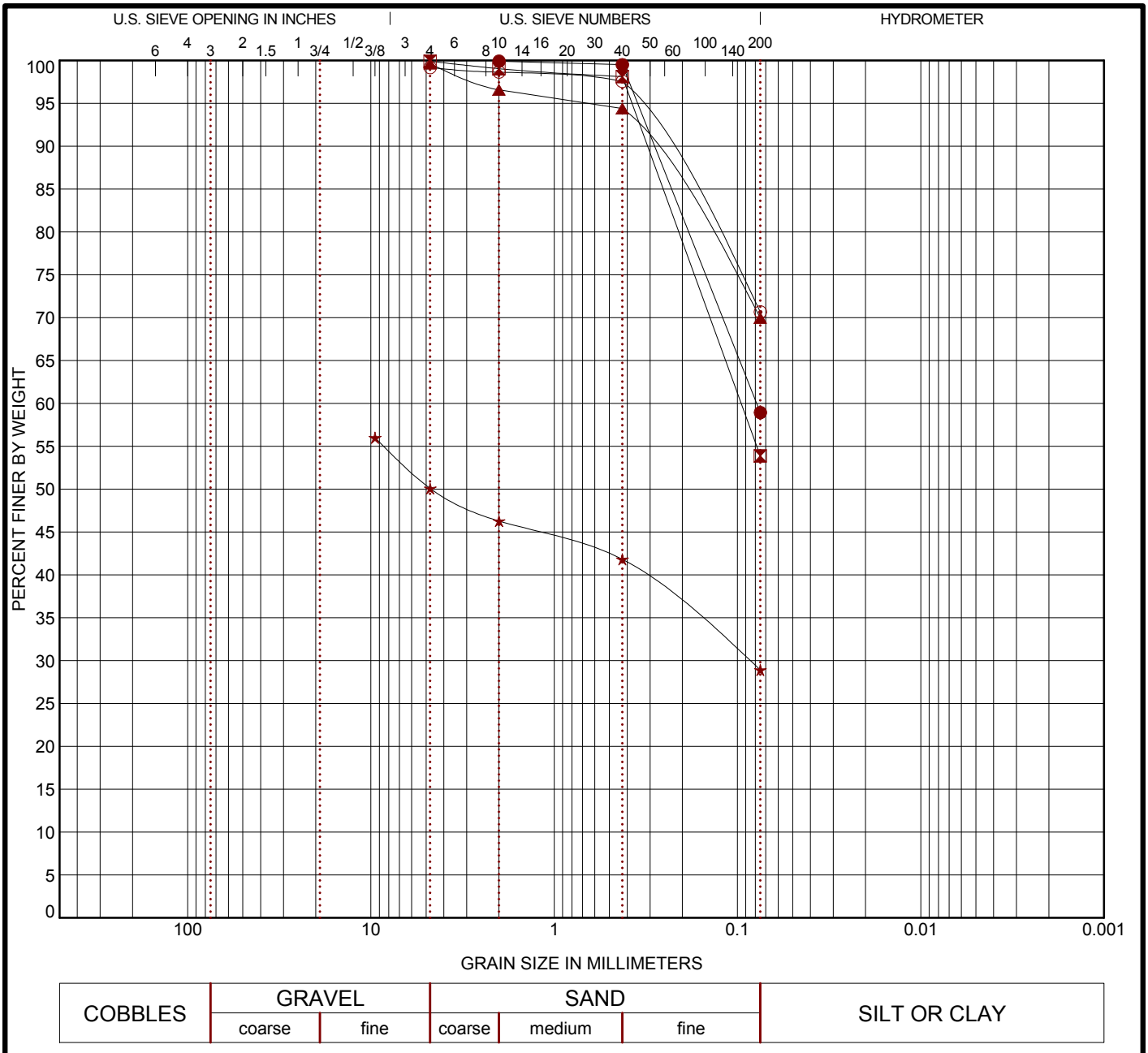
PROJECT NUMBER: 35135121

CLIENT: Atkins North America, Inc.
Dallas, Texas

EXHIBIT: B-5

GRAIN SIZE DISTRIBUTION

ASTM D422



Sample ID	USCS Classification	LL	PL	PI	Cc	Cu
● B-59	SANDY LEAN CLAY(CL)	40	18	22		
⊠ B-60	SANDY SILTY CLAY(CL-ML)	20	16	4		
▲ B-61	SANDY LEAN CLAY(CL)	24	15	9		
★ B-62	SILTY, CLAYEY GRAVEL with SAND(GC-GM)	23	16	7		
⊙ B-63	LEAN CLAY with SAND(CL)	21	7	14		

Sample ID	D_{100}	D_{50}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Clay
● B-59	2				0.0	41.0	58.9	
⊠ B-60	4.75				0.0	46.0	53.9	
▲ B-61	4.75				0.0	29.7	70.0	
★ B-62	9.5	4.665	0.087		5.9	21.2	28.9	
⊙ B-63	4.75				0.0	28.5	70.7	

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

SITE: Highway 412, Lawrence & Greene Co. Light, Arkansas

Terracon
25809 I-30 South
Bryant, Arkansas

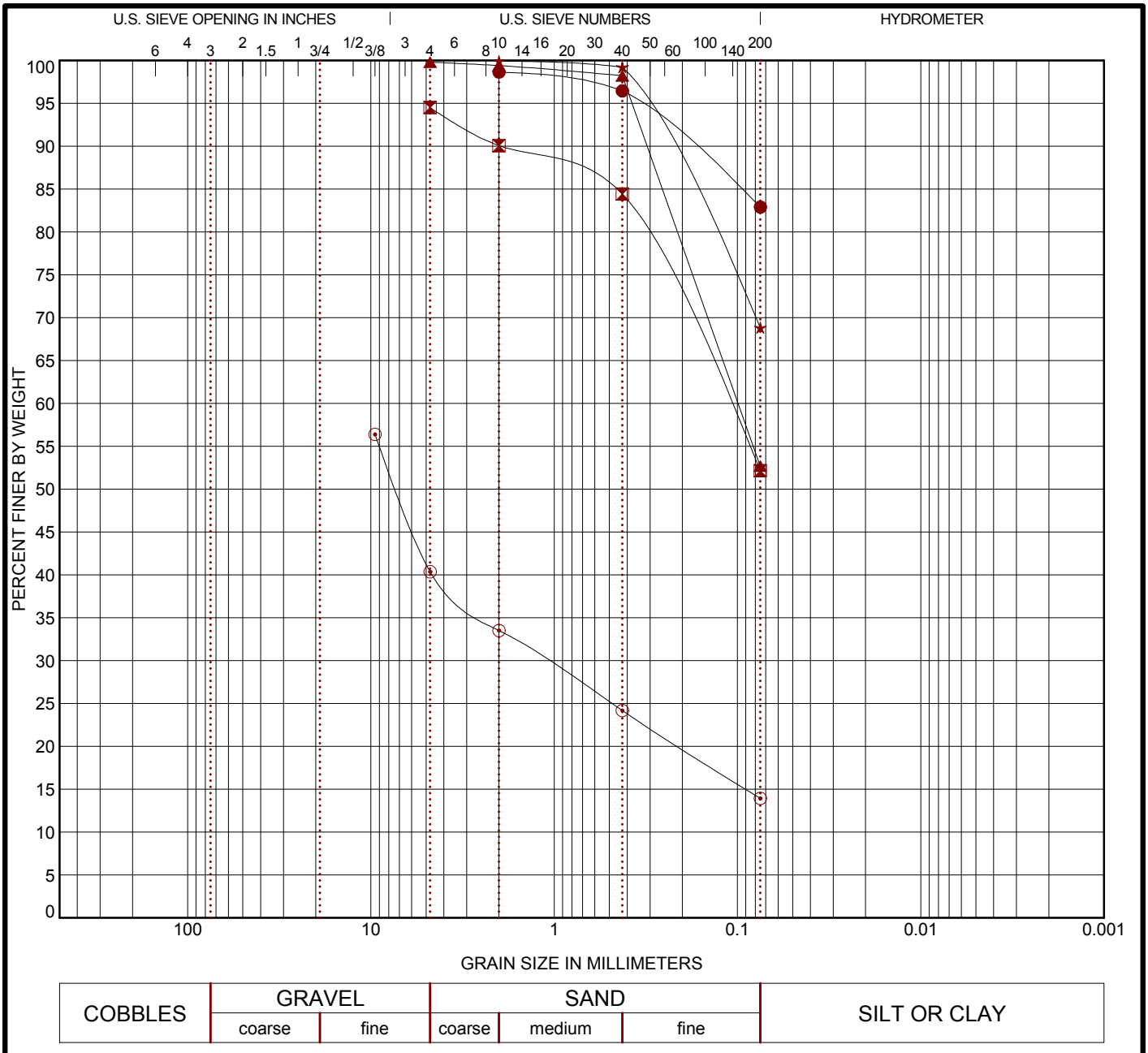
PROJECT NUMBER: 35135121

CLIENT: Atkins North America, Inc.
Dallas, Texas

EXHIBIT: B-6

GRAIN SIZE DISTRIBUTION

ASTM D422



	Sample ID	USCS Classification	LL	PL	PI	Cc	Cu
●	B-64	LEAN CLAY with SAND(CL)	28	18	10		
⊠	B-65	SANDY SILT(ML)	30	26	4		
▲	B-66	SANDY SILTY CLAY(CL-ML)	23	18	5		
★	B-67	SANDY LEAN CLAY(CL)	24	16	8		
⊙	B-68	SANDY SILTY GRAVEL (GP-GM)	19	12	7		

	Sample ID	D_{100}	D_{50}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Clay
●	B-64	2				0.0	15.7	82.9	
⊠	B-65	4.75				0.0	42.3	52.2	
▲	B-66	4.75				0.0	47.1	52.7	
★	B-67	2				0.0	31.1	68.8	
⊙	B-68	9.5	7.206	1.117		16.0	26.4	13.9	

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

SITE: Highway 412, Lawrence & Greene Co. Light, Arkansas

Terracon
25809 I-30 South
Bryant, Arkansas

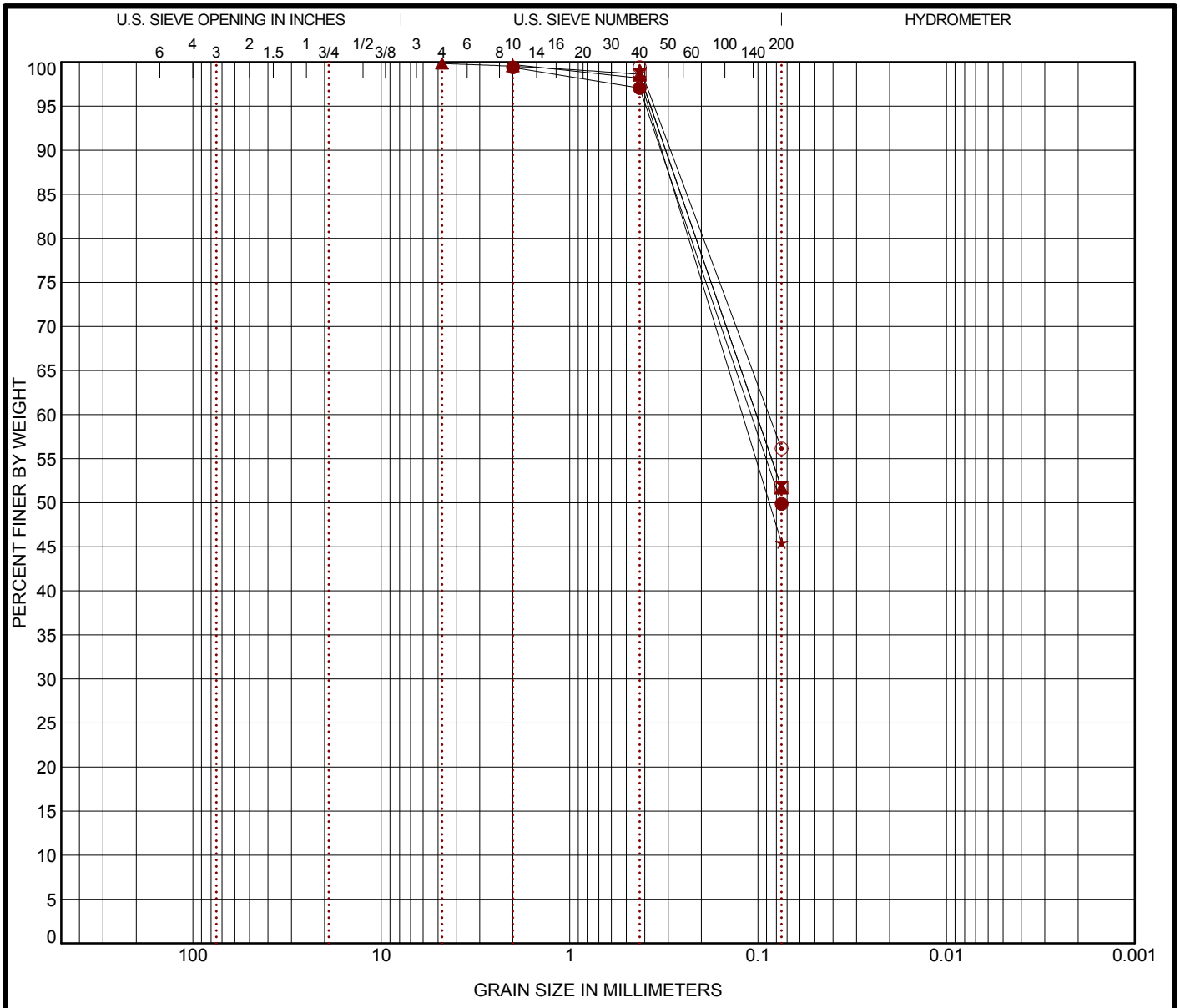
PROJECT NUMBER: 35135121

CLIENT: Atkins North America, Inc.
Dallas, Texas

EXHIBIT: B-7

GRAIN SIZE DISTRIBUTION

ASTM D422



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample ID	USCS Classification	LL	PL	PI	Cc	Cu
●	B-69	CLAYEY SAND(SC)	24	13	11		
⊠	B-70	SANDY LEAN CLAY(CL)	25	13	12		
▲	B-71	SANDY SILTY CLAY(CL-ML)	20	15	5		
★	B-72	CLAYEY SAND(SC)	34	21	13		
⊙	B-73	SANDY SILTY CLAY(CL-ML)	17	12	5		

	Sample ID	D_{100}	D_{50}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Clay
●	B-69	2	0.075			0.0	49.5	49.9	
⊠	B-70	0.425				0.0	46.9	51.7	
▲	B-71	4.75				0.0	48.1	51.7	
★	B-72	2	0.087			0.0	54.2	45.5	
⊙	B-73	0.425				0.0	43.3	56.2	

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

SITE: Highway 412, Lawrence & Greene Co. Light, Arkansas

Terracon
25809 I-30 South
Bryant, Arkansas

PROJECT NUMBER: 35135121

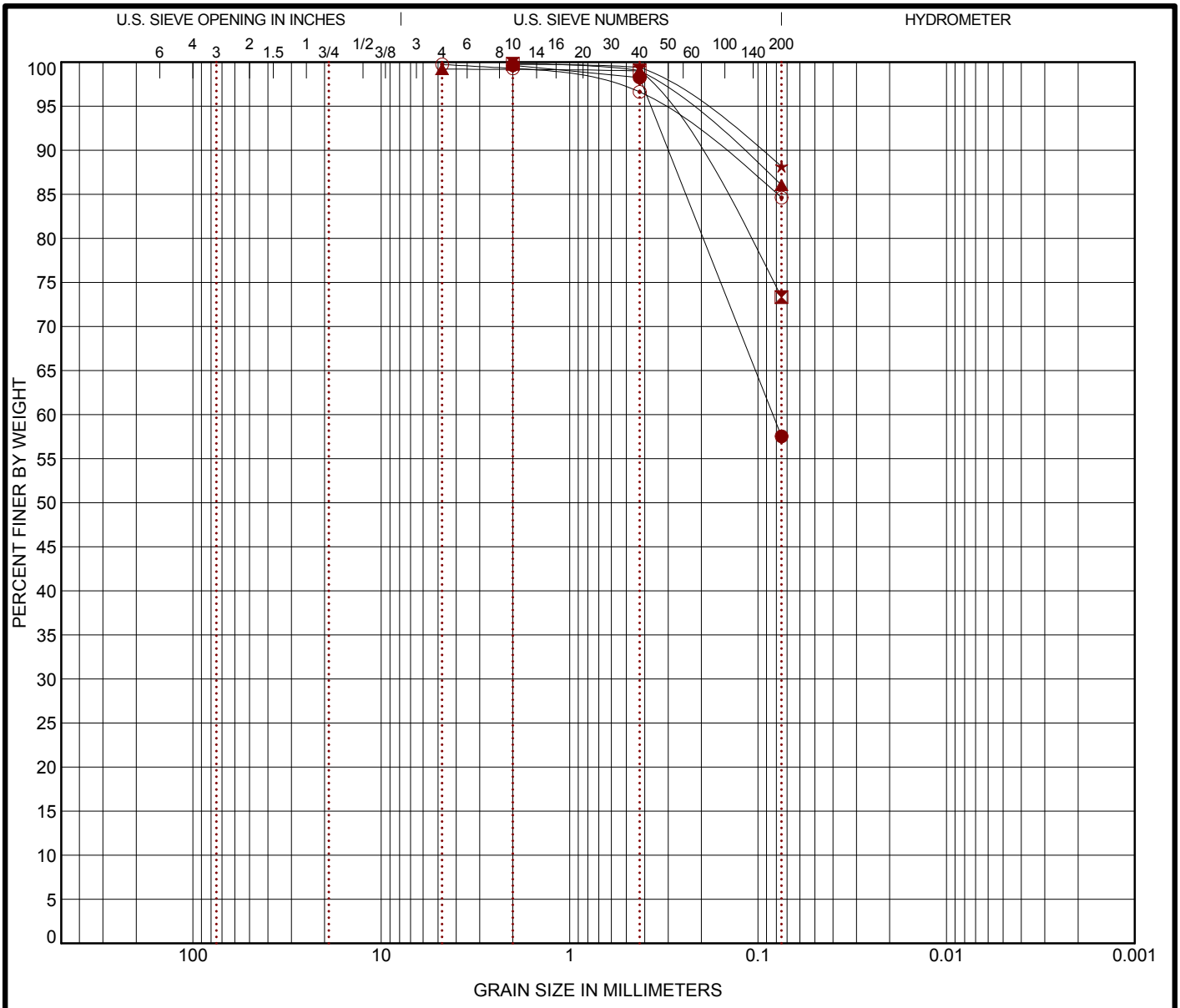
CLIENT: Atkins North America, Inc.
Dallas, Texas

EXHIBIT: B-8

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2-D50 35135121.CA1003-HWY412.8-5-2014.GPJ TERRACON2012.GDT 9/26/14

GRAIN SIZE DISTRIBUTION

ASTM D422



Sample ID	USCS Classification	LL	PL	PI	Cc	Cu
● B-74	SANDY SILTY CLAY(CL-ML)	20	13	7		
⊠ B-75	LEAN CLAY with SAND(CL)	36	15	21		
▲ B-76	LEAN CLAY(CL)	38	18	20		
★ B-77	SILT(ML)	36	27	9		
⊙ B-78	LEAN CLAY with SAND(CL)	36	17	19		

Sample ID	D_{100}	D_{50}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Clay
● B-74	2				0.0	42.1	57.5	
⊠ B-75	2				0.0	26.5	73.3	
▲ B-76	4.75				0.0	13.1	86.1	
★ B-77	2				0.0	11.6	88.2	
⊙ B-78	4.75				0.0	15.1	84.6	

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

SITE: Highway 412, Lawrence & Greene Co. Light, Arkansas

Terracon
25809 I-30 South
Bryant, Arkansas

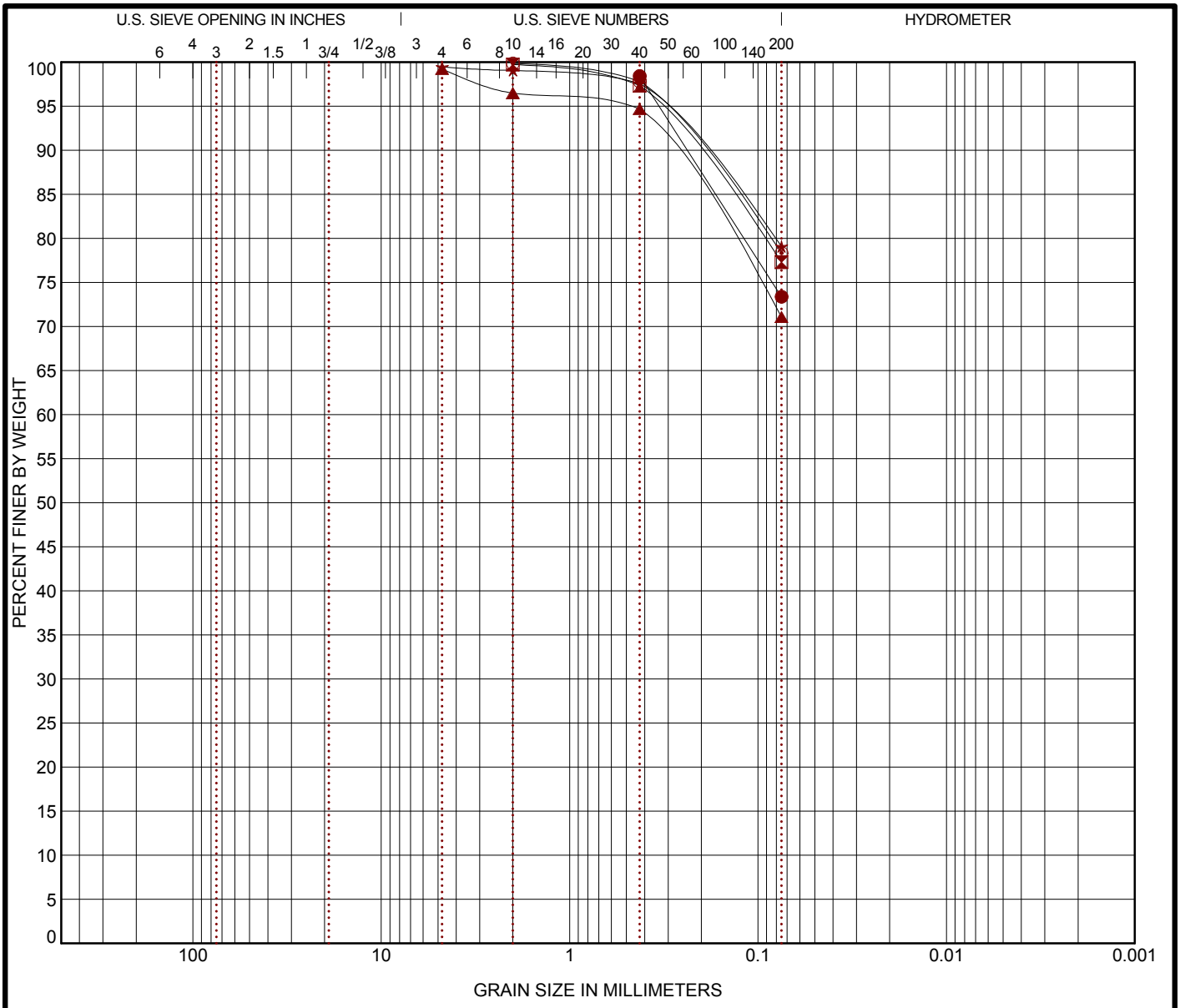
PROJECT NUMBER: 35135121

CLIENT: Atkins North America, Inc.
Dallas, Texas

EXHIBIT: B-9

GRAIN SIZE DISTRIBUTION

ASTM D422



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample ID	USCS Classification	LL	PL	PI	Cc	Cu
●	B-79	LEAN CLAY with SAND(CL)	42	20	22		
⊠	B-80	LEAN CLAY with SAND(CL)	49	19	30		
▲	B-81	LEAN CLAY with SAND(CL)	40	17	23		
★	B-82	LEAN CLAY with SAND(CL)	41	18	23		
⊙	B-83	LEAN CLAY with SAND(CL)	32	18	14		

	Sample ID	D_{100}	D_{50}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Clay
●	B-79	0.425				0.0	25.1	73.4	
⊠	B-80	2				0.0	22.4	77.3	
▲	B-81	4.75				0.0	28.2	71.1	
★	B-82	4.75				0.0	20.4	79.1	
⊙	B-83	2				0.0	21.5	78.3	

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

SITE: Highway 412, Lawrence & Greene Co. Light, Arkansas

Terracon
25809 I-30 South
Bryant, Arkansas

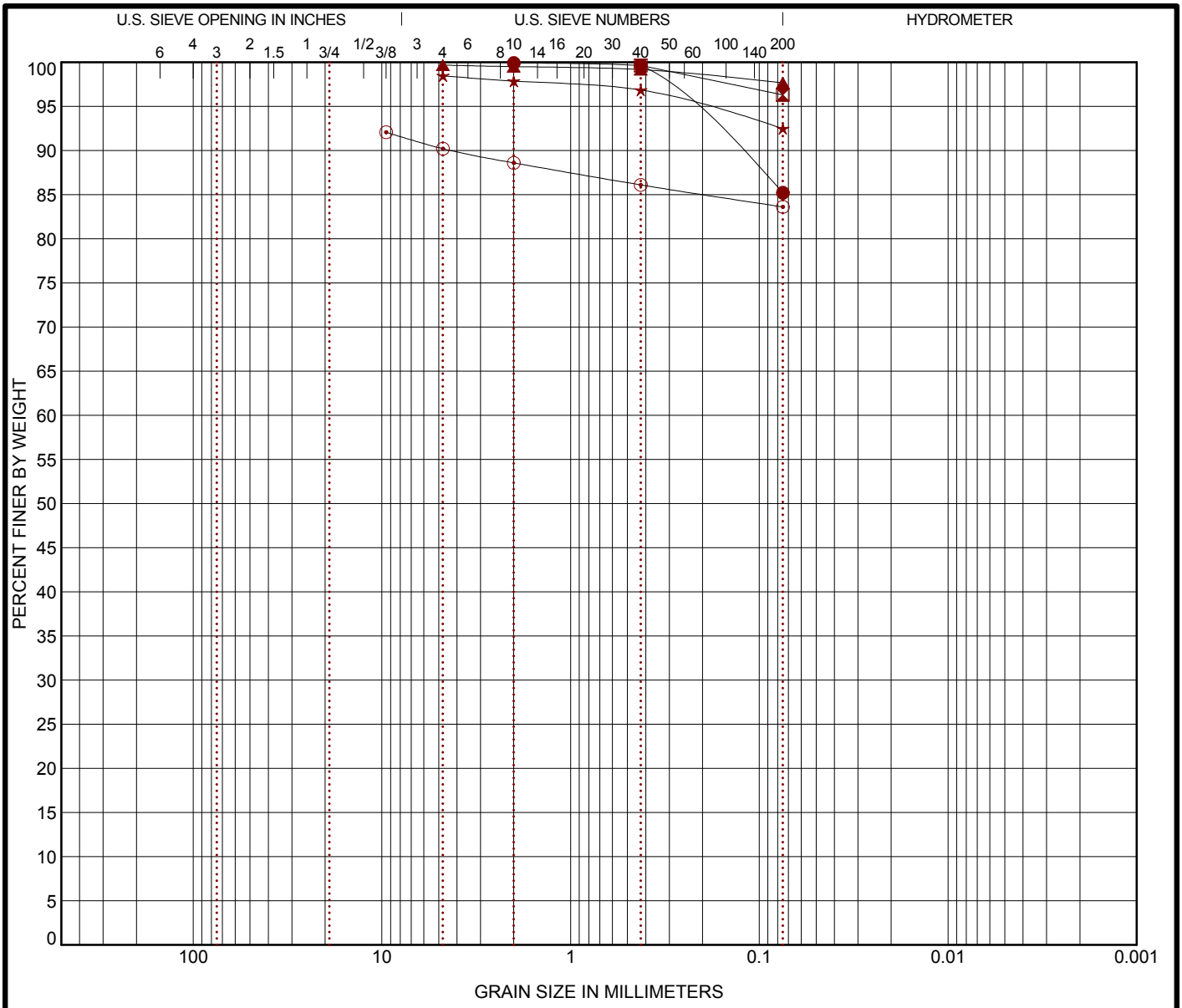
PROJECT NUMBER: 35135121

CLIENT: Atkins North America, Inc.
Dallas, Texas

EXHIBIT: B-10

GRAIN SIZE DISTRIBUTION

ASTM D422



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample ID	USCS Classification	LL	PL	PI	Cc	Cu
●	B-84	FAT CLAY(CH)	51	20	31		
⊠	B-85	LEAN CLAY(CL)	42	19	23		
▲	B-86	LEAN CLAY(CL)	34	15	19		
★	B-87	LEAN CLAY(CL)	28	14	14		
⊙	B-88	LEAN CLAY WITH SAND (CL)					

	Sample ID	D_{100}	D_{50}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Clay
●	B-84	2				0.0	14.7	85.2	
⊠	B-85	0.425				0.0	3.3	96.3	
▲	B-86	4.75				0.0	2.0	97.7	
★	B-87	4.75				0.0	6.0	92.5	
⊙	B-88	9.5				1.9	6.6	83.6	

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

SITE: Highway 412, Lawrence & Greene Co. Light, Arkansas

Terracon
25809 I-30 South
Bryant, Arkansas

PROJECT NUMBER: 35135121

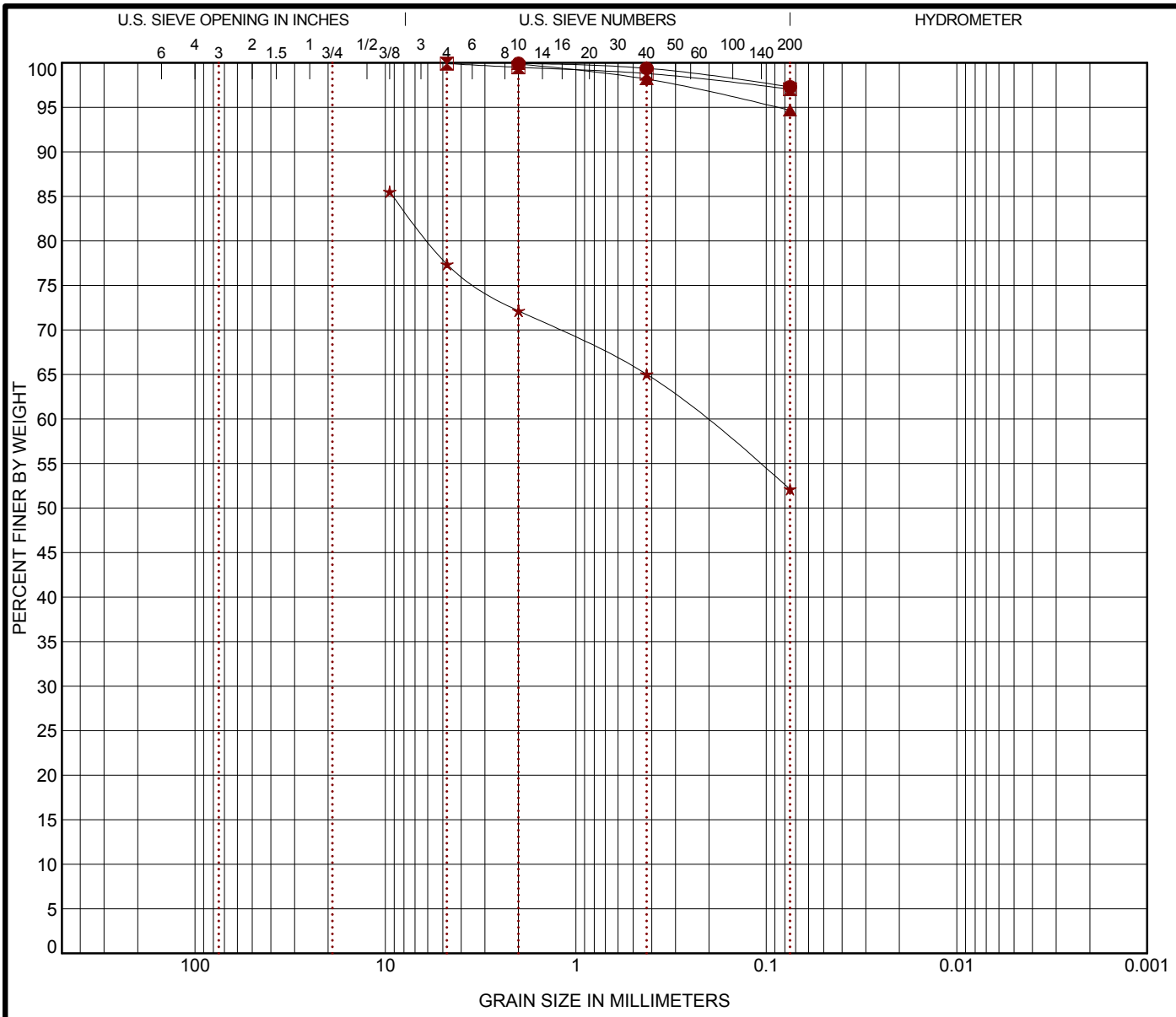
CLIENT: Atkins North America, Inc.
Dallas, Texas

EXHIBIT: B-11

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2-D50 35135121.CA1003-HWY412.8-5-2014.GPJ TERRACON2012.GDT 9/26/14

GRAIN SIZE DISTRIBUTION

ASTM D422



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample ID		USCS Classification	LL	PL	PI	Cc	Cu
●	B-89	LEAN CLAY(CL)	37	19	18		
⊠	B-90	LEAN CLAY(CL)	40	17	23		
▲	B-91	LEAN CLAY(CL)	35	17	18		
★	B-92	SANDY LEAN CLAY with GRAVEL(CL)	25	12	13		

Sample ID		D_{100}	D_{50}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Clay
●	B-89	2				0.0	2.6	97.3	
⊠	B-90	4.75				0.0	2.9	97.0	
▲	B-91	2				0.0	5.2	94.7	
★	B-92	9.5				8.1	25.2	52.1	

PROJECT: CA1003 Hwy 67 - Hwy 141 (Widening) (S)

SITE: Highway 412, Lawrence & Greene Co. Light, Arkansas

Terracon
25809 I-30 South
Bryant, Arkansas

PROJECT NUMBER: 35135121

CLIENT: Atkins North America, Inc.
Dallas, Texas

EXHIBIT: B-12

Laboratory Compaction Characteristics of Soil

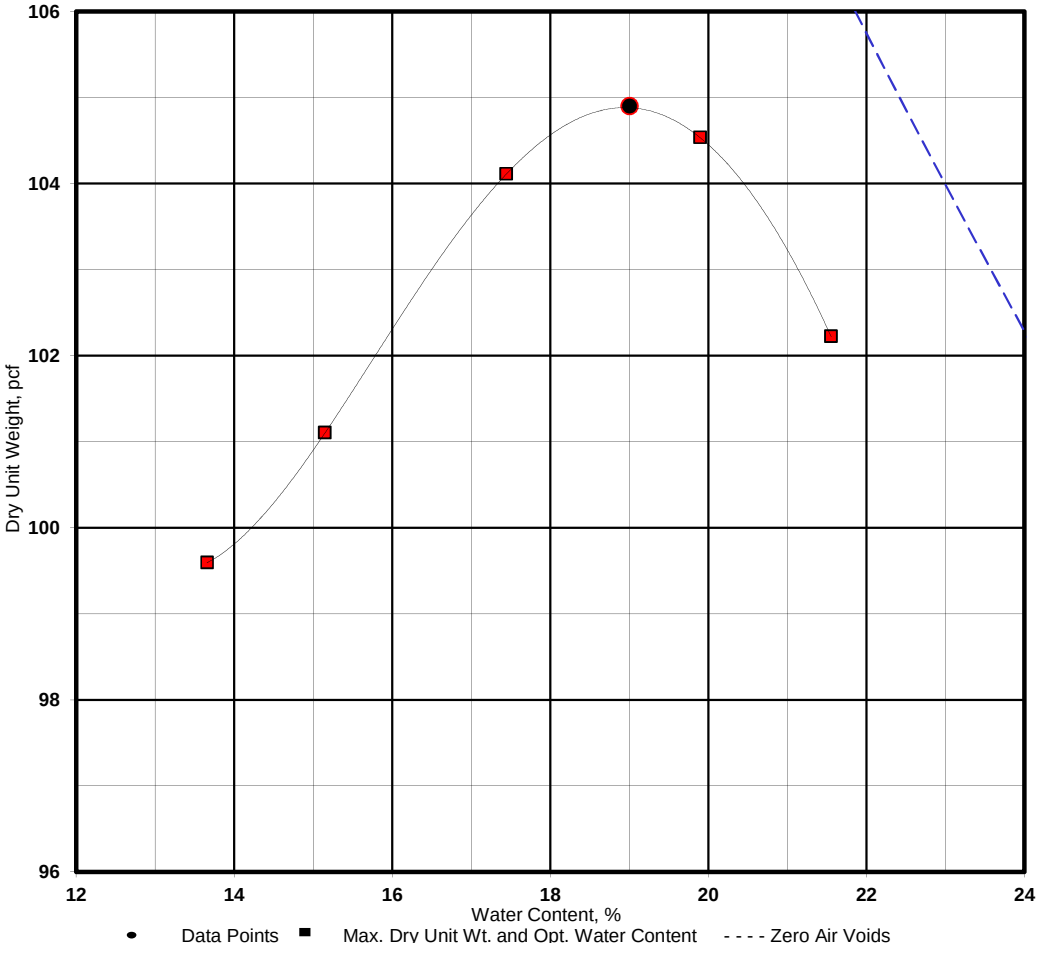
4701 North Stiles Ave.
Oklahoma City, OK 73105
(405) 525 0453

Client Name: Atkins North America, Inc.
Project No.: 35135121 Date: 02/05/14
Project Name: CA1003 Hwy. 67 - Hwy. 141 (Widening)
Location: Highway 412
Lawrence & Greene Counties
Arkansas
Source Material: B 1 + B 3
Sample Description: Lean clay

TEST RESULTS
Maximum Dry Unit Wt.: 104.9 pcf
Optimum Water Content: 19.0 %

Material Designation: Sample date: 01/27/14
Liquid Limit: 45 Plastic Limit: 14
Test Method: Method A
Plasticity Index: 31
Test Procedure: ASSHTO T-99
% passing # 200 sieve: 87
Sample Preparation: Dry
AASHTO Class. A-7-6 (27) USCS: CL
Rammer: X Mechanical ____ Manual
Reviewed by:

Zero air voids for specific gravity of 2.70



Laboratory Compaction Characteristics of Soil

4701 North Stiles Ave.
Oklahoma City, OK 73105
(405) 525 0453

Client Name: Atkins North America, Inc.
Project Name: CA1003 Hwy. 67 - Hey. 141 (Widening) (S)
Location: Highway 412
Lawrence and Greene Counties
Arkansas
Source Material: B 15 + B 20
Sample Description: Light Brown lean clay

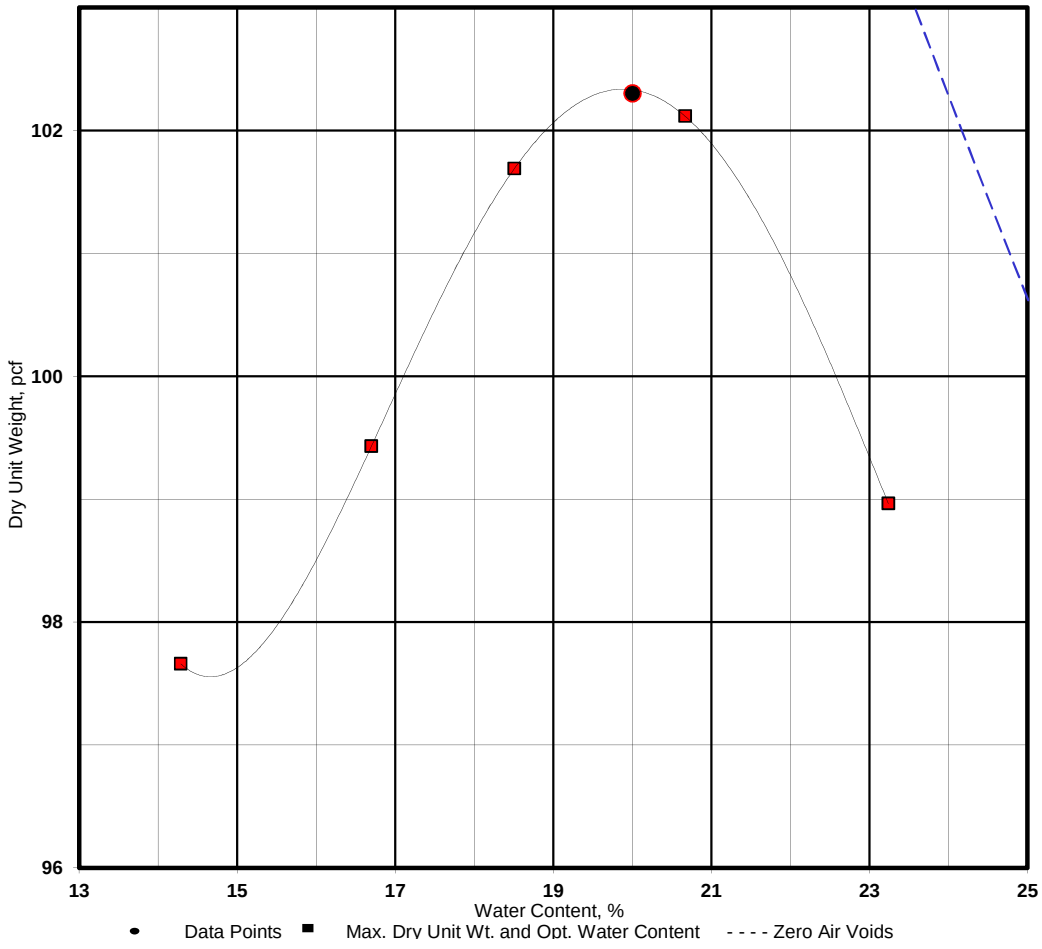
Project No.: 35135121 Date: 02/10/14

TEST RESULTS
Maximum Dry Unit Wt.: 102.3 pcf
Optimum Water Content: 20.0 %

Material Designation: Sample date: 01/27/14
Test Method: Method A
Test Procedure: ASSHTO T-99
Sample Preparation: Dry
Rammer: X Mechanical ____ Manual

Liquid Limit: 42 Plastic Limit: 17
Plasticity Index: 25
% passing # 200 sieve: 93.7
AASHTO Class. A-7-6(24) USCS: CL
Reviewed by:

Zero air voids for specific gravity of 2.70



Laboratory Compaction Characteristics of Soil

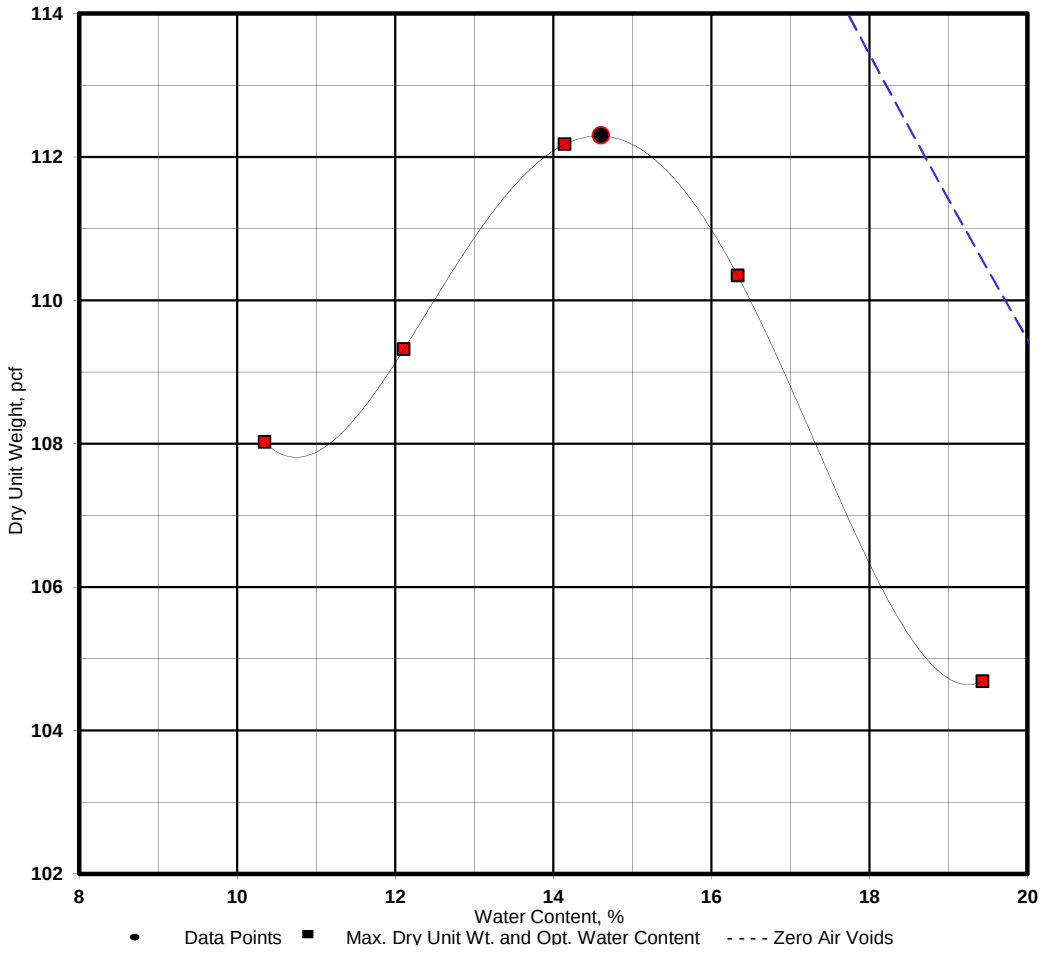
4701 North Stiles Ave.
Oklahoma City, OK 73105
(405) 525 0453

Client Name: Atkins North America, Inc.
Project No.: 35135121 Date: 02/05/14
Project Name: CA1003 Hwy.67 - Hwy. 141 (Widening) (S)
Location: Highway 412
Lawrence and Greene Counties
Arkansas
Source Material: B 30+ B 35
Sample Description: Lean clay with sand

TEST RESULTS
Maximum Dry Unit Wt.: 112.3 pcf
Optimum Water Content: 14.6 %

Material Designation: Sample date: 01/27/14
Liquid Limit: 33 Plastic Limit: 17
Test Method: Method A
Plasticity Index: 16
Test Procedure: ASSHTO T-99
% passing # 200 sieve: 80.4
Sample Preparation: Dry
AASHTO Class. A-6 (14) USCS: CL
Rammer: X Mechanical ____ Manual
Reviewed by:

Zero air voids for specific gravity of 2.70



Laboratory Compaction Characteristics of Soil

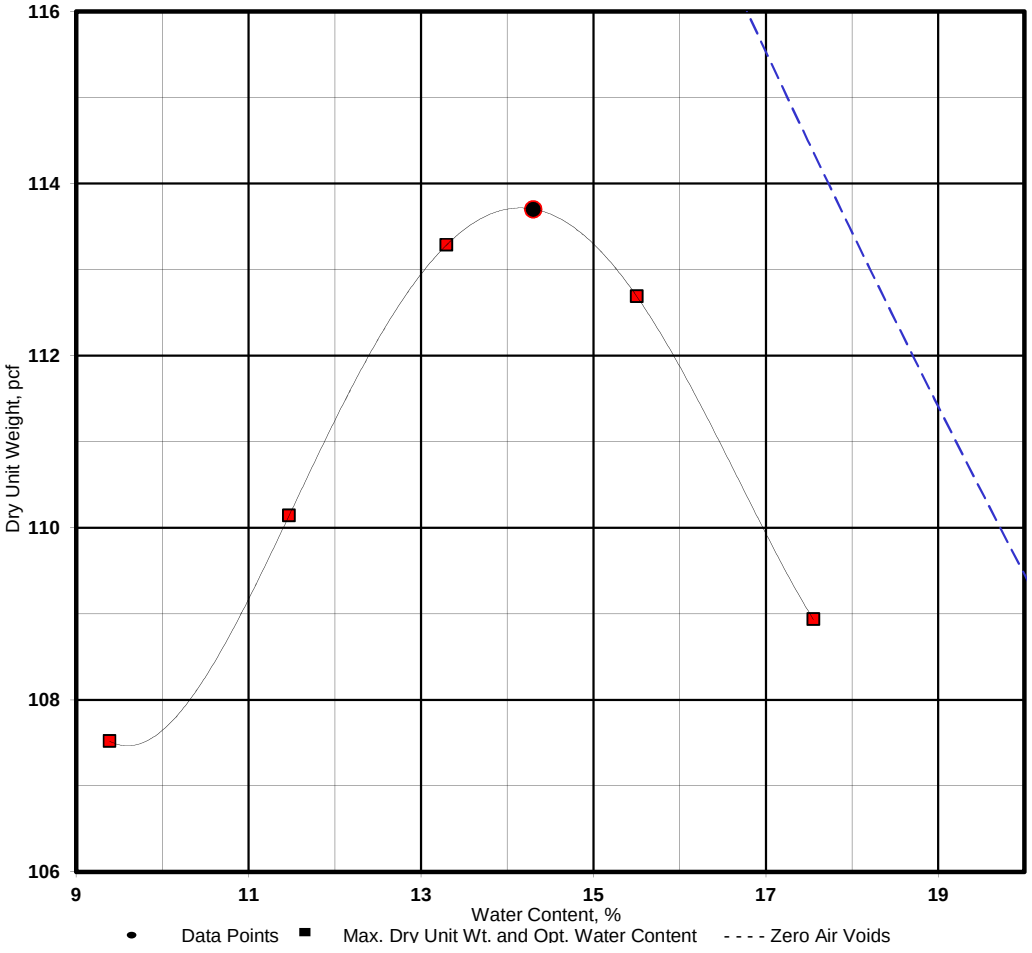
4701 North Stiles Ave.
Oklahoma City, OK 73105
(405) 525 0453

Client Name: Atkins North America, Inc.
Project No.: 35135121 Date: 02/14/14
Project Name: CA1003 Hwy. 67 - Hwy 141 (Widening) (S)
Location: Highway 412
Lawrence and Greene Counties
Arkansas
Source Material: B 40 + B 45
Sample Description: Sandy lean clay

TEST RESULTS
Maximum Dry Unit Wt.: 113.7 pcf
Optimum Water Content: 14.3 %

Material Designation: Sample date: 01/27/14
Liquid Limit: 35 Plastic Limit: 15
Test Method: Method A
Plasticity Index: 20
Test Procedure: ASSHTO T-99
% passing # 200 sieve: 65.1
Sample Preparation: Dry
AASHTO Class. A-6 (10) USCS: CL
Rammer: X Mechanical ____ Manual
Reviewed by:

Zero air voids for specific gravity of 2.70



Laboratory Compaction Characteristics of Soil

Terracon
4701 North Stiles Ave.
Oklahoma City, OK 73105
(405) 525 0453

Client Name: Atkins North America, Inc.
Project Name: CA 1003 Hwy. 67 - Hwy. 141 (Widening) (S)
Location: Highway 412
Lawrence & Greene Counties
Arkansas
Source Material: B 50 + B 55
Sample Description: Silt

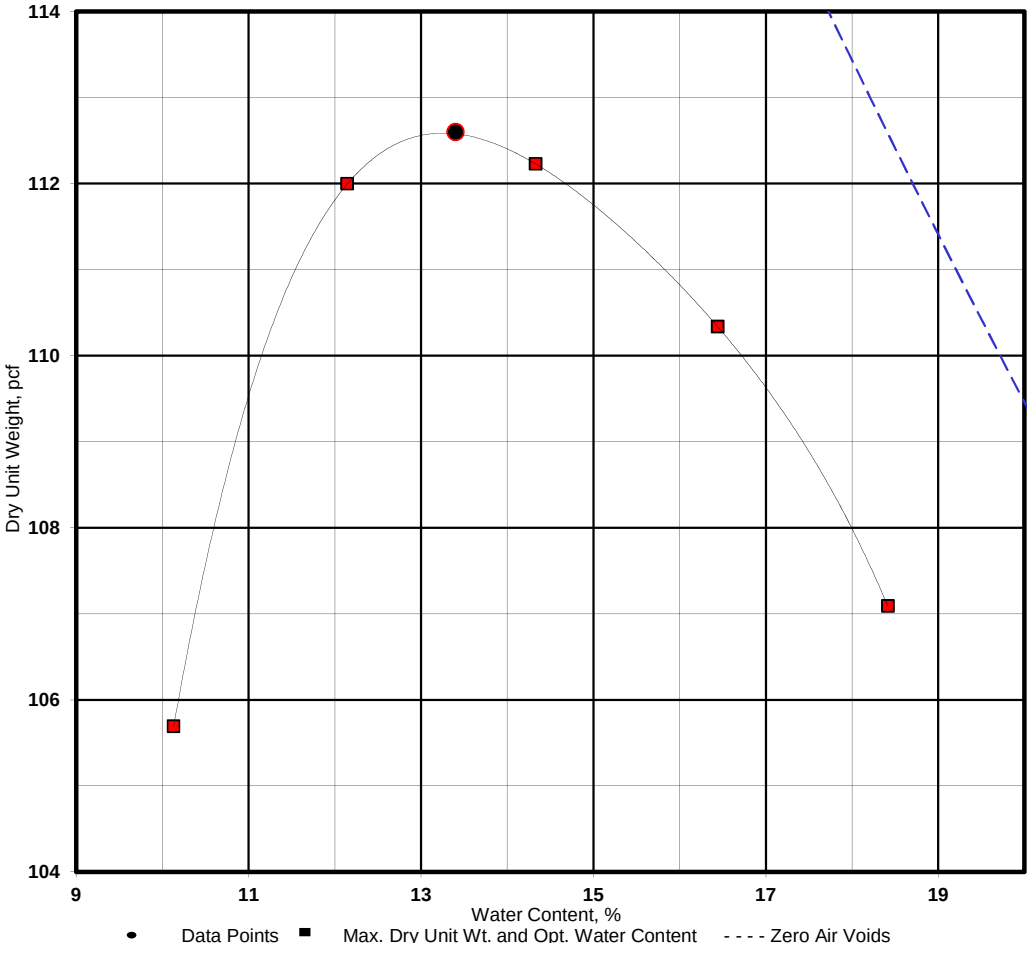
Project No.: 35135121 Date: 02/14/14

TEST RESULTS
Maximum Dry Unit Wt.: 112.6 pcf
Optimum Water Content: 13.4 %

Material Designation: Sample date: 01/27/14
Test Method: Method A
Test Procedure: ASSHTO T-99
Sample Preparation: Dry
Rammer: X Mechanical Manual

Liquid Limit: 18 Plastic Limit: 17
Plasticity Index: 1
% passing # 200 sieve: 64.3
AASHTO Class. A-4 (0) USCS: ML
Reviewed by:

Zero air voids for specific gravity of 2.70



Laboratory Compaction Characteristics of Soil

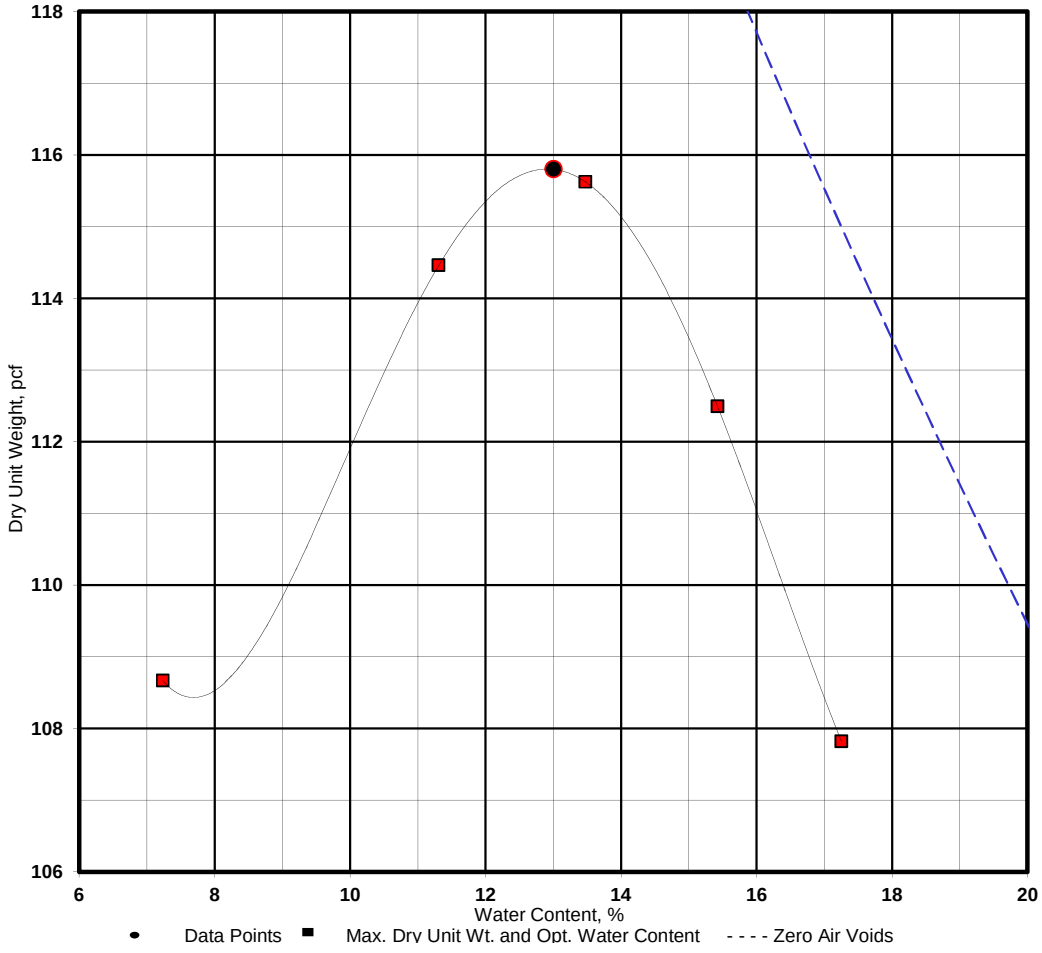
4701 North Stiles Ave.
Oklahoma City, OK 73105
(405) 525 0453

Client Name: Atkins North America, Inc.
Project No.: 35135121 Date: 02/14/14
Project Name: CA1003 Hwy. 67 - Hwy. 141 (Widening) (S)
Location: Highway 412
Lawrence & Greene Counties
Arkansas
Source Material: B 60 + B 65
Sample Description: Sandy lean clay

TEST RESULTS
Maximum Dry Unit Wt.: 115.8 pcf
Optimum Water Content: 13.0 %

Material Designation: Sample date: 01/27/14
Liquid Limit: 28 Plastic Limit: 19
Test Method: Method A
Plasticity Index: 9
Test Procedure: ASSHTO T-99
% passing # 200 sieve: 69
Sample Preparation: Dry
AASHTO Class. A-4 (4) USCS: CL
Rammer: X Mechanical ____ Manual
Reviewed by:

Zero air voids for specific gravity of 2.70



Laboratory Compaction Characteristics of Soil

4701 North Stiles Ave.
Oklahoma City, OK 73105
(405) 525 0453

Client Name: Atkins North America, Inc.
Project Name: CA1003 Hwy. 67 - Hwy 141 (Widening) (S)
Location: Highway 412
Lawrence & Greene Counties
Arkansas
Source Material: B 85 + B 87
Sample Description: Lean clay

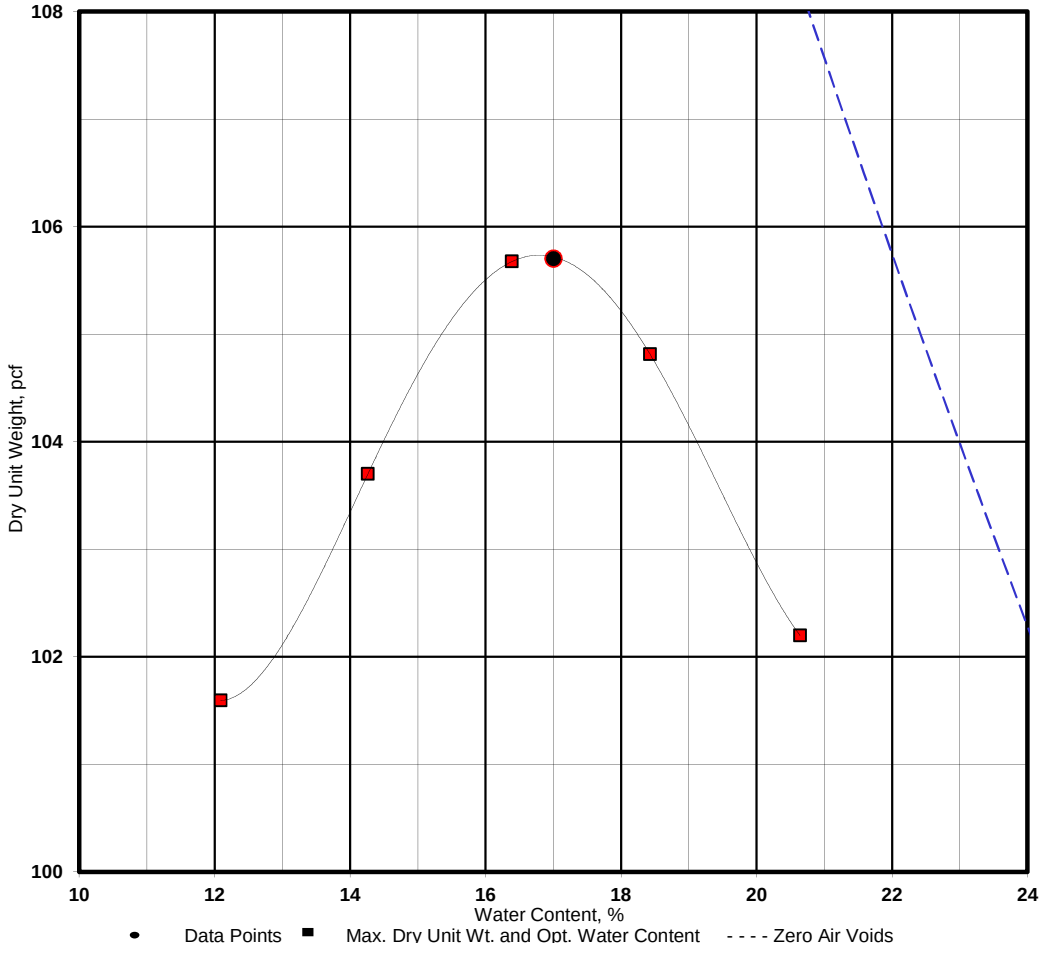
Material Designation: Sample date:
Test Method: Method A
Test Procedure: ASSHTO T-99
Sample Preparation: Dry
Rammer: X Mechanical Manual

Project No.: 35135121 Date: 02/14/14

TEST RESULTS
Maximum Dry Unit Wt.: 105.7 pcf
Optimum Water Content: 17.0 %

Liquid Limit: 37 Plastic Limit: 19
Plasticity Index: 18
% passing # 200 sieve: 95.9
AASHTO Class. A-6 (18) USCS: CL
Reviewed by:

Zero air voids for specific gravity of 2.70



Terracon

Resilient Modulus Testing - AASHTO T 307-99 English Units

Report Date:	18-Sep-14
Lab No.:	B1 & B3-OMC+2%
Project No.:	35135121

Soil Map Unit:	0
Soil Symbol:	0
Depth (in.)	0
Compaction Method	Static
Max. Dry Density (pcf)	104.9
Opt. Moisture Content (%)	19.0
Inside Mold Diameter (in)	3.94

Weight of Wet Soil (lb)	6.69
Initial Sample Diameter (in)	3.94
Initial Sample Height (in)	7.90
Initial Sample Area (in^2)	12.17
Sample Volume (in^3)	96.17
Compacted Moisture Content(%)	22.0
Wet Density (pcf)	120.1
Dry Density (pcf)	98.5

Test Date:	February 7, 2014
Final Sample Height (in)	7.9
Final Sample Wet Weight (lb)	6.69
Final Moisture Content (%)	22.0
Accumulated Strain (%)	0.14
Percent Passing No. 10	0
Percent Passing No. 200	0.0
Liquid Limit	0
Plasticity Index	0

Chamber Confining Pressure (S_3) psi	Nominal Maximum Axial Stress (S_{cyclic}) psi	Actual Applied Max. Axial Load (P_{max}) lb	Actual Applied Cyclic Load (P_{cyclic}) lb	Actual Applied Contact Load ($P_{contact}$) lb	Actual Applied Max. Axial Stress (S_{max}) psi	Actual Applied Cyclic Stress (S_{cyclic}) psi	Actual Applied Contact Stress ($S_{contact}$) psi	Recov. Def. LVDT #1 Reading (H_1) in	Recov. Def. LVDT #2 Reading (H_2) in	Average Recov. Def. LVDT 1 and 2 (H_{avg}) in	Resilient Strain (ϵ_r) in/in	Resilient Modulus (M_r) psi
6.00	2.00	23.5	20.1	3.4	1.93	1.65	0.278	0.0014	0.0014	0.0014	0.000174	9,519
6.00	4.00	47.7	42.0	5.7	3.92	3.45	0.468	0.0030	0.0030	0.0030	0.000384	8,991
6.00	6.00	72.4	63.8	8.6	5.95	5.24	0.710	0.0055	0.0051	0.0053	0.000668	7,841
5.99	8.00	96.9	85.7	11.2	7.96	7.04	0.923	0.0088	0.0080	0.0084	0.001066	6,600
5.99	10.00	121.0	107.2	13.8	9.94	8.81	1.131	0.0125	0.0119	0.0122	0.001542	5,712
4.02	2.00	24.0	20.3	3.7	1.97	1.66	0.305	0.0015	0.0015	0.0015	0.000186	8,956
3.99	4.00	48.4	42.3	6.1	3.98	3.47	0.505	0.0034	0.0033	0.0033	0.000420	8,261
4.01	6.00	72.6	64.0	8.6	5.96	5.25	0.710	0.0059	0.0054	0.0057	0.000717	7,330
4.00	8.00	96.8	85.7	11.1	7.95	7.04	0.909	0.0089	0.0082	0.0086	0.001084	6,494
4.01	10.00	121.0	107.3	13.7	9.93	8.81	1.125	0.0123	0.0117	0.0120	0.001513	5,821
1.99	2.00	24.0	20.4	3.6	1.97	1.68	0.299	0.0015	0.0015	0.0015	0.000191	8,791
2.01	4.00	48.3	42.2	6.1	3.97	3.47	0.498	0.0034	0.0034	0.0034	0.000431	8,057
2.00	6.00	72.6	64.0	8.5	5.96	5.26	0.699	0.0060	0.0056	0.0058	0.000731	7,194
2.00	8.00	96.8	85.7	11.1	7.95	7.04	0.910	0.0089	0.0084	0.0087	0.001095	6,432
2.00	10.00	121.1	107.4	13.7	9.95	8.82	1.124	0.0123	0.0118	0.0120	0.001522	5,795

Terracon

Resilient Modulus Testing - AASHTO T 307-99 English Units

Report Date: 18-Sep-14
Lab No.: B15 & B20_OMC+2%
Project No.: 35135121

Soil Map Unit:	0
Soil Symbol:	0
Depth (in.)	0
Compaction Method	Static
Max. Dry Density (pcf)	102.3
Opt. Moisture Content (%)	20.0
Inside Mold Diameter (in)	3.94

Weight of Wet Soil (lb)	6.57
Initial Sample Diameter (in)	3.94
Initial Sample Height (in)	7.87
Initial Sample Area (in^2)	12.17
Sample Volume (in^3)	95.85
Compacted Moisture Content(%)	22.5
Wet Density (pcf)	118.4
Dry Density (pcf)	96.7

Test Date: February 12, 2014

Final Sample Height (in)	7.9
Final Sample Wet Weight (lb)	6.57
Final Moisture Content (%)	22.3
Accumulated Strain (%)	0.06
Percent Passing No. 10	0
Percent Passing No. 200	0.0
Liquid Limit	0
Plasticity Index	0

Chamber Confining Pressure (S_3) psi	Nominal Maximum Axial Stress (S_{cyclic}) psi	Actual Applied Max. Axial Load (P_{max}) lb	Actual Applied Cyclic Load (P_{cyclic}) lb	Actual Applied Contact Load ($P_{contact}$) lb	Actual Applied Max. Axial Stress (S_{max}) psi	Actual Applied Cyclic Stress (S_{cyclic}) psi	Actual Applied Contact Stress ($S_{contact}$) psi	Recov. Def. LVDT #1 Reading (H_1) in	Recov. Def. LVDT #2 Reading (H_2) in	Average Recov. Def. LVDT 1 and 2 (H_{avg}) in	Resilient Strain (ϵ_r) in/in	Resilient Modulus (M_r) psi
6.00	2.00	23.9	20.3	3.6	1.96	1.67	0.298	0.0012	0.0012	0.0012	0.000154	10,800
6.01	4.00	48.2	42.1	6.2	3.96	3.46	0.506	0.0026	0.0028	0.0027	0.000339	10,207
5.99	6.00	72.7	64.1	8.6	5.97	5.27	0.705	0.0045	0.0047	0.0046	0.000582	9,051
5.99	8.00	97.2	86.3	10.9	7.98	7.09	0.894	0.0071	0.0075	0.0073	0.000928	7,640
6.01	10.00	121.4	107.9	13.5	9.97	8.86	1.109	0.0105	0.0110	0.0107	0.001360	6,517
4.02	2.00	23.7	20.1	3.5	1.94	1.65	0.291	0.0013	0.0014	0.0013	0.000169	9,792
4.01	4.00	48.4	42.5	6.0	3.98	3.49	0.491	0.0029	0.0031	0.0030	0.000380	9,185
4.02	6.00	72.8	64.2	8.6	5.97	5.27	0.705	0.0050	0.0052	0.0051	0.000644	8,181
3.99	8.00	97.3	86.3	10.9	7.99	7.09	0.898	0.0075	0.0079	0.0077	0.000980	7,238
4.01	10.00	121.5	108.2	13.3	9.98	8.89	1.089	0.0106	0.0111	0.0109	0.001378	6,449
2.02	2.00	23.8	20.3	3.5	1.95	1.66	0.287	0.0014	0.0015	0.0015	0.000189	8,804
1.98	4.00	48.3	42.3	5.9	3.96	3.48	0.486	0.0031	0.0034	0.0033	0.000414	8,403
2.02	6.00	72.5	64.2	8.3	5.95	5.27	0.683	0.0053	0.0055	0.0054	0.000691	7,626
2.01	8.00	97.1	86.3	10.8	7.98	7.09	0.890	0.0079	0.0083	0.0081	0.001027	6,903
1.99	10.00	121.4	108.4	13.0	9.97	8.91	1.068	0.0110	0.0115	0.0113	0.001430	6,230

Terracon

Resilient Modulus Testing - AASHTO T 307-99 English Units

Report Date: 18-Sep-14
Lab No.: B30-B35_OMC+2%
Project No.: 35135121

Soil Map Unit:	0
Soil Symbol:	0
Depth (in.)	0
Compaction Method	Static
Max. Dry Density (pcf)	112.3
Opt. Moisture Content (%)	14.6
Inside Mold Diameter (in)	3.94

Weight of Wet Soil (lb)	6.90
Initial Sample Diameter (in)	3.94
Initial Sample Height (in)	7.89
Initial Sample Area (in^2)	12.17
Sample Volume (in^3)	95.94
Compacted Moisture Content(%)	16.9
Wet Density (pcf)	124.2
Dry Density (pcf)	106.3

Test Date: February 13, 2014

Final Sample Height (in)	7.9
Final Sample Wet Weight (lb)	6.90
Final Moisture Content (%)	17.0
Accumulated Strain (%)	0.41
Percent Passing No. 10	0
Percent Passing No. 200	0.0
Liquid Limit	0
Plasticity Index	0

Chamber Confining Pressure (S_3) psi	Nominal Maximum Axial Stress (S_{cyclic}) psi	Actual Applied Max. Axial Load (P_{max}) lb	Actual Applied Cyclic Load (P_{cyclic}) lb	Actual Applied Contact Load ($P_{contact}$) lb	Actual Applied Max. Axial Stress (S_{max}) psi	Actual Applied Cyclic Stress (S_{cyclic}) psi	Actual Applied Contact Stress ($S_{contact}$) psi	Recov. Def. LVDT #1 Reading (H_1) in	Recov. Def. LVDT #2 Reading (H_2) in	Average Recov. Def. LVDT 1 and 2 (H_{avg}) in	Resilient Strain (ϵ_r) in/in	Resilient Modulus (M_r) psi
6.00	2.00	23.6	20.1	3.5	1.94	1.65	0.287	0.0014	0.0013	0.0013	0.000170	9,735
6.01	4.00	48.0	42.2	5.8	3.95	3.47	0.479	0.0033	0.0030	0.0031	0.000398	8,727
6.00	6.00	72.2	63.7	8.5	5.94	5.24	0.701	0.0059	0.0054	0.0056	0.000716	7,319
6.00	8.00	96.7	85.9	10.8	7.96	7.07	0.886	0.0088	0.0086	0.0087	0.001103	6,411
6.00	10.00	120.9	107.6	13.3	9.95	8.86	1.093	0.0115	0.0116	0.0116	0.001467	6,036
3.99	2.00	23.4	20.0	3.4	1.93	1.65	0.279	0.0016	0.0015	0.0016	0.000198	8,326
4.00	4.00	47.8	42.0	5.7	3.93	3.46	0.471	0.0040	0.0039	0.0039	0.000498	6,944
4.01	6.00	72.3	64.0	8.3	5.95	5.27	0.685	0.0071	0.0068	0.0070	0.000881	5,976
4.02	8.00	96.7	86.1	10.6	7.95	7.08	0.873	0.0101	0.0100	0.0100	0.001273	5,561
4.02	10.00	120.8	107.6	13.2	9.94	8.86	1.087	0.0129	0.0131	0.0130	0.001652	5,362
2.01	2.00	23.5	20.1	3.5	1.94	1.65	0.285	0.0019	0.0018	0.0018	0.000233	7,091
2.00	4.00	47.7	41.8	5.9	3.93	3.44	0.484	0.0047	0.0047	0.0047	0.000597	5,768
1.99	6.00	72.3	64.2	8.0	5.95	5.29	0.662	0.0085	0.0082	0.0083	0.001058	4,993
2.01	8.00	96.4	85.7	10.7	7.93	7.05	0.880	0.0118	0.0118	0.0118	0.001493	4,722
2.02	10.00	120.8	107.6	13.2	9.94	8.86	1.083	0.0150	0.0152	0.0151	0.001912	4,633

Terracon

Resilient Modulus Testing - AASHTO T 307-99 English Units

Report Date: 18-Sep-14
Lab No.: B40 & B45_OMC+2%
Project No.: 35135121

Soil Map Unit:	0
Soil Symbol:	0
Depth (in.)	0
Compaction Method	Static
Max. Dry Density (pcf)	113.8
Opt. Moisture Content (%)	14.3
Inside Mold Diameter (in)	3.94

Weight of Wet Soil (lb)	6.97
Initial Sample Diameter (in)	3.94
Initial Sample Height (in)	7.87
Initial Sample Area (in^2)	12.17
Sample Volume (in^3)	95.81
Compacted Moisture Content(%)	16.9
Wet Density (pcf)	125.6
Dry Density (pcf)	107.4

Test Date: February 12, 2014

Final Sample Height (in)	7.9
Final Sample Wet Weight (lb)	6.96
Final Moisture Content (%)	16.7
Accumulated Strain (%)	0.23
Percent Passing No. 10	0
Percent Passing No. 200	0.0
Liquid Limit	0
Plasticity Index	0

Chamber Confining Pressure (S_3) psi	Nominal Maximum Axial Stress (S_{cyclic}) psi	Actual Applied Max. Axial Load (P_{max}) lb	Actual Applied Cyclic Load (P_{cyclic}) lb	Actual Applied Contact Load ($P_{contact}$) lb	Actual Applied Max. Axial Stress (S_{max}) psi	Actual Applied Cyclic Stress (S_{cyclic}) psi	Actual Applied Contact Stress ($S_{contact}$) psi	Recov. Def. LVDT #1 Reading (H_1) in	Recov. Def. LVDT #2 Reading (H_2) in	Average Recov. Def. LVDT 1 and 2 (H_{avg}) in	Resilient Strain (ϵ_r) in/in	Resilient Modulus (M_r) psi
6.00	2.00	23.2	20.3	2.9	1.90	1.67	0.234	0.0012	0.0012	0.0012	0.000153	10,921
6.00	4.00	46.8	41.7	5.1	3.85	3.43	0.421	0.0028	0.0027	0.0028	0.000350	9,790
6.00	6.00	71.1	63.2	7.9	5.84	5.19	0.652	0.0050	0.0049	0.0050	0.000633	8,206
6.01	8.00	95.7	85.2	10.5	7.86	7.00	0.863	0.0083	0.0079	0.0081	0.001031	6,791
6.00	10.00	120.2	107.2	13.0	9.88	8.80	1.071	0.0116	0.0112	0.0114	0.001444	6,097
4.00	2.00	23.6	20.7	2.9	1.94	1.70	0.240	0.0014	0.0013	0.0014	0.000175	9,719
4.01	4.00	47.7	42.1	5.6	3.92	3.46	0.462	0.0033	0.0031	0.0032	0.000408	8,488
4.02	6.00	72.0	63.7	8.3	5.91	5.23	0.682	0.0059	0.0055	0.0057	0.000725	7,219
4.01	8.00	96.1	85.5	10.6	7.89	7.02	0.871	0.0089	0.0084	0.0087	0.001101	6,379
4.01	10.00	120.6	107.6	13.0	9.91	8.84	1.071	0.0120	0.0117	0.0119	0.001508	5,861
1.97	2.00	23.4	20.1	3.3	1.92	1.65	0.270	0.0016	0.0014	0.0015	0.000191	8,664
2.03	4.00	47.7	42.0	5.8	3.92	3.45	0.474	0.0036	0.0035	0.0036	0.000455	7,582
2.02	6.00	72.2	63.9	8.2	5.93	5.25	0.675	0.0065	0.0061	0.0063	0.000798	6,586
2.02	8.00	96.5	86.0	10.5	7.93	7.06	0.863	0.0097	0.0092	0.0094	0.001196	5,909
2.00	10.00	120.6	107.4	13.2	9.91	8.82	1.085	0.0128	0.0125	0.0127	0.001610	5,477

Terracon

Resilient Modulus Testing - AASHTO T 307-99 English Units

Report Date: 18-Sep-14
Lab No.: B50 & B 55_OMC+2%
Project No.: 35135121

Soil Map Unit:	0				
Soil Symbol:	0	Weight of Wet Soil (lb)	6.85	Test Date:	February 12, 2014
Depth (in.)	0	Initial Sample Diameter (in)	3.94		
Compaction Method	Static	Initial Sample Height (in)	7.87	Final Sample Height (in)	7.9
Max. Dry Density (pcf)	112.6	Initial Sample Area (in^2)	12.17	Final Sample Wet Weight (lb)	6.84
Opt. Moisture Content (%)	13.4	Sample Volume (in^3)	95.85	Final Moisture Content (%)	16.0
Inside Mold Diameter (in)	3.94	Compacted Moisture Content(%)	15.8	Accumulated Strain (%)	0.07
		Wet Density (pcf)	123.4		
		Dry Density (pcf)	106.5	Percent Passing No. 10	0
				Percent Passing No. 200	0.0
				Liquid Limit	0
				Plasticity Index	0

Chamber Confining Pressure (S_3) psi	Nominal Maximum Axial Stress (S_{cyclic}) psi	Actual Applied Max. Axial Load (P_{max}) lb	Actual Applied Cyclic Load (P_{cyclic}) lb	Actual Applied Contact Load ($P_{contact}$) lb	Actual Applied Max. Axial Stress (S_{max}) psi	Actual Applied Cyclic Stress (S_{cyclic}) psi	Actual Applied Contact Stress ($S_{contact}$) psi	Recov. Def. LVDT #1 Reading (H_1) in	Recov. Def. LVDT #2 Reading (H_2) in	Average Recov. Def. LVDT 1 and 2 (H_{avg}) in	Resilient Strain (ϵ_r) in/in	Resilient Modulus (M_r) psi
6.00	2.00	22.3	17.5	4.8	1.83	1.44	0.393	0.0009	0.0009	0.0009	0.000116	12,341
6.00	4.00	46.2	39.3	6.9	3.80	3.23	0.571	0.0022	0.0022	0.0022	0.000275	11,721
6.00	6.00	70.9	61.0	9.8	5.82	5.01	0.809	0.0038	0.0039	0.0038	0.000487	10,296
6.00	8.00	95.6	83.3	12.3	7.85	6.84	1.010	0.0061	0.0061	0.0061	0.000771	8,873
6.01	10.00	120.6	106.1	14.4	9.90	8.72	1.186	0.0086	0.0088	0.0087	0.001104	7,896
4.01	2.00	22.9	18.4	4.4	1.88	1.51	0.365	0.0011	0.0011	0.0011	0.000138	10,977
4.02	4.00	47.2	40.3	6.9	3.88	3.31	0.569	0.0027	0.0027	0.0027	0.000338	9,778
4.01	6.00	71.5	62.2	9.3	5.87	5.11	0.761	0.0046	0.0046	0.0046	0.000579	8,822
4.02	8.00	96.0	84.4	11.6	7.89	6.93	0.956	0.0068	0.0069	0.0069	0.000870	7,961
4.00	10.00	120.5	106.3	14.2	9.89	8.73	1.164	0.0093	0.0094	0.0093	0.001186	7,358
1.98	2.00	22.8	18.8	4.0	1.87	1.55	0.327	0.0013	0.0013	0.0013	0.000164	9,424
1.99	4.00	47.1	40.7	6.4	3.87	3.35	0.525	0.0030	0.0030	0.0030	0.000386	8,662
1.98	6.00	71.4	62.5	8.9	5.86	5.13	0.730	0.0052	0.0051	0.0052	0.000655	7,833
1.99	8.00	96.1	84.7	11.3	7.89	6.96	0.929	0.0076	0.0076	0.0076	0.000966	7,207
2.02	10.00	120.4	106.8	13.6	9.89	8.77	1.117	0.0102	0.0103	0.0102	0.001299	6,751

Terracon

Resilient Modulus Testing - AASHTO T 307-99 English Units

Report Date: 18-Sep-14
Lab No.: B60 & B65-OMC+2%
Project No.: 35135121

Soil Map Unit:	0				
Soil Symbol:	0	Weight of Wet Soil (lb)	7.01	Test Date:	February 6, 2014
Depth (in.)	0	Initial Sample Diameter (in)	3.94		
Compaction Method	Static	Initial Sample Height (in)	7.89	Final Sample Height (in)	7.9
Max. Dry Density (pcf)	115.8	Initial Sample Area (in^2)	12.18	Final Sample Wet Weight (lb)	7.01
Opt. Moisture Content (%)	13.0	Sample Volume (in^3)	96.11	Final Moisture Content (%)	15.5
Inside Mold Diameter (in)	3.94	Compacted Moisture Content(%)	15.5	Accumulated Strain (%)	0.28
		Wet Density (pcf)	126.0		
		Dry Density (pcf)	109.1	Percent Passing No. 10	0
				Percent Passing No. 200	0.0
				Liquid Limit	0
				Plasticity Index	0

Chamber Confining Pressure (S_3) psi	Nominal Maximum Axial Stress (S_{cyclic}) psi	Actual Applied Max. Axial Load (P_{max}) lb	Actual Applied Cyclic Load (P_{cyclic}) lb	Actual Applied Contact Load ($P_{contact}$) lb	Actual Applied Max. Axial Stress (S_{max}) psi	Actual Applied Cyclic Stress (S_{cyclic}) psi	Actual Applied Contact Stress ($S_{contact}$) psi	Recov. Def. LVDT #1 Reading (H_1) in	Recov. Def. LVDT #2 Reading (H_2) in	Average Recov. Def. LVDT 1 and 2 (H_{avg}) in	Resilient Strain (ϵ_r) in/in	Resilient Modulus (M_r) psi
6.00	2.00	23.9	20.7	3.2	1.96	1.70	0.260	0.0014	0.0013	0.0014	0.000173	9,837
6.00	4.00	47.8	42.4	5.5	3.93	3.48	0.448	0.0031	0.0029	0.0030	0.000381	9,145
6.00	6.00	72.2	64.1	8.1	5.93	5.27	0.668	0.0050	0.0048	0.0049	0.000619	8,505
6.01	8.00	96.5	86.0	10.5	7.93	7.06	0.866	0.0071	0.0069	0.0070	0.000888	7,952
6.01	10.00	120.8	107.6	13.2	9.93	8.84	1.085	0.0090	0.0089	0.0090	0.001138	7,767
3.99	2.00	24.1	20.8	3.3	1.98	1.71	0.270	0.0017	0.0016	0.0017	0.000210	8,149
4.02	4.00	48.0	42.4	5.7	3.95	3.48	0.465	0.0039	0.0037	0.0038	0.000483	7,207
4.00	6.00	72.3	64.2	8.0	5.94	5.28	0.660	0.0064	0.0060	0.0062	0.000788	6,698
4.01	8.00	96.7	86.1	10.6	7.94	7.07	0.871	0.0086	0.0083	0.0085	0.001073	6,591
4.01	10.00	121.0	108.0	13.1	9.94	8.87	1.073	0.0107	0.0105	0.0106	0.001347	6,587
2.00	2.00	24.0	20.7	3.3	1.97	1.70	0.271	0.0022	0.0021	0.0021	0.000269	6,310
1.99	4.00	48.2	42.4	5.8	3.96	3.49	0.475	0.0052	0.0048	0.0050	0.000636	5,484
2.01	6.00	72.6	64.4	8.2	5.97	5.29	0.673	0.0082	0.0077	0.0080	0.001012	5,231
1.99	8.00	96.8	86.0	10.8	7.95	7.06	0.887	0.0107	0.0104	0.0105	0.001336	5,286
2.02	10.00	121.0	107.7	13.2	9.94	8.85	1.088	0.0131	0.0130	0.0131	0.001654	5,351

Terracon

Resilient Modulus Testing - AASHTO T 307-99 English Units

Report Date: 18-Sep-14
Lab No.: B85-B87_OMC+2%
Project No.: 35135121

Soil Map Unit:	0
Soil Symbol:	0
Depth (in.)	0
Compaction Method	Static
Max. Dry Density (pcf)	105.7
Opt. Moisture Content (%)	17.0
Inside Mold Diameter (in)	3.94

Weight of Wet Soil (lb)	6.62
Initial Sample Diameter (in)	3.94
Initial Sample Height (in)	7.87
Initial Sample Area (in^2)	12.17
Sample Volume (in^3)	95.80
Compacted Moisture Content(%)	19.5
Wet Density (pcf)	119.5
Dry Density (pcf)	100.0

Test Date: February 13, 2014

Final Sample Height (in)	7.9
Final Sample Wet Weight (lb)	6.62
Final Moisture Content (%)	19.5
Accumulated Strain (%)	0.13
Percent Passing No. 10	0
Percent Passing No. 200	0.0
Liquid Limit	0
Plasticity Index	0

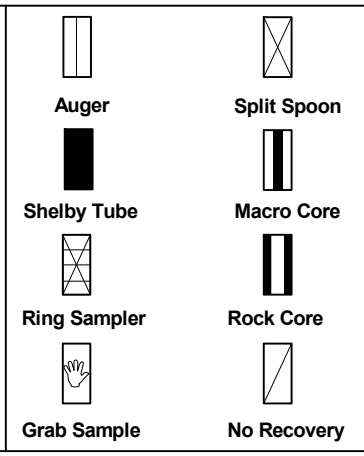
Chamber Confining Pressure (S_3) psi	Nominal Maximum Axial Stress (S_{cyclic}) psi	Actual Applied Max. Axial Load (P_{max}) lb	Actual Applied Cyclic Load (P_{cyclic}) lb	Actual Applied Contact Load ($P_{contact}$) lb	Actual Applied Max. Axial Stress (S_{max}) psi	Actual Applied Cyclic Stress (S_{cyclic}) psi	Actual Applied Contact Stress ($S_{contact}$) psi	Recov. Def. LVDT #1 Reading (H_1) in	Recov. Def. LVDT #2 Reading (H_2) in	Average Recov. Def. LVDT 1 and 2 (H_{avg}) in	Resilient Strain (ϵ_r) in/in	Resilient Modulus (M_r) psi
5.99	2.00	23.8	20.7	3.1	1.96	1.70	0.255	0.0010	0.0014	0.0012	0.000149	11,447
6.01	4.00	48.2	42.7	5.5	3.96	3.51	0.454	0.0022	0.0030	0.0026	0.000331	10,609
6.00	6.00	72.4	64.3	8.2	5.95	5.28	0.670	0.0039	0.0051	0.0045	0.000569	9,282
6.00	8.00	96.8	86.1	10.8	7.96	7.07	0.884	0.0063	0.0080	0.0071	0.000906	7,809
6.01	10.00	121.1	107.8	13.3	9.95	8.86	1.096	0.0093	0.0113	0.0103	0.001306	6,783
4.01	2.00	24.1	20.9	3.2	1.98	1.71	0.266	0.0011	0.0016	0.0013	0.000169	10,142
4.00	4.00	48.1	42.4	5.8	3.96	3.48	0.473	0.0025	0.0035	0.0030	0.000378	9,209
4.02	6.00	72.8	64.3	8.5	5.98	5.28	0.695	0.0044	0.0058	0.0051	0.000652	8,105
4.02	8.00	97.0	86.3	10.7	7.97	7.09	0.879	0.0070	0.0087	0.0079	0.000998	7,108
4.01	10.00	120.9	107.8	13.2	9.94	8.86	1.081	0.0100	0.0120	0.0110	0.001394	6,355
2.00	2.00	23.9	20.7	3.2	1.97	1.70	0.266	0.0013	0.0018	0.0015	0.000193	8,820
1.99	4.00	48.5	42.8	5.7	3.99	3.52	0.472	0.0028	0.0040	0.0034	0.000431	8,152
2.01	6.00	72.8	64.5	8.2	5.98	5.30	0.678	0.0050	0.0065	0.0058	0.000733	7,238
2.00	8.00	97.0	86.4	10.6	7.97	7.10	0.868	0.0078	0.0097	0.0087	0.001107	6,417
2.00	10.00	121.3	108.0	13.3	9.97	8.87	1.094	0.0110	0.0130	0.0120	0.001527	5,810

APPENDIX C
SUPPORTING DOCUMENTS

EXPLANATION OF BORING LOG INFORMATION

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING



WATER LEVEL

Water Initially Encountered

Water Level After a Specified Period of Time

Water Level After a Specified Period of Time

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.

FIELD TESTS

(HP)	Hand Penetrometer
(T)	Torvane
(b/f)	Standard Penetration Test (blows per foot)
(PID)	Photo-Ionization Detector
(OVA)	Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. 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 Includes gravels, sands and silts.			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.**	**Ring Sampler Blows/Ft.**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength, Qu, psf**	**Standard Penetration or N-Value Blows/Ft.**	**Ring Sampler Blows/Ft.**
Very Loose	0 - 3	0 - 6	Very Soft	less than 500	0 - 1	< 3
Loose	4 - 9	7 - 18	Soft	500 to 1,000	2 - 4	3 - 4
Medium Dense	10 - 29	19 - 58	Medium-Stiff	1,000 to 2,000	4 - 8	5 - 9
Dense	30 - 50	59 - 98	Stiff	2,000 to 4,000	8 - 15	10 - 18
Very Dense	> 50	≥ 99	Very Stiff	4,000 to 8,000	15 - 30	19 - 42
			Hard	> 8,000	> 30	> 42

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	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 $1 > Cc > 3$ [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 $1 > Cc > 3$ [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" line [J]		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-in. (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] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 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 ≥ 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 ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

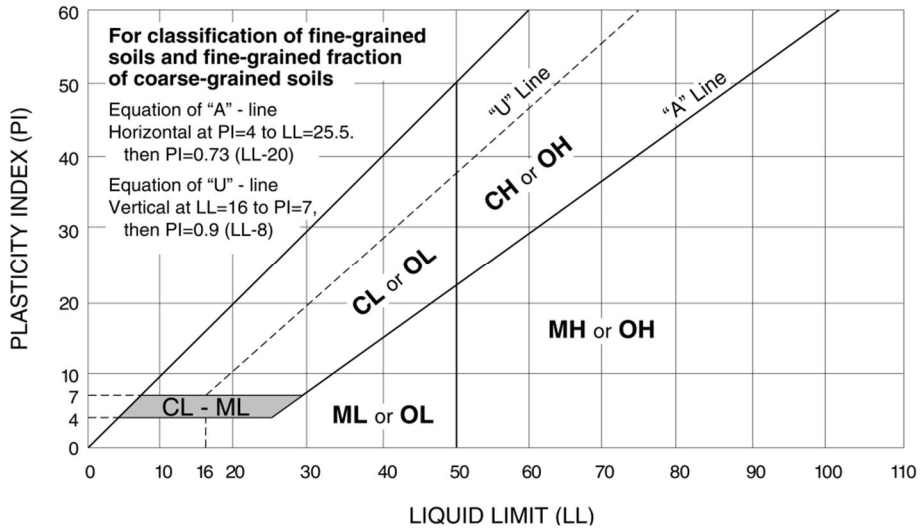
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 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.



AASHTO SOIL CLASSIFICATION SYSTEM

General classification	Silt-clay materials (more than 35% of total sample passing No. 200)			
Group classification	*A-4*	*A-5*	*A-6*	*A-7* *A-7-5** *A-7-6†*
Sieve analysis (percent passing)				
No. 10				
No. 40				
No. 200	36 min.	36 min.	36 min.	36 min.
Characteristics of fraction passing No. 40				
Liquid limit	40 max.	41 min.	40 max.	41 min.
Plasticity index	10 max.	10 max.	11 min.	11 min.
Usual types of significant constituent materials	Silty soils		Clayey soils	
General subgrade rating	Fair to poor			

*For A-7-5, $PI \leq LL - 30$
†For A-7-6, $PI > LL - 30$

General classification	Granular materials (35% or less of total sample passing No. 200)						
	A-1			*A-2*			
Group classification	*A-1-a*	*A-1-b*	*A-3*	*A-2-4*	*A-2-5*	*A-2-6*	*A-2-7*
Sieve analysis (percent passing)							
No. 10	50 max.						
No. 40	30 max.	50 max.	51 min.				
No. 200	15 max.	25 max.	10 max.	35 max.	35 max.	35 max.	35 max.
Characteristics of fraction passing No. 40							
Liquid limit				40 max.	41 min.	40 max.	41 min.
Plasticity index	6 max.		NP	10 max.	10 max.	11 min.	11 min.
Usual types of significant constituent materials	Stone fragments, gravel, and sand		Fine sand	Silty or clayey gravel and sand			
General subgrade rating	Excellent to good						