

Geotechnical Engineering Report

Planned Fitzhugh Generating Station Improvements

AECC Thomas B. Fitzhugh Power Generating Station
6006 Lock and Dam Road
Ozark, Arkansas
GTS Project No. 24-35001

October 16, 2024



Prepared For:

Arkansas Electric Cooperative Corporation

1 Cooperative Way
Little Rock, Arkansas



www.gtsconsulting.net



October 16, 2024

Arkansas Electric Cooperative Corporation
1 Cooperative Way
Little Rock, Arkansas 72209

Attention: Mr. Doug Reves, Production Outage Supervisor

RE: Final Geotechnical Engineering Report
Planned AECC Fitzhugh Generating Station Improvements
AECC Thomas B. Fitzhugh Power Generating Station
6006 Lock and Dam Road
Ozark, Arkansas
Project No. 24-35001

Mr. Reeves:

This report provides the results of the subsurface exploration, laboratory testing, and geotechnical engineering analysis performed for the planned new facility improvements at the AECC Thomas B. Fitzhugh Power Generating Station in Ozark, Arkansas.

We very much appreciate the opportunity to provide engineering services to you on this project. Please contact us if you have any questions regarding the contents of this report.

Sincerely,

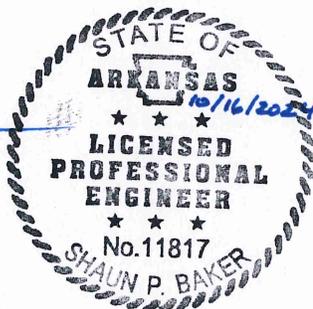


Certificate of Authorization No. 1251, expires 12/31/2025

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Travis Willis, P.E.
Geotechnical Department Manager



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PROJECT DESCRIPTION and INFORMATION

Introduction

Our services were performed in accordance with GTS, Inc. (GTS) Proposal No. GTS324005S, authorized by Arkansas Electric Cooperative Corporation (AECC) on May 6, 2024. The intent of the authorized scope of services was to explore the subsurface soil/rock conditions at the project site in order to prepare recommendations for designing and constructing the equipment/building foundations and slabs-on-grade as well as mass grading.

GTS previously provided preliminary geotechnical engineering services for the planned generating station in 2023 and issued the findings and recommendations in GTS Geotechnical Engineering Report No. 23-35030, dated December 11, 2023. Six (6) borings were initially performed. Our scope of services for this more comprehensive report included evaluating the subsurface conditions at a total of 29 boring locations, identified as Borings DH-A through DH-CC. The borings were drilled to terminal depths of about 5 to 34 feet below existing grade.

In addition, a Supplemental Geotechnical Engineering report was issued to AECC on June 29, 2024, for use in the preliminary design and construction budgeting for the project by AECC. This Final Geotechnical Engineering Report is based on the most recent site grading plans and structural information provided to us by AECC.

The scope of services requested of GTS and provided in this report pertains to the evaluation of the site in preparation for construction of the planned facility improvements to the AECC Fitzhugh Power Generating Station. Our scope of services is concluded with the issuance of this Final Geotechnical Engineering Report.

Project Site

The project site is located at the real property address of 6006 Lock and Dam Road in Ozark, Arkansas. More specifically, the project site coordinates are latitude N35.465450°, longitude W93.805250°. The general boundary of the project site is shown in yellow in Figure 1 on the following page.

At the time of the field exploration, the site was an undeveloped tract covered predominantly by grass and vegetation. Patches of exposed soils and gravel were also present. Finally, an apparent concrete slab was also present in the southern portion of the site. Based on Google Earth historical imagery, the site appears to have been relatively undeveloped; however, it appears to have been used as a temporary staging area since before 1994.



Figure 1 - General Boundary of the Project Site (in yellow)

Planned Development

The following documents were provided to and used by GTS to prepare this report:

- **AECC Geotechnical Testing and Report Specifications, Fitzhugh Power Plant.** This document, herein referred to as the scope of work (SOW), provides rough coordinates for the project location and details the requested scope of work.
- **Boring Location Request Diagram.** A JPG image was provided to us showing the most current power plant layout and the locations of 29 additional borings requested by AECC.
- **Grading and Erosion Plan, Drawing No. C3-1, prepared by Powers Engineers, undated.** The preliminary current layout and grading plan provided to us on October 7, 2024.
- **Geotechnical Specification for AECC F34 Project, 2 Unit LM6000, Dual Fuel, prepared by Stanley Consultants, Inc. for Relevant Power, dated August 20, 2024.**



This document provides requirements for the geotechnical investigation and report as well as some of the preliminary structure and foundation design information.

The project will consist of installing new power plant equipment in association with AECC's existing Thomas B. Fitzhugh Generating Station located near Ozark, Arkansas. Specific information regarding the planned facility improvements was not available. Based on the preliminary site plan provided to us, we understand that an above-ground fuel oil storage tank and containment area are planned in the northern portion of the site and the main power generating station structures will be constructed in the southern portion of the site.

We anticipate both footing/mat foundations and straight-shaft drilled pier foundations will be used to support the new tank and generating station structures. Foundation loads were not available at the time of preparing this report. However, we understand that the structures are preliminarily designed to be supported on footing/mat foundations using a minimum 3,000 pounds per square foot (psf) bearing pressure.

The new facility will also include constructing aggregate-surfaced yards and access roads.

Planned Site Grading

This report uses the terms "existing grade" and "finished subgrade". Existing grade is used in this report to describe the site elevations at the time of our field drilling and sampling. Finished subgrade is used in this report to describe the Civil Engineer-designed top-of-soil elevations at the site at completion of grading.

Based on the surface elevation contours provided on the preliminary site plan provided to us by AECC, the site appears to be relatively flat and generally slopes downhill to the northeast. Existing ground surface elevations range from about 432 feet in the northwestern portion of the site to 410 feet in the southeastern portion. The ground surface elevations in the main generating station site and fuel oil storage tank area range from about 428 feet to 432 feet.

After discussions with AECC and the design team, we understand that the site will be lowered and the final grade within the facility will be around 423 feet. Based on this elevation, we estimate cuts of about 9 feet and fills of about 5 feet within the generating plant facility footprint. Cuts of about 14 feet and fills of about 10 feet could be necessary to develop the slopes and detention areas adjacent to the facility footprint.

If the above-stated assumptions are incorrect or when final development plans become available, please contact and provide us the project information to allow the recommendations in this report to be reviewed and, if necessary, revised.

SUBSURFACE CONDITIONS and WATER OBSERVATIONS

Site Geology

Based on available geologic maps, the project site is underlain by the geologic units mapped as the Quaternary Alluvium, Qal, and Pennsylvanian Atoka Formation (undivided), Pa. The following descriptions of these formations were obtained from the Stratigraphic Summary of Arkansas (Arkansas Geological Commission IC-36, 2004).

The Alluvium consists of variably sized gravel overlain by unconsolidated sand, silt, and clay comprises the unit. This unit occurs in the floodplains of streams and rivers. The sediments form a rich loam and are excellent for agriculture. Thickness varies from 0 to 25 feet. Areas of alluvium are presently receiving sediment deposition.

The Atoka Formation is a sequence of marine, mostly tan to gray silty sandstones and grayish-black shales. The Atoka Formation may reach up to 25,000 feet thick in the Ouachita Mountains, although only large incomplete sections are known.

Based on the subsurface conditions encountered at the boring locations, the native overburden soils and sandstone/shale encountered at the boring locations are consistent with the Atoka Formation.

Surface and Subsurface Conditions

At the time of the field exploration, the ground surface at most of the boring locations was covered by grass with an approximately 1 to 4 inch thick root mat. Approximately 3 inches of surficial gravel was encountered at Boring DH-B. Approximately 3 inches of surficial sand was encountered at Boring BHJ. Bare ground was exposed at Borings DH-E and DH-H.

Existing Fill

Existing fill materials were encountered at all boring locations except at Boring DH-G. The existing fill extended to depths of about 2 to 13 ½ feet below existing grade. The existing fill materials generally consisted of mixtures and layers of gravelly (crushed shale and sandstone) lean clay, sandy lean clay, lean clay (CL), lean to fat clay (CL-CH), fat clay (CH), and sand. The clay fill materials contained varying amounts of silt, sand, gravel (rounded pebbles), crushed shale and sandstone, and pieces wood (sticks and possibly a stump). The sand fill contained varying amounts of rounded pebbles and clay clods.

The existing fill materials had low to high, predominantly moderate, shear strength during drilling and sampling. Standard Penetration Test (SPT) N-values of 3 to 48 blows per foot (bpf) were

recorded, although blow counts of 50 blows for 5 inches of penetration were recorded in the gravelly clay fill at Boring DH-B.

Stratum I – Native Soils

Native, silty clay, lean clay, lean to fat clay, fat clay, and shaley clay soils were encountered beneath the existing fill materials at most of the boring locations and extended to depths of about 3 to 18 ½ feet below existing grade. The native soils contained varying amounts of sand, gravel, and shale fragments. The native Stratum I soils extended to termination depths of about 8 ½ to 17 feet at Borings DH-A, DH-C, DH-F, DH-4, and DH-BB.

The Stratum I soils had low to moderate, predominantly moderate, shear strength during drilling and sampling. SPT N-values of 0 (weight of hammer) to 57 bpf were recorded for the native Stratum I soils, although the higher N values were mostly observed in the shaley lean clays. Hand penetrometer tests were performed on selected portions of intact clay samples and measured between 1 and 4.5 tons per square foot (tsf).

Stratum II – Weathered Shale

In general, moderately weathered, very soft to soft, shale was encountered directly beneath the existing fill materials at Borings DH-B, DH-H, DH-Q, and DH-X at depths of about 8 ½ to 13 ½ feet below existing grade. The exception was Boring DH-G where highly weathered shale was encountered at the ground surface. The Stratum II shale extended to depths of about 10 feet to 18 ½ feet below existing grade at Borings DH-B, DH-H, DH-J, DH-O, DH-U, and DH-CC.

The Stratum II, highly weathered shale had moderate to high, predominantly high, shear strength during drilling and sampling. N-values in the shale were recorded as 48 to 82 bpf, 9 to 34 blows for 6 inches of penetration, and 50 blows for 1 to 5 inches of penetration. Weathering typically decreased and the relative strength of the shale typically increased with depth.

Stratum III – Shale and Sandstone

Soft to hard, slightly weathered to fresh shale and sandstone were encountered beneath the Stratum I clays and Stratum II highly weathered shale at the boring locations with the exception of Borings DH-A, DH-B, DH-C, DH-F, DH-H, DH-J, DH-O, DH-R, DH-U, DH-Y, DH-BB, and DH-CC. The Stratum III shale and sandstone extended to boring termination depths of about 5 to 34 feet below existing grade, where encountered.

The Stratum II shale and sandstone had high shear strength. N-values in the Stratum III shale-sandstone rock were recorded as 50 blows for 0 to 5 inches of penetration. The sandstone and shale were cored at five (5) boring locations: Borings DH-L, DH-S, DH-T, DH-V, and DH-AA. Photographs of the rock cores are provided in Appendix A. Percent recovery (REC) values of 62



to 100 percent and Rock Quality Designation (RQD) values of 8 to 85 percent were measured for the core runs. Unconfined compression strength test results ranged from 2,401 to 9,402 pounds per square inch (psi). The REC, RQD, and unconfined compression strength test values are presented on the boring logs and on the rock core photo logs in Appendix A.

Auger Refusal/Hard Drilling Conditions

Hard drilling conditions were encountered upon encountering the highly weathered shale (Stratum II) or shale-sandstone (Stratum III), although difficult drilling conditions were also encountered in the gravelly lean clay fill materials at Boring DH-B beginning at a depth of about 2 feet below existing grade. Auger refusal occurred on the Stratum III shale-sandstone at depths of about 5 to 24 feet below existing grade at most boring locations.

A summary of the depths to the hard drilling conditions and the auger refusal material is provided in Table 1 below continuing onto the following page.

Table 1: Depths and Elevations to Difficult Drilling Conditions and Auger Refusal

Boring Number	Depth to Hard Drilling Conditions (feet below existing grade)	Elevation ¹ to Hard Drilling Conditions (feet)	Approximate Depth to Auger Refusal (feet below existing grade)	Elevation ¹ to Auger Refusal (feet)
DH-A	Not Encountered	n/a	Not Encountered to 10 feet	n/a
DH-B	2 to 5 (Existing Fill)	423	Not Encountered to 10 feet	n/a
	8 ½ (Stratum II)	416 ½		
DH-C	8 ½	412 ½	8 ½	412 ½
DH-D	13 ½	417 ½	23	408
DH-E	9 ½	419	17	411 ½
DH-F	Not Encountered	n/a	Not Encountered to 10 feet	n/a
DH-G	Surface	432 ½	5	427 ½
DH-H	13 ½	417	18 ½	412
DH-I	13 ½	416	18 ½	411
DH-J	13 ½	416	16	413 ½
DH-K	8 ½	424 ½	18 ½	414 ½
DH-L	8 ½	421 ½	17 Rock cored to 27	413
DH-M	14 ½	415 ½	21	409



Boring Number	Depth to Hard Drilling Conditions (feet below existing grade)	Elevation ¹ to Hard Drilling Conditions (feet)	Approximate Depth to Auger Refusal (feet below existing grade)	Elevation ¹ to Auger Refusal (feet)
DH-N	8 ½	423 ½	18 ½	413 ½
DH-O	8 ½	423	18 ½	413
DH-P	13 ½	418	22	409 ½
DH-Q	8 ½	423	20	411 ½
DH-R	Not Encountered	n/a	Not Encountered to 10 feet	n/a
DH-S	23 ½	408 ½	24 Rock cored to 34	408
DH-T	13 ½	418	21 Rock cored to 31	410 ½
DH-U	13 ½	418 ½	17	415
DH-V	13 ½	418	20 Rock cored to 30	411 ½
DH-W	18 ½	413 ½	18 ½	413 ½
DH-X	18 ½	418 ½	22	410
DH-Y	Not Encountered	n/a	Not Encountered to 10 feet	n/a
DH-Z	5	411 ½	8 ½	408
DH-AA	13 ½	414 ½	17 Rock cored to 27	404 ½
DH-BB	13 ½	418 ½	17	415
DH-CC	2	Not provided	18 ½	Not provided
1) The elevations provided in this table are estimated from the ground surface elevations shown on the site grading plan provided to us by AECC and relative to the subsurface conditions encountered at the boring locations.				

Water Measurements

The borings were observed for free groundwater while drilling and immediately prior to coring the rock. Free groundwater was observed while drilling in Borings DH-D, DH-M, DH-R, and DH-W at depths of about 4 to 15 feet below existing grade and also at depths of about 4 to 15 feet immediately after boring completion. No groundwater was observed while drilling nor immediately after boring completion in the other borings. An accurate water level measurement



could not be obtained after beginning rock coring at DH-L, DH-S, DH-T, DH-V, and DH-AA because water was injected into the borehole. The borings were all backfilled upon completion.

The depths to water are date-dependent measurements of groundwater levels at the time of the field exploration. Perched water could develop in the existing fill materials underlain by less permeable, native clay soils (Stratum II) and near the soil-rock interface. Fluctuations of the groundwater level can occur due to seasonal variations in the amount of rainfall; the Arkansas River level fluctuations; site topography and runoff; horizontal and vertical hydraulic conductivity of soil and rock; and other factors not evident at the time the borings were performed. It is difficult to predict the magnitude of subsurface water fluctuations that might occur based on short-term observations. The installation and periodic measurement of monitoring wells would be required to establish seasonal piezometric surfaces below this project site. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.



GEOTECHNICAL ENGINEERING RECOMMENDATIONS

Geotechnical Considerations

Existing Fill

As previously described, existing fill materials consisting of a mixture of clays, sand, and crushed rock gravel were encountered to varying depths ranging from about 2 to 13 ½ feet below existing grade at all boring locations except at Boring DH-G. A summary of the fill thickness (depth to bottom) and associated elevation is presented in Table 2, below. The existing fill had low to high, predominantly moderate, shear strength. Information regarding the history and placement of the existing fill was not available to us. We assume that the fill is associated with the apparent staging area for the construction of the existing Fitzhugh power generating station.

Table 2: Depths and Elevations to Bottom of Existing Fill

Boring Number	Depth to Bottom of Existing Fill (feet below existing grade)	Elevation ¹ to Bottom of Existing Fill (feet)
DH-A	8 ½	421 ½
DH-B	8 ½	416 ½
DH-C	5	416
DH-D	8 ½	422 ½
DH-E	8 ½	420
DH-F	8 ½	416
DH-G	Not Encountered	n/a
DH-H	13 ½	417
DH-I	8 ½	416
DH-J	8 ½	421
DH-K	3 ½	429 ½
DH-L	3 ½	426 ½
DH-M	8 ½	421 ½
DH-N	3 ½	428 ½
DH-O	3 ½	428
DH-P	8 ½	423
DH-Q	8 ½	423
DH-R	8 ½	424
DH-S	8 ½	423 ½
DH-T	5	426 ½



Boring Number	Depth to Bottom of Existing Fill (feet below existing grade)	Elevation ¹ to Bottom of Existing Fill (feet)
DH-U	8 ½	423 ½
DH-V	5 ½	425 ½
DH-W	8 ½	423 ½
DH-X	13 ½	418 ½
DH-Y	Below 10	Below 421 ½
DH-Z	2	414 ½
DH-AA	8 ½	423
DH-BB	13 ½	418 ½
DH-CC	2	Not Provided
1) The elevations provided in this table are estimated from the ground surface elevations shown on the site grading plan provided to us by AECC and relative to the subsurface conditions encountered at the boring locations.		

Compressible fill and/or deleterious and unsuitable materials might be buried within or by the existing fill. Given that wood pieces were observed within the fill materials at some of the boring locations, we anticipate that this is a low to moderate risk.

In summary, there is risk of unpredictable structural performance associated with leaving the existing fill in place due to potentially unsuitable materials. Also, the existing fill materials do not appear to have been constructed in a controlled manner per standard industry practice (with adequate compaction and testing) based on the varying composition, SPT N-values, and the presence of low-strength native soils lying directly beneath the fill. Therefore, we consider the existing fill materials encountered at the boring locations to have a low to moderate risk potential for both containing unsuitable materials and detrimental structural performance (excessive settlement). This risk cannot be eliminated unless the existing fill materials are removed and replaced full depth beneath the structures. Furthermore, based on the understood required design bearing pressure of 3,000 psf, we do not recommend supporting the new planned structures on shallow foundations or slabs directly within or above the existing fill materials.

Based on the understood finished grade elevation of 423 feet within the generating plant addition footprint, we anticipate most, if not all, of the existing fill materials will be removed. However, as shown in bold in Table 2 above, localized areas containing existing fill materials could still remain at and below the planned finished grade elevation of 423 feet. We anticipate that existing fill materials will likely be exposed in the subgrade near Borings DH-A, B, C, D, E, F, H, I, J, M, X, Y, Z, and BB and extending to depths of about 1 to 8 ½ feet below final grades. Again, we recommend that any remaining existing fill materials be overexcavated and replaced full depth with new select fill materials within the planned generating station addition footprint.



However, as a cost savings measure, if the Owner is willing to accept the risk of increased pavement distress and maintenance, the aggregate-surfaced areas and non-structural areas outside of the main generating plant footprint could be supported on minimum 1-foot-thick layer of new select fill constructed atop existing fill as long as the existing fill is stable at the time of construction. In addition, the risk associated with supporting pavements and new fills above existing fill can be reduced by performing thorough testing and evaluation at the time of construction. Special observation and testing procedures for evaluating the existing fill in the planned aggregate-surfaced area(s) and access road subgrade are provided later in this report.

Low-Strength Soils

Low shear-strength soils (SPT N-value of 6 or less) were encountered within the existing fill and native Stratum I soils at various depths below existing grade at 10 of the 29 boring locations. Table 3 shown below summarizes the locations and depths where low-strength soils were encountered. The locations and depths where low-strength soils are expected to be encountered after completing mass grading are shown in bold.

Table 3: Location, Depth, and Elevation of Low-Shear-Strength Soils

Boring Location	Depth of Low-Shear-Strength Soils (feet below existing grade)	Elevation to Low-Shear-Strength Soils (feet)	N Values
DH-B	5 to 8 ½ (Existing Fill)	420 to 416 ½	3
DH-J	8 ½ to 13 ½ (Stratum I)	421 to 416	4
DH-P	5 to 8 ½ (Existing Fill)	426 ½ to 423	6
DH-Q	5 to 8 ½ (Existing Fill)	426 ½ to 423	6
DH-U	2 to 5 (Existing Fill)	430 to 427	5 and 6
DH-V	2 to 5 (Existing Fill)	429 ½ to 426 ½	5 and 6
DH-W	8 ½ to 13 ½ (Stratum I)	423 ½ to 418 ½	0
DH-X	8 ½ to 13 ½ (Existing Fill)	423 ½ to 418 ½	3
DH-Y	3 ½ to 5 (Existing Fill)	428 to 426 ½	6
DH-AA	5 to 13 ½ (Existing Fill and Stratum I)	426 ½ to 418	6
1) The elevations provided in this table are estimated from the ground surface elevations shown on the site grading plan provided to us by AECC and relative to the subsurface conditions encountered at the boring locations.			

In their present condition, the low-strength soils are not suitable for support of new fill, foundations, slabs-on-grade, or pavements. Supporting structures above the low-strength soils will result in compression of the existing fill materials and consolidation of the native Stratum II soils,



which will result in relatively large settlement of the planned structures and potential loss of support.

As with the existing fill materials, we expect that low-strength soils will likely be encountered at the exposed subgrade after mass grading in localized areas (near Borings DH-B, J, W, and X) and extending to depths of about 4 ½ to 7 feet below plan finished grade. The low-strength soils should also be undercut and replaced full depth with new select fill, where encountered. Recommendations are provided in this report for ground improvement, generally through removing these low-strength soils full depth from the planned structure footprints, pavement areas, and slope/pond footprints and replacing them with new, approved fill material constructed as recommended in this report.

Moisture-Sensitive Soils

The existing fill materials as well as the native lean clay, silty clay, silt, and clayey sand (Stratum I) soils are susceptible to further strength loss with increases in moisture content and/or when exposed to repetitive construction traffic. Even if stable upon initial exposure, these soils can become unstable when wet and subjected to construction activities. Ground improvement will likely be required during moderately wet to wet periods of the year and when wet site conditions develop.

Expansive Clay Soils

Expansive lean to fat (CL-CH) and fat clay (CH) soils having medium to high plasticity were encountered beneath the existing fill materials at some of the boring locations. Based on the subsurface conditions encountered at the boring locations and the understood site grading plans, we anticipate that the fat clay soils (portion of Stratum I) could be exposed in the subgrade at and near Borings DH-A, D, L, N, O, R, U, and W. We expect that the expansive fat clays will likely be difficult to discern from the in-situ lean clay soils.

Based on the anticipated grading and the resulting thickness of the fat clays remaining after mass grading, we estimate a potential vertical rise (PVR) of 1 to 2 inches for grade-support slabs at this project site. However, the PVR can be reduced to about 1 inch by undercutting and replacing the fat clays with new select fill materials to a depth of at least 1 foot below plan finished subgrade elevations beneath grade-supported slabs.

This report provides recommendations to help mitigate the effects of soil shrinking and swelling. However, even if these procedures are followed, some movement and at least minor cracking in the structures and pavements could still occur. The severity of cracking and other cosmetic damage such as uneven floor slabs/pavements will probably increase if any modification of the site results in excessive wetting or drying of the expansive soils. Eliminating the risk of movement and cosmetic distress may not be feasible, but it may be possible to further reduce the risk of



movement if more extensive measures are used during construction. We would be pleased to discuss other construction alternatives with you upon request.

Rock Excavation

Based on the subsurface conditions encountered at the boring locations and the understood plan finished grades, we expect that localized rock (sandstone and shale) will be encountered during mass grading near Borings DH-G, K, N, O, and Q. Of particular notice is that sandstone was encountered at the ground surface at Boring DH-G and extended to a depth of about 5 feet below existing grade (elevation 427 ½ feet), at which depth auger refusal was encountered. The locations, depths, and elevations are also summarized in Table 1.

We expect that localized rock excavation measures will be required at and near these boring locations. Abrupt differential settlement could occur across the structure footprints where the footing foundations transition abruptly from bearing on existing fill materials, new fill, and native (Stratum I) soils into intact rock over short distances. For this condition, special design recommendations will be required for reducing the risk of abrupt differential settlement between the footing foundations.

Earthwork

Site Preparation

Mass grading should extend a minimum of 5 feet laterally outside of the structure footprints in all directions, at least 2 feet beyond the edges of the planned access road or back of curb, and within the footprints of the planned new slopes and detention areas.

At a minimum, surface organics and topsoil should be removed from the planned development area. We estimate a stripping depth of about 6 inches based on the results of the borings. This depth does not include the depth to stump and grub existing trees, if present at the project site. The topsoil material may be stockpiled and reused for landscaping, at the discretion of the design team.

The existing concrete slabs and pavements as well as any other surface or subsurface structures associated with previous site use should be removed full depth from the planned area of development. Excavations to remove these structures should be backfilled as recommended in this report. The existing concrete slabs and pavements may be crushed, stockpiled, and reused as fill material in non-structural areas, at the discretion of the design team.

Buried utility lines should be relocated or abandoned, as necessary. Excavations after removing buried utilities should be backfilled with new select fill as recommended in this report. Abandoned utility lines should be grouted and plugged.



It is our experience that properties with previously existing structures, especially where mass grading has occurred, have a higher potential for encountering unknown conditions during mass grading and construction. These conditions include backfilled excavations, trash pits (buried debris), concrete foundations as well as underground utilities associated with previous structures.

Recommended Undercuts

After completing the cuts necessary for mass grading, we recommend undercutting any remaining existing fill materials and low-strength soils within the planned structure footprints as well as in the planned access drive alignment. As discussed in the Geotechnical Considerations section, we estimate localized undercut depths on the order of 1 to 8 ½ feet below plan finished grade (elevation 423 feet) could be necessary to remove the existing fill materials and low-strength soils full depth. The locations, depths, and elevations are summarized in Tables 2 and 3.

If the owner elects to leave the existing fill in place beneath the pavement areas or aggregate-surfaced areas where structures are not planned, we recommend constructing a minimum 1-foot thick layer of select fill beneath the aggregate/pavement section for more uniform support. The recommended 1-foot-thick layer of select fill could be achieved by a combination of undercutting 1 foot below plan finished subgrade elevations and/or raising grades. We expect that this recommended layer of select fill will likely already be in place where fill is required for grading.

As discussed, localized areas of fat clays could be exposed after initial mass grading. We recommend that GTS evaluate the subgrade for the presence of the fat clay soils. Where fat clay soils are exposed in the structure subgrade, we recommend also undercutting them to a depth of at least 1 foot below plan finished subgrade elevation.

Lastly, shale and sandstone could be exposed at final grade in the vicinity of Borings DH-G, K, N, O, and Q as presented in Table 1. We recommend undercutting any intact rock to a depth of at least 1 foot below plan finished subgrade elevation where grade-supported slabs/structures are planned to a depth of at least 1 foot below design footing/mat foundation bearing elevation beneath shallow foundations. The rock undercut should be backfilled with select soil fill materials to provide a soil cushion for more uniform foundation settlement.

General Mass Grading

After stripping the topsoil, undercutting low-strength soils, existing fill materials, fat clays, and intact shale/sandstone where exposed, completing the recommended 1-foot undercut as discussed above in aggregate/pavement areas, and before placing new fill, the subgrade should be evaluated by GTS. The topsoil material may be stockpiled and reused for landscaping, at the discretion of the design team.



The exposed soils should be evaluated for stability through proofrolling with a loaded, tandem-axle dump truck weighing at least 25 tons. If the excavations for the planned structures will be too steep, limited by size, and/or inaccessible to proofrolling equipment, GTS should test and evaluate the exposed soils by using hand probes, cone penetrometer tests, and dynamic cone penetrometer tests.

Where unstable soils are identified by proofrolling or other methods, they should be scarified, moisture conditioned, and compacted, or removed and replaced full depth with new select fill if they cannot be stabilized in place.

After proofrolling and removing and replacing any unstable or unsuitable soils, the exposed subgrade soils within 2 feet of finished subgrade elevations should be scarified a minimum depth of 9 inches, moisture conditioned and compacted as recommended in the Geotechnical Report Requirements and Specifications section of this report. After scarification and compaction, the exposed soils are suitable for the placement and compaction of new approved, select fill material. Subgrade soils exposed deeper than 2 feet of finished subgrade elevation will not require scarification and compaction prior to fill placement provided they are stable.

If the prepared subgrade should become saturated, desiccated, frozen, or otherwise damaged prior to construction of the on-grade slabs and pavement sections, the affected subgrade material should be scarified, moisture-conditioned and compacted prior to placing the aggregate base course. Final conditioning of the finished subgrade should be performed immediately prior to placement of the slab-on-grade and pavement aggregate base course material.

Weather and Instability Considerations

Soil stability is directly related to the moisture within and below the exposed soils. If the on-site, existing fill materials and Stratum I soils are moist to wet or have undergone freeze-thaw cycles after mass grading and/or placement and compaction, we anticipate that these soils will likely be unstable and ground improvement will be required.

If the exposed subgrade soils are unstable but otherwise suitable to remain in-place based on their classification or depth below plan finish grades, they may be scarified and allowed to dry to achieve stability if the construction timeframe and prevailing weather conditions allow. Alternatively, the unstable soils could be undercut and replaced full depth with new fill. For budgeting purposes, an average undercut depth of 2 feet below existing grade is anticipated when the on-site soils are moist to wet, excluding the undercuts to remove the existing fill and already encountered low-strength soils.



Fill Material Type

Engineered fill should meet the following material property requirements:

Table 4: Engineered Fill Property Requirements

Fill Type ¹	USCS Classification	Acceptable Location for Placement
Select ²	CL, SC, SP, SP-SC, SW, GC, GP, GP-GC, GW (LL < 45 and 7 < PI < 20)	All locations and elevations
On-Site Soils and Existing Fill Materials	CL-ML, CL-CH, CH, ML	At least 4 feet below plan finished subgrade elevations in structural areas (see below) Non-structural areas
	CL, GC, SC Excavated Rock (LL < 45 and 7 < PI < 20)	All locations and elevations (see below)
1. Controlled, compacted fill should consist of approved materials that are free of organic matter and debris and contain maximum rock size of 3 inches. Frozen material should not be used, and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to its use. 2. An approved aggregate base, such as ARDOT Class 7 aggregate base course material, can also be used as <u>select</u> fill material.		

Based on the results of the laboratory testing, the on-site, existing fill and native Stratum I soils consisting of silty clay (CL-ML) and silt (ML) should not be re-used as select fill due to their sensitivity to moisture increases as well as frost action. The lean clays (CL), sand, and gravel soils (portions of existing fill and Stratum I) could be re-used as select fill if they can be separated during mass grading and excavation or they are thoroughly mixed, then tested and approved meeting the requirements above.

Sticks and an apparent stump were encountered within some of the existing fill materials. The on-site existing fill materials should not be re-used as select fill if they contain a noticeable amount of organics or debris (greater than 10 percent by visual inspection). GTS should observe any existing fill materials containing deleterious materials to evaluate the suitability of their re-use.

As a cost-savings measure, the existing fill materials consisting of the silty clay, lean to fat clay, fat clay, and silt soils as well as native soils classifying as CL-ML, CL-CH, CH, and ML soils in accordance with the USCS could be placed as engineered fill at depths below 4 feet below plan finished subgrade elevations in structural areas provided that they are constructed to meet the compaction requirements recommended in this report.



We anticipate that the on-site fill materials and Stratum I soils will be intermixed during mass grading. We anticipate that the intermixed soils will likely meet the fill specifications for select fill. Larger, bulk samples of the on-site soils proposed for use as fill by the contractor should be thoroughly mixed, then sampled by GTS during mass grading, and laboratory tested to confirm the apparent classification of these soils, prior to re-use.

Imported soils should be tested and approved before use for fill material. Fill containing rock (both on-site, existing fill and imported fill materials) will need to be crushed into pieces no greater than 3 inches in any dimension prior to reuse.

Compaction Requirements

The scarified and compacted subgrade and any engineered fill should be moisture conditioned and compacted using recommendations provided in Table 5 below.

Table 5: Fill Placement and Compaction Recommendations

ITEM	DESCRIPTION
Subgrade Scarification Depth	9 inches
Fill Lift Thickness	9 inches or less in loose thickness
Compaction Requirements ¹ (Soil meeting requirements of Table 4)	At least <u>98%</u> of the material's maximum Standard Proctor dry density (ASTM D698) within -2 to +2% of optimum moisture content
Compaction Requirements ¹ (Crushed rock having a maximum dimension of 3 inches)	At least <u>98%</u> of the material's maximum Standard Proctor dry density (ASTM D698) within 0 to +4% of optimum moisture content
Compaction Requirements (Aggregate Base)	At least 95% of the material's maximum Modified Proctor dry density (ASTM D1557) at workable moisture content ²
<ol style="list-style-type: none"> 1. We recommend that engineered fill (including scarified compacted subgrade) be tested for moisture content and compaction during placement. 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. Moisture content sufficient to achieve satisfactory compaction without causing pumping when proofrolled. 	

Earthwork Construction Considerations

Upon completion of filling and grading, care should be taken to maintain the subgrade moisture content prior to construction of foundations, grade-supported slabs, and pavement sections.



Construction traffic over the completed subgrade should be avoided to the extent practical. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. If the subgrade should become frozen, desiccated, saturated, or disturbed, the affected material should be reworked.

For the on-site soils, or imported soil fill, shrinkage factors on the order of 10 to 15 percent should be anticipated from undisturbed in-place borrow volume to compacted in-place volume.

Rock Excavation Considerations

We generally anticipate that the existing fill materials and Stratum I soils could be excavated using conventional earthwork equipment.

As discussed previously, highly weathered shale (Stratum II) was encountered at the ground surface at Boring DH-G and at depths of about 2 to 3 feet at Borings DH-Z and DH-CC. Elsewhere, difficult drilling conditions were generally encountered at depths of about 8 ½ to 23 ½ feet below existing grade. Overall, auger refusal was encountered at depths of about 5 to 24 feet below existing grade. The depths and elevations to hard drilling and auger refusal at each boring location are summarized in Table 1.

We anticipate that difficult excavation could likely be encountered within portions of the existing fill materials in the vicinity of Boring DH-B as well as in the highly weathered shale (Stratum II) and underlying shale-sandstone (Stratum III). We anticipate that heavy-duty track hoes and excavation equipment will be required to excavate these materials. We also expect that hydraulic or pneumatic rock hammers/breakers will be required to excavate the sandstone encountered at Boring DH-G. Greater excavation effort is expected in limited access excavations, such as for foundations and utility trenches, when excavating the existing gravel fill materials.

Temporary excavations will probably be required during grading operations. The grading contractor, by his contract, is usually responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required, to maintain stability of both the excavation sides and bottom. At a minimum, all temporary excavations should be sloped or braced as required by Occupational Safety and Health Administration (OSHA) regulations to provide stability and safe working conditions.

Shallow Mat and Footing Foundations

Based on the subsurface conditions encountered at the boring locations and the plan finished grade elevation of 423 feet, we expect that most of the existing fill materials and low-strength soils will be removed during mass grading. As discussed in the Geotechnical Considerations section, localized areas of ground improvement will be necessary after initial mass grading to support the



footing and mat foundations for the generating station structures and equipment, tanks, and any buildings.

Additionally, rock excavation could be required where rock is exposed in the bottom of the foundation excavation (anticipated near Borings DH-G, K, N, O, and Q). As previously stated, we recommend undercutting any intact rock exposed in the bottom of the foundation excavations at least 1 foot below the design bottom of foundation elevation. The resulting undercut should be backfilled with engineered soil fill materials constructed as recommended in this report.

The following design recommendations are provided for designing and constructing footing/mat foundations bearing on new engineered fill materials after replacing the existing fill materials and low-strength soils full depth, undercutting any rock, and/or on tested and approved, native very stiff Stratum I clay soils. We can discuss these recommendations and other alternatives with you after more information and plans are available for the planned structures.

Observation and testing will be required during foundation construction to confirm suitable bearing materials are encountered. Design recommendations for mat or footing foundations for the proposed structures are presented on the next page and the following paragraphs based on the full-depth overexcavation and replacement of the existing fill materials and any low-strength soils.



Mat and Footing Foundation Design Recommendations

Table 6: Mat and Footing Foundation Design Parameters

Description	Mat or Slab Foundation
Maximum net allowable bearing pressure ¹	3,000 psf on New Engineered Fill and/or on Very Stiff, Native Stratum I Clay Soils
Minimum width	30 inches
Minimum embedment (depth below final adjacent grade) ²	18 inches
Estimated total settlement ³	1 inch
Estimated differential settlement	½ inch between foundations in the same structure 1 inch between structures
Allowable passive pressure ⁴	750 psf
Coefficient of sliding friction ⁵	0.35
<p>1. The net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the mat or slab foundation base elevation. The recommended allowable bearing pressures include a factor of safety of approximately 3. The recommended allowable bearing pressures can be increased by 1/3 under transient seismic or wind live loads.</p> <p>2. Minimum depth will provide frost protection.</p> <p>3. Estimated total settlement depends on foundation sizes, bearing pressures, and bearing materials beneath the foundations. The estimated total settlements in the table are based on supporting the foundation on compacted and tested, new engineered fill after removing existing fill and low-strength soils full depth. We assumed a 15-foot by 15-foot mat or slab foundation with uniform sustained recommended bearing pressures for this analysis.</p> <p>4. Allowable passive pressure values are based on a factor of safety of 2. Passive pressure values apply to tested and approved, new engineered fill. If formed footings are constructed, the space between the formed side of a footing and excavation sidewall should be cleaned of all loose material, debris, and water and backfilled with tested and approved, engineered fill material compacted to at least 98 percent of the material's Standard Proctor dry density. Passive resistance should be neglected for the upper 3 feet of the soil below the final adjacent grade due to strength loss from freeze-thaw and seasonal moisture variation.</p> <p>5. Coefficient of friction values are ultimate values and do not contain a factor of safety. Sliding resistance between the base of the foundation and the bearing soils should not be used for uplift conditions.</p>	

If a Winkler-type subgrade modulus model is utilized to model the mat response to load, a subgrade modulus (k) of 80 pounds per cubic inch (pci) can be utilized for tested and approved, engineered fill. The recommended subgrade modulus value is for a 12-inch square plate and is based on correlation with soil type and consistency.

As an alternative, the long-term modulus of subgrade reaction value could be used for design (defined as k_s' in Foundation Analysis and Design, 5th Edition, page 548, by Bowles). The long-term modulus of subgrade reaction considers both immediately elastic settlement and long-term consolidation settlement. We recommend using a long-term modulus of subgrade reaction value of 20 psi/inch. The recommended long-term modulus of subgrade reaction value is for a 30-inch diameter round plate.

The mat or slab foundations can provide uplift resistance for those structures subjected to wind or other induced structural loading. The uplift resistance of a mat or slab foundation may be computed using the effective weight of the soil above the foundation along with the weight of the foundation and structure. A soil unit weight of 110 pcf may be assumed for the on-site soils placed above the foundation, provided the fill is properly compacted. If this value is critical to the design, the soil unit weight value can be further refined after the type of fill material is known and moisture-density relationship tests have been performed.

Settlement Analysis for Specific Foundations

AECC provided us foundation information for three specific foundation systems: Combustion Turbine & Generator, SCR & Stack, and Transformers. The specific foundation structure information is shown in the following Figure 2 from an excerpt of the document provided to us by AECC.

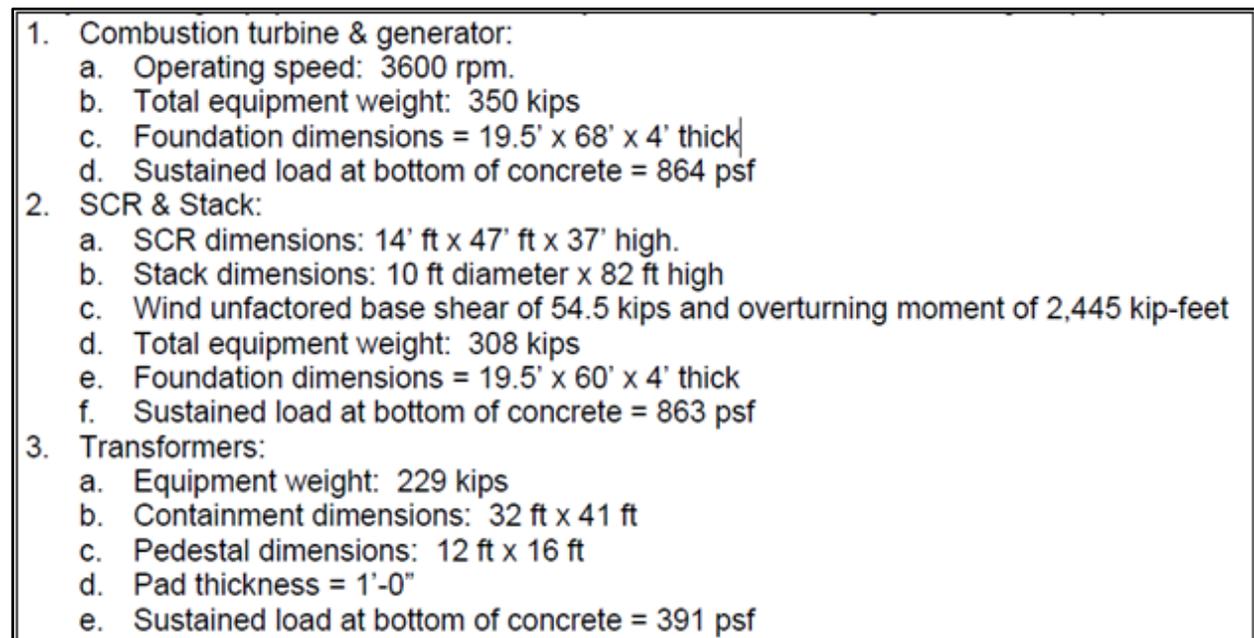
- 
1. Combustion turbine & generator:
 - a. Operating speed: 3600 rpm.
 - b. Total equipment weight: 350 kips
 - c. Foundation dimensions = 19.5' x 68' x 4' thick
 - d. Sustained load at bottom of concrete = 864 psf
 2. SCR & Stack:
 - a. SCR dimensions: 14' ft x 47' ft x 37' high.
 - b. Stack dimensions: 10 ft diameter x 82 ft high
 - c. Wind unfactored base shear of 54.5 kips and overturning moment of 2,445 kip-feet
 - d. Total equipment weight: 308 kips
 - e. Foundation dimensions = 19.5' x 60' x 4' thick
 - f. Sustained load at bottom of concrete = 863 psf
 3. Transformers:
 - a. Equipment weight: 229 kips
 - b. Containment dimensions: 32 ft x 41 ft
 - c. Pedestal dimensions: 12 ft x 16 ft
 - d. Pad thickness = 1'-0"
 - e. Sustained load at bottom of concrete = 391 psf

Figure 2: Foundation Structure Information



Based on the provided information and the subsurface conditions anticipated after completing grading to reach EL 423 feet, we estimate total settlement of $\frac{3}{4}$ inch and differential settlement of $\frac{1}{2}$ inch between individual foundations for these specific structures.

We also performed settlement analyses for the planned storage tanks having a diameter of 52 feet and assuming a mat foundation system designed using a maximum allowable bearing pressure of 3,000 psf. We estimate a total settlement of $1 \frac{1}{2}$ inch at the tank center and 1 inch at the edge of tank. Again, the settlement results are based on the subsurface conditions anticipated after completing grading to reach EL 423 feet and a 4-foot foundation bearing depth.

Construction Considerations for Mat or Footing Foundations

The base of all shallow foundation excavations should be free of water, loose soil and rock and debris at the time of concrete placement. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Should the soils at bearing level become excessively wet or dry, disturbed, or frozen, the affected depth of soil should be removed prior to placing concrete. GTS should be retained to observe and test the soil foundation bearing materials to confirm that suitable bearing materials are encountered.

If unsuitable bearing soils are encountered at the bottom of foundations, the mat/footing foundation excavations should be extended deeper to expose suitable soils. Overexcavation below the bottom of foundations should extend laterally beyond all edges of the mat/slab at least 8 inches per foot of overexcavation depth, as shown in Figure 3 on the following page. If flowable fill is used, it is not necessary to extend foundation excavations laterally beyond the footing perimeter. The overexcavation should then be backfilled with approved soil fill material meeting the requirements of Tables 4 and 5 of this report, aggregate base course material, or flowable fill.

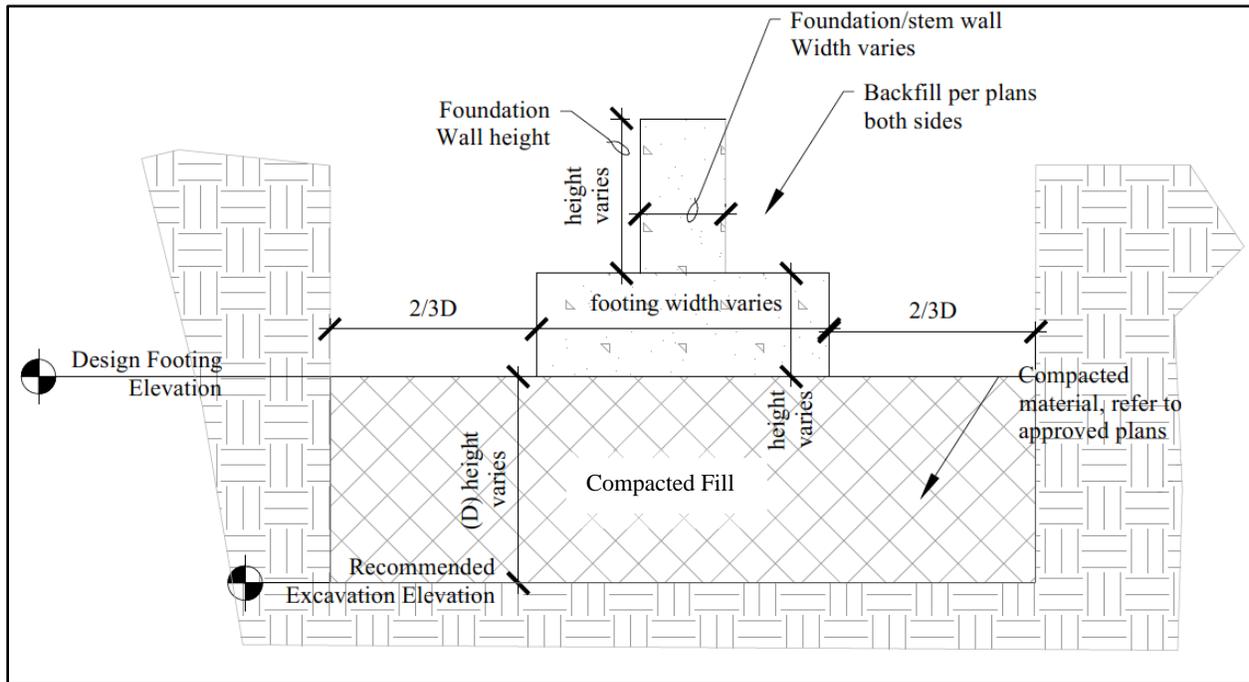


Figure 3: Foundation Backfill Detail for Soil and Aggregate Base Material

Compacted, approved, select soil fill material, aggregate base material, and flowable fill material (i.e., “lean concrete”) may be used to backfill foundation overexcavations, where required. Specifications regarding these approved materials are shown in the Geotechnical Report Requirements and Specifications section of this report. Flowable fill material should have a minimum compressive strength of 400 psi.

Only select soil fill should be used to backfill foundation overexcavations where intact rock is encountered. Flowable fill and aggregate base material should not be used as foundation backfill material where rock is undercut due its limited compressibility.

Where new select fill and aggregate base material is constructed as backfill in footing excavations, the backfill material should be compacted with a jumping jack or similar type of compaction equipment. After compaction, the fill exposed in the bottom of foundation excavations should be retested for in-place density each lift every 25 feet of continuous foundation length, at every individual column foundation location, and again immediately before the placement of reinforcing bar and concrete.

Drilled Pier Foundations

As outlined previously, depending on the actual structural loads and sensitivity to settlement, drilled pier foundations could be used to support some of the structures, such as transmission pole structures. Subsurface conditions at the site are generally favorable and practical for

installing straight-shaft (non-underreamed) drilled piers bearing in the Strata II and III shale and sandstone first encountered at depths of about 8 ½ to 13 ½ feet below existing grade at most boring locations. Recommendations for straight-shaft piers are provided in the following sections.

Axial Loading

Compressive axial loads on pier foundations are resisted by both skin friction along the shaft and by end bearing at the base of the shaft, while uplift loads are resisted by skin friction along the shaft and by the weight of the shaft.

Recommended ultimate skin/side friction and ultimate end bearing pressure for each soil/rock layer are provided on Tables A.1 and A.2 in Appendix C of this report. Based on the similar soil and rock conditions encountered at the boring locations, we developed a generalized geotechnical profile for the soil and rock parameters relative to the existing grades and a finished grade of 423 feet. More specific soil/rock parameters can be provided upon request for the planned structures once design plans are more developed. The soil and rock parameters provided in the tables are intended to be used for new fill, existing fill, and undisturbed native soil/rock.

The recommended ultimate end bearing pressure is based on a minimum penetration of 2 feet or one pier diameter, whichever is greater, into the recommended shale material. **Additionally, drilled piers should be founded at least 10 feet below final grade or to a depth to satisfy a minimum length to diameter ratio of 3 (length):1 (diameter) for the constructed pier or to satisfy the design loading conditions, whichever depth is greater.**

Based on the weathering of the shale, we expect that the pier foundation bearing in shale will mobilize sufficiently to develop skin friction in the soils. A combination of end bearing and skin friction could be used for designing pier foundations. Uplift reduction factors of 0.9 for clay soils and 1.0 for intact rock.

We recommend that an appropriate factor of safety be applied to the ultimate skin friction and bearing pressure values. Generally, a factor of safety of three (3) is applied to end bearing, two (2) to side shear (skin friction), and two (2) to uplift (tension). The actual factors of safety should be chosen by the foundation designer and will depend on several factors including: the type of structure, location of the structure, intended performance of the structure, use of the structure, and applicable code requirements.

Settlement due to compression loading is expected to be less than ½ inch for drilled pier foundations bearing in shale or sandstone, designed and constructed as recommended in this report. Settlement of drilled piers will be more sensitive to installation techniques than to soil-structure interaction.

Lateral Loading

A number of methods, including hand solutions and computer programs, are available for calculating the lateral behavior of drilled piers. The majority of these methods rely on key soil and rock parameters such as elastic properties (E , E_{ri} , k_s , and k_{rm}), strain at 50 percent of the principal stress difference (ϵ_{50}), undrained shear strength (c_u), angle of internal friction (ϕ), and load-deflection (p-y) criteria. The p-y criteria, which are commonly used to model soil reaction, were developed from instrumented load tests and are generally considered to provide the best model of soil behavior under short term lateral loading. It should be noted that the p-y criteria are not only a function of the soil properties but also the diameter of the structure foundation.

The majority of p-y curve models use a parabolic shape to describe the initial portion of a p-y curve; at small deflections the slope of these p-y curves approach infinity. The initial secant modulus, E_s , is used to prevent the initial slope of the p-y curve from becoming too steep. This is an important consideration, since most laterally loaded pile analysis programs use p-y curves to develop equivalent soil springs in their computations. These soil springs are defined as the soil reaction, p , divided by the soil deflection, y .

Factors of safety are not generally applied to the lateral load analysis. A performance criterion, or “limit state” is usually considered. The analysis is generally conducted using the working loads and the limit state values. The applied loads are then doubled to evaluate the deflection and rotation at the top of the pier to determine if the foundation will topple over under extreme overload. This overload condition may indicate that the foundation would deflect or rotate such that the tower will tilt but not experience failure.

The choice of the final design embedment depth is also evaluated by determining the critical depth of the foundation. The critical depth is a depth range and can be defined as that range in depth at which a small decrease in the pier embedment depth will result in a large increase in the groundline deflection of the pier. The analysis is conducted by incrementally decreasing the embedment depth and plotting the resultant groundline deflection versus embedment depth. The embedment depth is then chosen below the critical depth range.

Soil and rock parameters for the LPILE2019 program are provided in Tables B.1 and B.2 in Appendix C. Soil and rock parameters for the FAD series programs are provided in Tables C.1 and C.2. The parameters provided on these tables can be used for the in-place existing fill, undisturbed native soils, and rock.

For on-site soils and imported fill material placed and compacted as recommended in this report, the following soil parameters may be used.



Table 7: Soil Parameters for Compacted Fill Materials

Soil Type	Unit Weight (pcf)	Undrained Soil Shear Strength (psf)	Internal Friction Angle (degrees)	Ultimate Skin Friction (psf)	LPILE k Value (pci)	LPILE Strain Factor ϵ_{50}	FAD Deformation Modulus (ksi)
Granular Soils	120	0	30	48 psf/ft	100	---	1.0
Low Plasticity Clay Fill	120	1,500	0	825	500	0.008	1.0

We estimated the modulus of deformation values for soil presented for use with FAD software using published correlations in the MFAD 5.0/HFAD 5.0 software manual.

The near-surface soils will be prone to strength loss due to the effects of moisture variation, freeze/thaw, and drilling disturbance. The frost depth in the project area is less than 18 inches. The shear strength and deformation modulus values provided in the tables are based on the soil strength at the time our boring was drilled and have not been reduced for the effects of moisture variations, freeze/thaw, or drilling disturbance. To account for these potential effects, we recommend that the top 3 feet or one pier diameter of soil, whichever is less, below the final adjacent grade be neglected for lateral support.

Drilled Pier Construction Considerations

Drilled pier installation should be performed as discussed in this report and in general accordance with the recommendations in the FHWA Publication No. FHWA-NHI-10-016, titled “Drilled Shaft: Construction Procedures and LRFD Design Methods”, dated May 2010.

Free water was observed at depths of about 4 to 15 feet below existing grade at Borings DH-D, DH-M, DH-R, and DH-W. Free water was not observed in the remaining borings during the field exploration. We interpret that the shallow water was likely perched within the existing fill materials and near the soil-rock interface after the heavy rain events that occurred prior to and during the field exploration. If water is encountered in pier excavations, we anticipate that water can be removed by using suction pumps for pier depths less than 20 feet. If water cannot be removed in the excavations by pumping, the concrete should be tremied completely to the bottom of the excavation with a closed-end tremie.

Based on the subsurface conditions encountered in the borings, temporary casing is not expected to be necessary but should be made available in case site conditions change from those observed at the boring locations. The contractor should determine if temporary casing is required based on subsurface conditions encountered during construction. Care should be taken so that the sides and bottom of the excavations are not disturbed during construction.



If temporary casing is used, a concrete slump of at least 6 inches is recommended to facilitate casing removal. Care should be exercised while removing the casing to maintain concrete inside the casing at a sufficient level to resist earth and hydrostatic pressures acting on the casing exterior. Arching of the concrete, loss of seal and other problems can occur during casing removal and result in contamination of the drilled shaft. These conditions should be considered during the design and construction phases. Placement of loose soil backfill should not be permitted around the casing prior to removal. If water cannot be removed in the excavations by pumping, the concrete should be tremied completely to the bottom of the excavation with a closed-end tremie.

The depths and elevations to shale and sandstone (Strata II and III) are summarized in Table 1. A rock auger with rock teeth or a rock coring bit will likely be needed to penetrate the weathered shale and sandstone. A rock coring bit will likely be required to penetrate the shale and sandstone below the auger refusal depths, where encountered.

The bottom of the foundation excavation should be free of loose material and water at the time of concrete placement. Concrete should be placed as soon as possible after the foundation excavation is completed to reduce the potential disturbance of the bearing surface.

GTS should observe all drilled pier excavations to evaluate the suitability of the bearing materials and to confirm that conditions in the drilled pier excavations are consistent with those encountered in the test borings. If unsuitable materials are encountered at planned depths, it may be necessary to deepen the excavations.

IBC Site Classification

Based on our knowledge of the regional geology, the subsurface conditions encountered at the boring locations as well as preparing the subgrade as recommended in this report, the subsurface conditions at this project site are consistent with a Site Class C per the International Building Code (IBC), 2021 Edition.

The 2021 International Building Code (IBC) uses a site profile extending to a depth of 100 feet for seismic site classification. The deepest boring performed at this site was extended to a maximum depth of approximately 27 ½ feet and terminated in soft shale. The subsurface conditions below the boring depth to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area. Additional deeper borings or geophysical testing may be performed to confirm the conditions below the current boring depth. These supplemental services could be provided upon request.

The following mapped acceleration parameters may be used in design based on a Risk Category II and Site Class C.

- S_s : 0.189g
- S_1 : 0.100g
- F_a : 1.3
- F_v : 1.5
- S_{DS} : 0.164g
- S_{D1} : 0.100g
- PGA_M : 0.119g

These values were obtained using on-line seismic tools provided by the USGS (<https://seismicmaps.org>) at the site location coordinates of Latitude: 35.465450°, Longitude: -93.805250°.

Alkali-Silica Reaction Considerations

Based on FHWA Publication FHWA-RD-03-047, titled “Guideline for the Use of Lithium to Mitigate or Prevent Alkali-Silica Reaction (ASR)”, there was a reported case of ASR near Fort Smith, Arkansas. There are also well known, recent cases of ASR-associated deterioration along the concrete barriers on Interstate I-49 between Alma and Chester, Arkansas and along the main runway at the Northwest Arkansas Regional Airport (XNA). The main runway at XNA airport was replaced due to ASR in 2011.

The planned source of the aggregates to be used at the project are not known to GTS, Inc. and have likely not been determined yet by the design team. The following sources may be consulted to help determine if the proposed aggregates are potentially reactive regarding ASR:

- AASHTO Guide Specification for ASR –Resistant Concrete
- Arkansas Highway and Transportation Department (AHTD) Personnel, AHTD Records
- QA/QC Personnel for Aggregate/Concrete Supplier.

If it is determined that aggregates proposed for use in concrete at this site have a history of ASR, then one of the following should be incorporated in the concrete used for the foundations:

Option 1: Replace 20 to 35% of the cement with Class C or Class F fly ash. However, if sulfate resistant concrete is required, do not use a Class C fly ash and do not use Type I Portland cement.

Option2: Use a lithium nitrate admixture at a minimum dosage of 0.55 gallons of 30% lithium nitrate solution per pound of alkalis present in the Portland cement. Coordinate with admixture supplier.



Option 3: When using Portland cement only, ensure that the total alkali contribution from the cement in the concrete does not exceed 4.00 lb. per cubic yard of concrete when calculated as follows:

$$\text{Pounds of alkali per cu yd.} = (\text{pounds of cement per cu yd}) \times (\% \text{Na}_2\text{O equivalent in cement}) / 100$$

In the above calculation, use the maximum cement alkali content reported on the cement mill certificate.

Option 4: Test the proposed cementitious materials – aggregate mix in accordance with ASTM C1567. Before use of the mix, provide the certified test report, signed and sealed by a licensed professional engineer, demonstrating that mortar bar expansion at 16 days exposure per ASTM C1567 does not exceed 0.10%.

Aggregate-Surfaced Pavements

We anticipate that a new aggregate-surfaced access road as well as the open areas surrounding the generating station structures will be covered by aggregate base or crushed rock gravel materials. Subgrade preparation and fill construction in the aggregate-surfaced pavement areas should be performed in accordance with the recommendations included in the “Earthwork” section of this report.

No traffic design information was available to GTS at the time of preparing this report. For the haul road, we assume that construction traffic will consist of 1,200 passes by loaded dump trucks, 800 passes by front-end loaders, 800 passes by heavy, tracked construction equipment (e.g., dozers and track hoes), and 120 passes by loaded tractor-trailers hauling construction equipment. We also assume a rut depth of 1 inch for our design. For the standard yard surface, we assume that the traffic will consist of periodic service vehicles after construction is completed. These assumptions should be evaluated by the design team prior to using the aggregate-surfaced pavement recommendations provided in this report.

For long-term separation and improved stability, we recommend placing a layer of non-woven geotextile fabric, such as Tencate Mirafi 140N or equivalent, between the prepared subgrade and the aggregate base course layer. We recommend placing a Type II biaxial geogrid, triaxial geogrid, or equivalent above the geotextile for reinforcing the aggregate base course material for the aggregate-surfaced pavement. However, we also understand that the use of the geotextile and geogrid could impede the grounding grid and utilities, so their use is not expected at this facility. However, the pavement alternatives using a geogrid are still being provided for consideration.



Aggregate-surfaced pavement section alternatives are presented in Table 8 below. Other pavement sections could be considered based on the actual traffic loading conditions once design plans finalize.

Table 8: Recommended Aggregate-Surfaced Pavement Section Alternatives

Traffic Type	Reinforcement	Aggregate Base Thickness
Standard Yard	Unreinforced	12 inches
	Biaxial Class II Geogrid or Triaxial Geogrid	8 inches
Construction Haul Road/Access Road	Unreinforced	24 inches (Constructed in 3, 8-inch lifts)
	Unreinforced	12 inches (Constructed in 2, 6-inch lifts) over 12 inches B Stone
	Biaxial Class II Geogrid or Triaxial Geogrid	12 inches

The aggregate base materials should comprise crushed aggregate base meeting the requirements of ARDOT Class 7 aggregate base as defined in Section 303 of the ARDOT Standard Specifications for Highway Construction, 2014 Edition.

The aggregate base should be placed in maximum 9-inch loose lifts and compacted to at least 95 percent of the material’s Modified Proctor maximum dry density (ASTM D1557) at a workable moisture content. We recommend that the finished aggregate-surfaced pavements be properly sloped to facilitate drainage of surface water and to minimize infiltration of surface water into the base layer which may result in ponding and weakening of the underlying subgrade.

Generally, aggregate-surfaced pavements will be subjected to progressive segregation and erosion during service. Routine maintenance of the in-service pavement will be required to replace aggregate and fines lost from erosion to maintain pavement grade, slope, and layer thickness as well as to address localized distresses such as rutting and shoving of the aggregate surface.

Site Drainage

The performance of the foundations, on-grade slabs, and aggregate-surfaced pavements will not only be dependent upon the quality of construction but also upon the moisture content of the near surface soils. We recommend that positive drainage be developed adjacent to all foundations, equipment slabs-on-grade, and pavements so ponding of surface water near the structures does not occur. We recommend that a minimum 1 percent slope be maintained away from all



foundations/slabs. Accumulations of water near foundations/slabs may cause significant moisture variations in the soils adjacent to the foundations and slabs, increasing the potential to weaken the soils and cause excessive movements of the foundations/slabs.

Temporary Earth Slopes and Excavations

Temporary earth slopes will be constructed during development of the project site. The recommended maximum temporary slopes for overburden soils are 2 H:1 V (Horizontal:Vertical) and for the deeper, harder shale and sandstone is nearly vertical. Alternatively, local construction practices allow for benched excavations (4 feet vertical followed by 4 feet horizontal) with an effective slope of 1H:1V.

The contractor, by his contract, is usually responsible for designing and constructing stable, temporary excavations and should shore, slope or bench the sides of the excavations as required to maintain stability of the excavation sides and bottom. All excavations should comply with applicable local, state and federal safety regulations, including the current Occupational Safety and Health Administration (OSHA) Excavation and Trench Safety Standards.

Permanent Earth Slopes

Constructed cut and fill earth slopes are generally understood to be planned at the project site. Table 9, below, summarizes recommended slopes for permanent cut and fill earth slopes with a maximum height of 10 feet at this project site. Slope stability analysis should be performed for steeper and/or taller slopes. GTS can provide these services after the final design plans have been completed, if interested.

Table 9 : Recommended Maximum Slopes for Permanent Earth Slopes

On-Site Materials	Recommended Maximum Slope ¹ (horizontal:vertical)
On-Site, Native Stratum I Soils	3H:1V
Intact Shale and Sandstone	0.5H:1V
Newly Placed and Compacted Fill Material ²	3H:1V
<p>¹ The given slope is based on maximum slope heights of 10 feet and without surcharge or flooding/saturation.</p> <p>² The given slope is recommended provided the fill material meets the requirements provided in the Geotechnical Report Requirements and Specifications section of this report</p>	



Dispersive Soil, Soil Collapse, Liquefaction, and Karst Formation

Based on our experience and the subsurface conditions encountered at the boring locations, the on-site soils (existing fill and native soils and shale) are not susceptible to dispersion or soil collapse. Based on the subsurface conditions encountered at the boring locations and the seismic acceleration parameters for this site, the soils are not liquefiable. Based on the local geology, sinkhole development and/or the presence of voids within the subsurface materials are not expected within the Atoka Formation shale and sandstone.

SUBSURFACE EXPLORATION and PROCEDURES

The subsurface exploration for this phase of the project included drilling and sampling a total of 29 borings, designated as Borings DH-A through DH-CC. The borings were drilled to depths of approximately 5 to 34 feet below existing grade. Six (6) borings were previously performed during the preliminary phase of the project. The boring logs from this recent exploration and the previous exploration are provided in Appendix A.

The boring locations were established in the field by AECC, and the latitude/longitude coordinates of the boring locations were provided to GTS. The approximate boring locations are shown on the Boring Location Diagrams provided in Appendix A. The ground surface elevations were also measured by others and provided to us by AECC. The surface elevations are shown near the top of the borings and are rounded to the nearest 0.1 foot. The locations and elevations of the borings should be considered accurate only to the degree implied by the methods used to define them. The results of the borings are provided in Appendix A.

The borings were drilled with a track-mounted Diedrich D-50 drill rig. The soils and rock (shale and sandstone) were sampled using split-barrel sampling procedures in general accordance with ASTM D1586. In the split-barrel sampling procedure, a 2-inch O.D. split-barrel sampler was driven into the boring with an automatic, 140-pound Standard Penetration Test (SPT) hammer falling 30 inches. We recorded the number of blows required to advance the sampler the last 12 inches of an 18-inch sampling interval, or the penetration after 50 blows. The number of blows is the standard penetration resistance value, N. This value is used to estimate the in-situ relative density of cohesionless soils, consistency of cohesive soils, and relative hardness of weathered rock.

An automatic SPT-hammer was used to advance the split-barrel sampler for this project. 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 augers used to advance the borings were able to penetrate the shale to depths of about 5 to 24 feet below existing grade. Upon encountering auger refusal at Borings DH-L, DH-S, DH-T, DH-V, and DH-AA, we cored the rock strata for a length of 10 feet using a double-walled, diamond faced, NX-size core barrel with water used as a drilling fluid. The cores obtained were placed in core boxes. We reported the core run length, percent recovery (REC), and the Rock Quality Designation (RQD) values for each run on the boring logs. Photographs of the sampled rock cores are provided in Appendix A.

Groundwater observations were also recorded while drilling, immediately after boring completion, and prior to rock coring. The borings were backfilled with the auger cuttings and bentonite chips after finishing the field exploration.



The samples obtained from the borings were identified by boring number and depth. The samples were placed in containers, transported to the GTS laboratory for further observation, classification, and testing.

The field logs were prepared by the drill crew during the drilling operation. The boring logs included visual classifications of the materials encountered during drilling and the drill crew's interpretation of the subsurface conditions between samples. The final boring logs include modifications based on observations and tests of the samples in the laboratory.



LABORATORY TESTING and PROCEDURES

The soil samples were examined in our laboratory by an experienced geotechnical engineer and classified based on the soil's texture and plasticity, in accordance with the Unified Soil Classification System. The estimated Unified Soil Classification System group symbols are shown on the boring logs.

Hand penetrometer tests were performed on select intact cohesive samples. Hand penetrometer test values are shown on the boring logs as filled squares.

The laboratory testing was performed in general accordance with the American Society for Testing and Materials (ASTM) test designations and other accepted standards shown in the following.

Table 10: Laboratory Test Methods

Laboratory Test	Test Designation	Method (if applicable)
Moisture Content of Soil	ASTM D2216-10	Method A
Visual Classification of Soil Types	ASTM D2488	
USCS Classification	ASTM D2487	
Atterberg Limits	ASTM D4318	Method A
Sieve Analysis	ASTM D1140	Method A

The results of the laboratory are presented on the boring logs and in Appendix B.



GEOTECHNICAL REPORT LIMITATIONS

The recommendations contained in this report are based on our interpretation of subsurface conditions encountered at the discrete boring locations. Variations between the subsurface conditions anticipated in this report and actual project site conditions may occur away from the boring locations.

If significant differences between the findings of the borings and site conditions are observed, GTS, Inc. should be contacted to assess the variation and, if necessary, reevaluate the recommendations contained in this report.

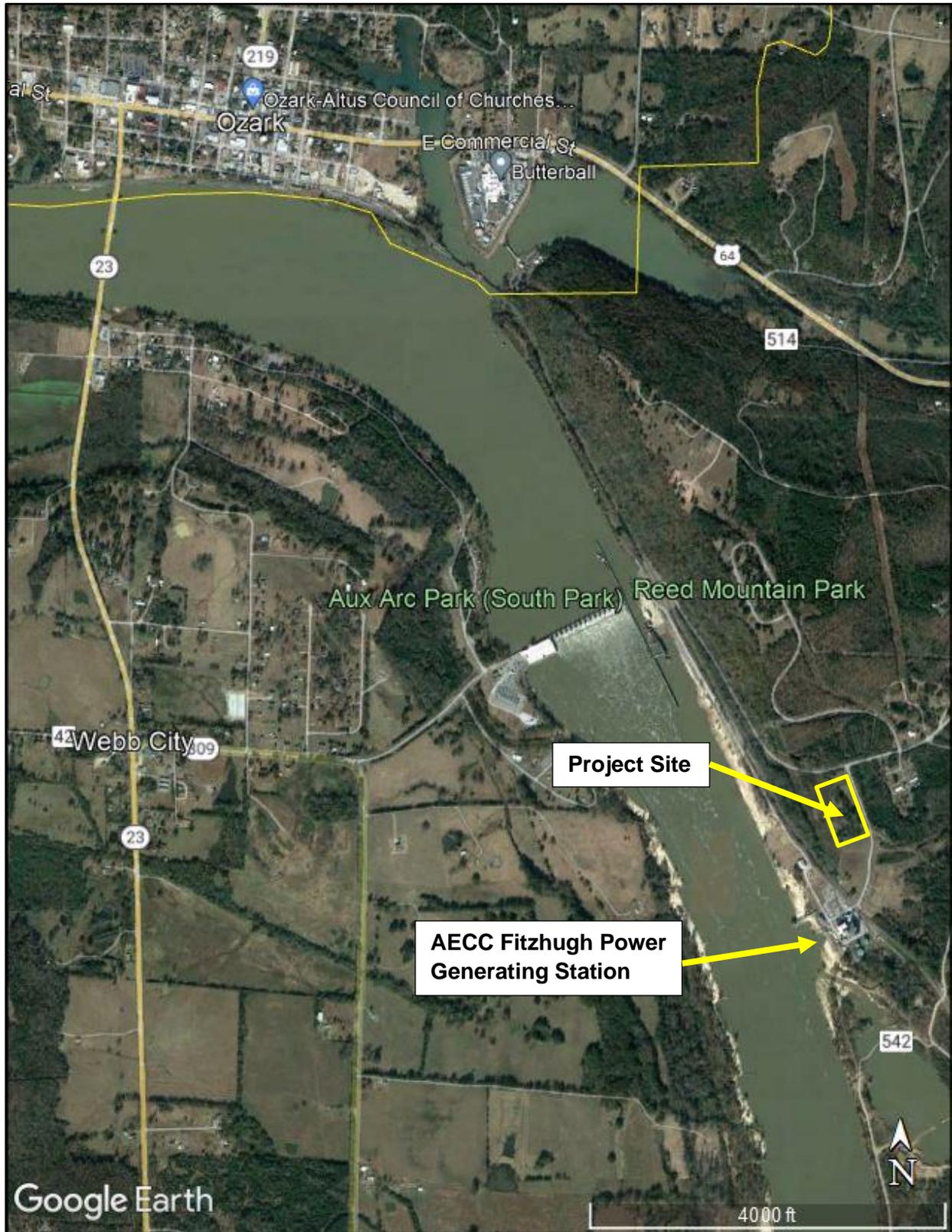
In addition, the involvement of GTS, Inc. during site grading and construction is encouraged to note differences between site conditions and anticipated conditions.

ENVIRONMENTAL EXCLUSION

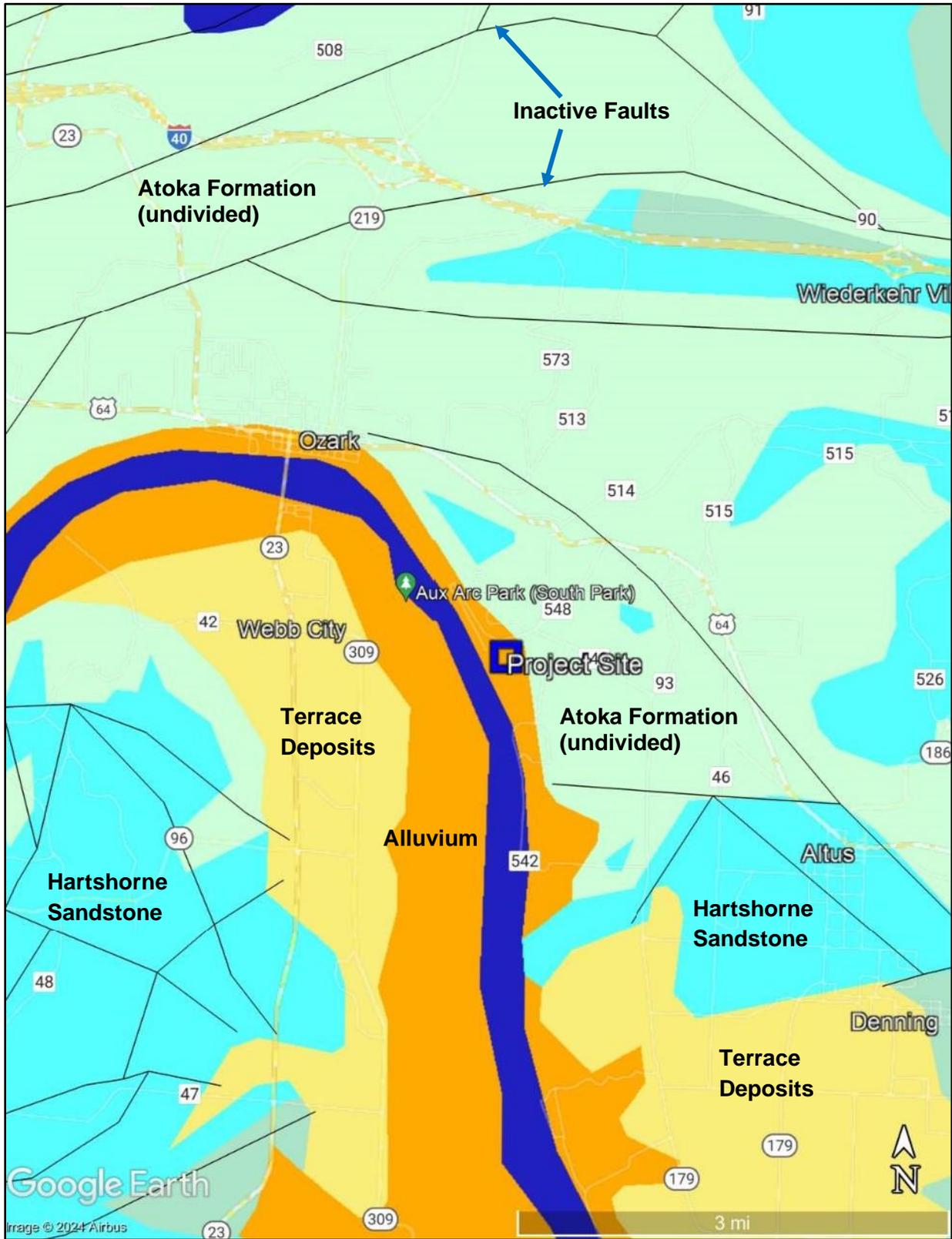
A Geotechnical Engineering Report assesses the engineering properties of soil and rock. No environmental assessment of a project site is performed during a geotechnical exploration. If the owner is concerned about the potential for environmental hazards at the project site, other studies should be undertaken.

APPENDIX A

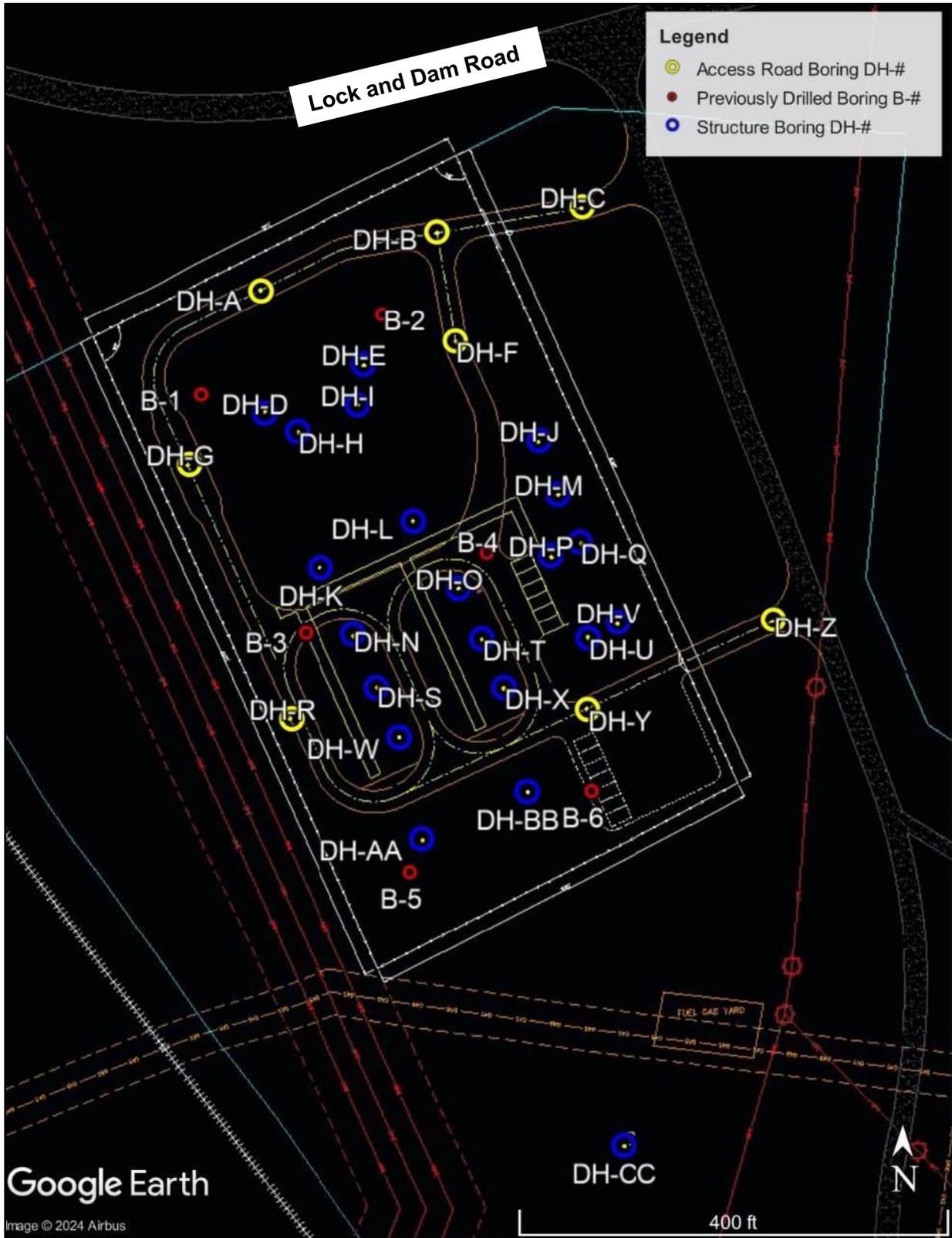
Vicinity Map
Geologic Map
Boring Location Diagrams
Boring Logs – Recent Exploration
Rock Core Photo Logs – Recent Exploration
Boring Logs – Previous Exploration
Rock Core Photo Logs – Previous Exploration
Soil Classification Legend
Rock Classification Legend



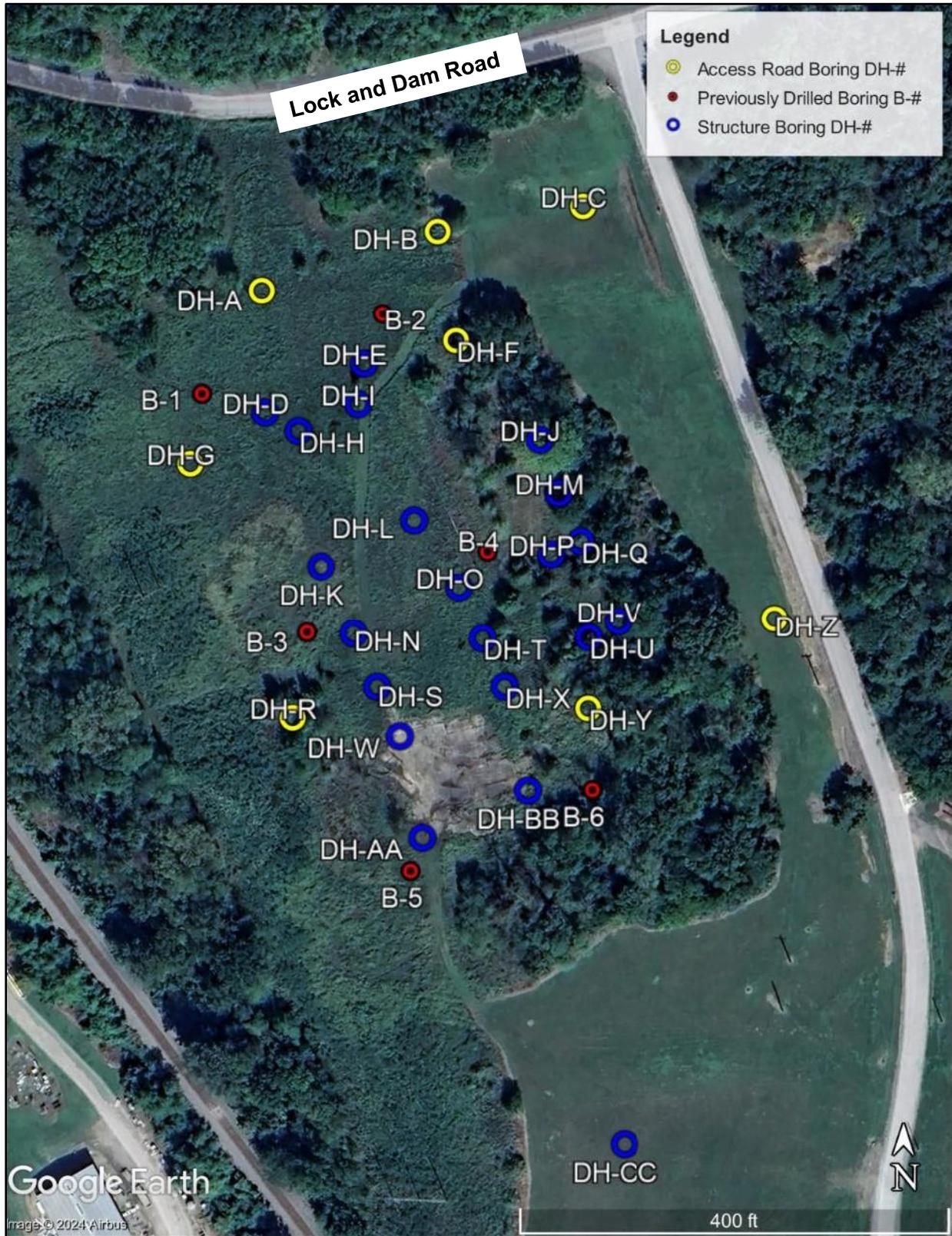
Vicinity Map



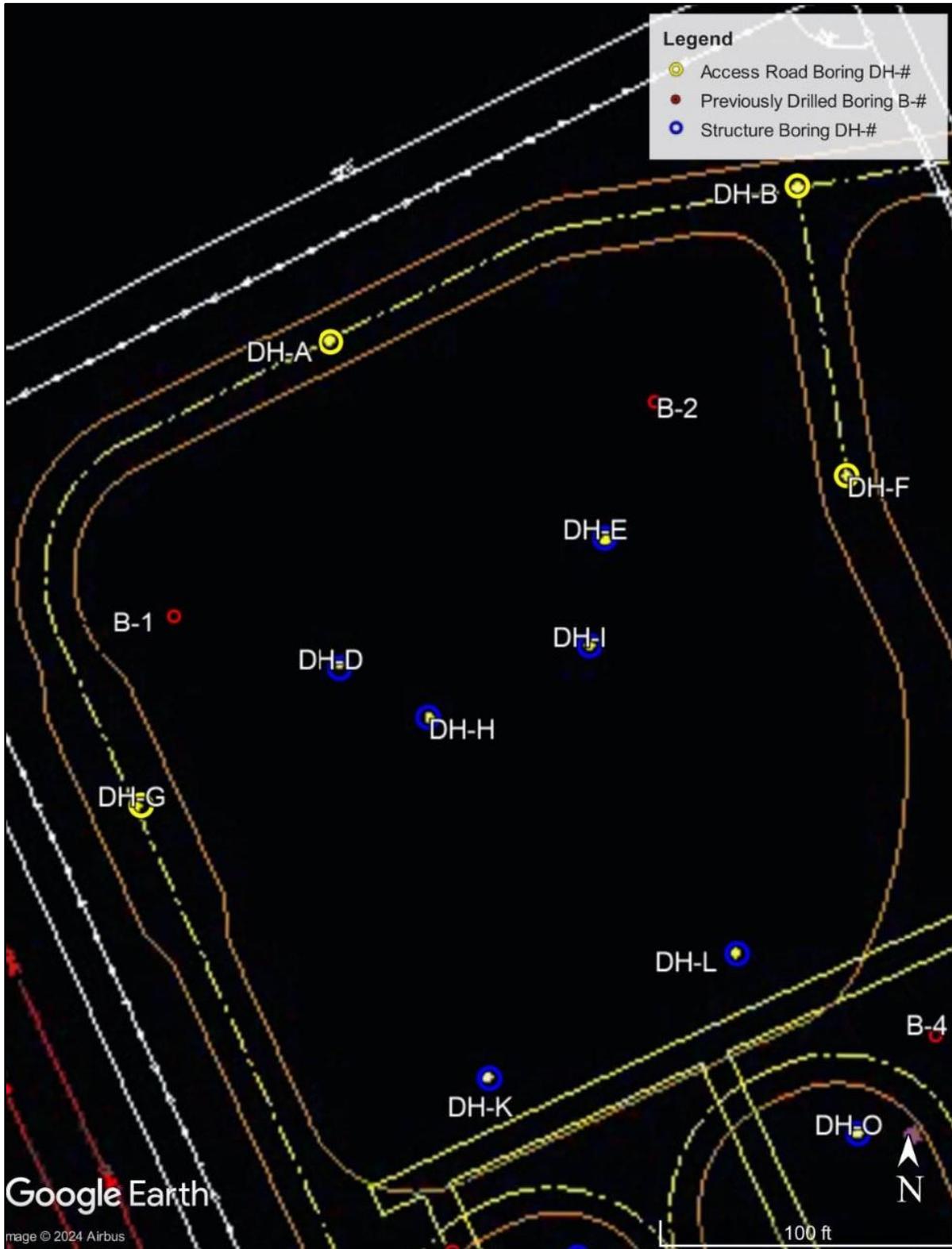
Geologic Map



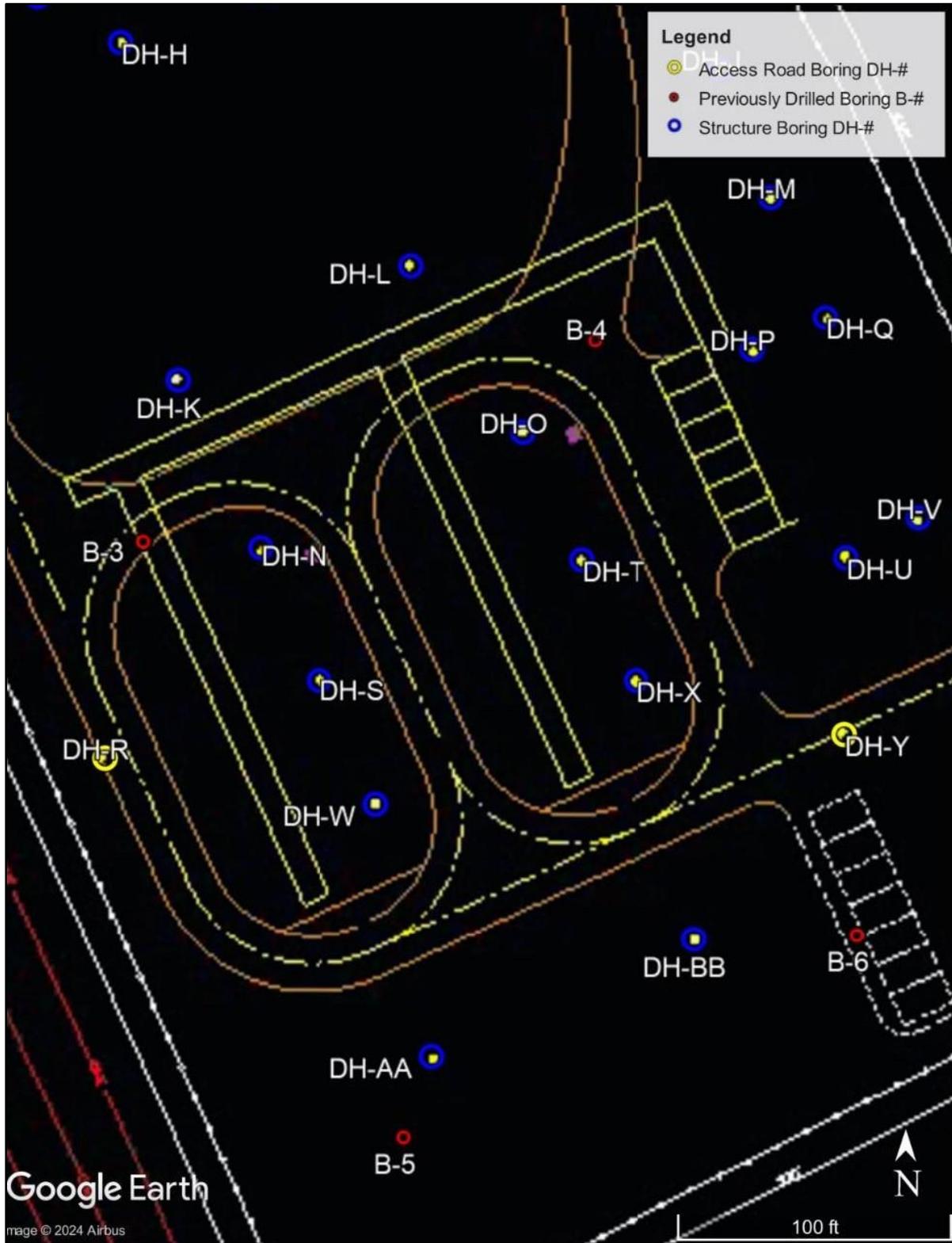
Boring Location Diagram (Preliminary Site Plan overlain on Google Earth image)



Boring Location Diagram (Google Earth Image)



**Boring Location Diagram – North Half of Site
(Preliminary Site Plan overlain on Google Earth image)**



**Boring Location Diagram – South Half of Site
(Preliminary Site Plan overlain on Google Earth image)**

LOG OF BORING NO. DH-A

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% <#200	HAND PENETROMETER, TSF ■				BLOWS PER FT	
								LAB. COHESION, TSF ▲					
					Surface Description=Grass Rootmat: 2 inches			0.4	0.8	1.2	1.6		
								WATER CONTENT, % ●					
								PL	LL				
								20	40	60	80		
0					El.=430.0								
			1	13	FILL: Gravelly Lean Clay brown, dark brown, and orange-brown, with shale and sandstone gravel, trace rootlets	FILL						12	
			2	14									14
			3	12									20
5			4	6									16
					El.=421.5								
			5	17	LEAN TO FAT CLAY very stiff, light gray, red, orange-brown, and light brown	CL-CH					4.0	20	
10					El.=420.0								
					BOTTOM OF BORING AT ABOUT 10 FEET								
15													
20													
25													
30													
35													

COMPLETION DEPTH: 10 ft.

DATE: 5/21/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: Dry

AT COMPLETION: Dry

AT 24 HOURS: Backfilled



LOG OF BORING NO.DH-B

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	%<#200	HAND PENETROMETER, TSF ■				BLOWS PER FT	
								LAB. COHESION, TSF ▲					
					Surface Description=Exposed Soil Base: 3 inches			0.4	0.8	1.2	1.6		
								WATER CONTENT, % ●					
								PL	LL				
								20	40	60	80		
0					El.=425.1								
			1	12	FILL: Gravelly Lean Clay	FILL						8	
			2	5	brown, dark brown, and orange-brown, with shale and sandstone gravel, trace rootlets								50/5"
			3	0									50/5"
5			4	17	- becomes moist at about 5 feet								3
			5	15	El.=416.6	ROCK						4.5+	31/6", 50/2"
10					SHALE moderately weathered, very soft, light brown, orange-brown, and light gray								
					El.=415.1								
					BOTTOM OF BORING AT ABOUT 10 FEET								
15													
20													
25													
30													
35													

COMPLETION DEPTH: 10 ft.

DATE: 5/21/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: Dry

AT COMPLETION: Dry

AT 24 HOURS: Backfilled



LOG OF BORING NO.DH-C

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% <#200	HAND PENETROMETER, TSF ■				BLOWS PER FT
								LAB. COHESION, TSF ▲				
					Surface Description=Grass Rootmat: 3 inches			0.4	0.8	1.2	1.6	
								WATER CONTENT, % ●				
								PL	LL			
								20	40	60	80	
0												
			1	10	FILL: Gravelly Lean Clay brown, dark brown, light brown, and orange-brown, with shale and sandstone gravel, trace rootlets	FILL						12
			2	13								9
			3	11	FILL: Lean Clay	FILL						20
5			4	5	olive-brown, light brown, and dark gray, with shale gravel							9
					LEAN TO FAT CLAY	CL-CH					3.0	
			5	0	stiff, light gray, light brown, red, and orange-brown, with shale fragments							
10					BOTTOM OF BORING AND AUGER REFUSAL AT ABOUT 8 1/2 FEET							50/0"
15												
20												
25												
30												
35												

COMPLETION DEPTH: 8.6 ft.

DATE: 5/20/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: Dry

AT COMPLETION: Dry

AT 24 HOURS: Backfilled



LOG OF BORING NO. DH-D

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% <#200	HAND PENETROMETER, TSF ■				BLOWS PER FT	
								LAB. COHESION, TSF ▲					
					Surface Description=Grass Rootmat: 4 inches			0.4	0.8	1.2	1.6		
								WATER CONTENT, % ●					
								PL	LL				
								20	40	60	80		
0					El.=430.8								
			1	13	FILL: Gravelly Lean Clay brown, dark brown, orange-brown, and light brown, with shale and sandstone gravel, trace rootlets	FILL							13
			2	15									11
			3	17	El.=427.8								14
5			4	11	FILL: Lean Clay orange-brown, reddish brown, light gray, and brown, with shale gravel and sand	FILL							25
			5	14	El.=422.3								10
10					LEAN TO FAT CLAY stiff, orange-brown, light gray, red, light brown, and dark brown, with sandstone fragments	CL- CH							
			6	16	- becomes hard and shaley at about 13 ½ feet El.=416.3								24/6", 50/2"
15					SHALE moderately weathered, very soft to moderately hard, brown and dark gray	ROCK							
			7	1	El.=412.3								50/1"
20					SHALE slightly weathered, hard, dark gray, wet	ROCK							
			8	0	El.=407.7								50/0"
25					BOTTOM OF BORING AND AUGER REFUSAL AT ABOUT 23 FEET								
30													
35													

COMPLETION DEPTH: 23.1 ft.

DATE: 5/21/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: 15 ft.

AT COMPLETION: 5 ft.

AT 24 HOURS: Backfilled



LOG OF BORING NO.DH-E

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% <#200	HAND PENETROMETER, TSF ■				BLOWS PER FT	
								LAB. COHESION, TSF ▲					
								0.4	0.8	1.2	1.6		
								WATER CONTENT, % ●					
								PL	LL				
								20	40	60	80		
0					Surface Description=Bare Ground								
			1	15	FILL: Gravelly Lean Clay	FILL						16	
			2	13	brown, dark brown, and orange-brown, with shale and sandstone gravel, trace rootlets								11
			3	16									14
5			4	12									7
			5	8	LEAN TO FAT CLAY	CL-CH						24	
10					very stiff, light gray, light brown and orange-brown, with dark brown ferrous nodules	ROCK							
			6	1	SANDSTONE	ROCK						50/1"	
					moderately weathered, very soft, light brown and gray								
15					SANDSTONE	ROCK						50/0"	
			7	0	slightly weathered, hard, light brown and gray								
					BOTTOM OF BORING AND AUGER REFUSAL AT ABOUT 17 FEET								
20													
25													
30													
35													

COMPLETION DEPTH: 17.1 ft.

DATE: 5/22/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: Dry

AT COMPLETION: Dry

AT 24 HOURS: Backfilled



LOG OF BORING NO.DH-F

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% <#200	HAND PENETROMETER, TSF ■				BLOWS PER FT	
								LAB. COHESION, TSF ▲					
					Surface Description=Grass Rootmat: 4 inches			0.4	0.8	1.2	1.6		
								WATER CONTENT, % ●					
								PL	LL				
								20	40	60	80		
0					El.=424.7								
			1	13	<u>FILL: Gravelly Lean Clay</u> brown, dark brown, and orange-brown, with shale and sandstone gravel	FILL						4.5+	13
			2	12									13
			3	8									13
5			4	17	<u>FILL: Lean to Fat Clay</u> light brown, orange-brown, and black, with rootlets, wood chips, and sticks	FILL							10
			5	17	<u>LEAN TO FAT CLAY</u> very stiff, orange-brown, light gray, red, and light brown, with dark brown ferrous nodules and sandstone fragments	CL- CH							13
10					El.=416.2								
					El.=414.7								
					BOTTOM OF BORING AT ABOUT 10 FEET								
15													
20													
25													
30													
35													

COMPLETION DEPTH: 10 ft.

DATE: 5/23/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: Dry

AT COMPLETION: Dry

AT 24 HOURS: Backfilled



LOG OF BORING NO.DH-G

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	%<#200	HAND PENETROMETER, TSF ■				BLOWS PER FT	
								LAB. COHESION, TSF ▲					
					Surface Description=Grass Rootmat: 1 inch			0.4	0.8	1.2	1.6		
								WATER CONTENT, % ●					
								PL	LL				
								20	40	60	80		
0			1	6	SANDSTONE moderately weathered, very soft, light brown, orange-brown, and brown, with thin shale seams	ROCK						4.5+	9/6", 50/5"
			2	12									48
			3	0									50/3"
5			4	0	SANDSTONE slightly weathered, soft to moderately hard, light brown	ROCK							50/0"
					El.=427.5 BOTTOM OF BORING AND AUGER REFUSAL AT ABOUT 5 FEET								
10													
15													
20													
25													
30													
35													

COMPLETION DEPTH: 5.1 ft.

DATE: 5/21/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: Dry

AT COMPLETION: Dry

AT 24 HOURS: Backfilled



LOG OF BORING NO.DH-H

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	%<#200	HAND PENETROMETER, TSF ■				BLOWS PER FT		
								LAB. COHESION, TSF ▲						
								0.4	0.8	1.2	1.6			
								WATER CONTENT, % ●						
								PL	LL					
								20	40	60	80			
0					Surface Description=Bare Ground									
			1	17	FILL: Lean Clay orange-brown, red, light gray, and dark brown, with shale and sandstone gravel	FILL						8		
			2	7										11
			3	1										14
5			4	4	FILL: Lean to Fat Clay light brown, red, orange-brown, and light gray, with decayed wood chunks (possible stump), trace sand	FILL						48		
			5	6										11
10														
15			6	6	SANDSTONE moderately weathered, very soft, light brown, light gray, and orange-brown	ROCK						14/6", 50/5"		
20			7	0	BOTTOM OF BORING AND AUGER REFUSAL AT ABOUT 18 1/2 FEET							50/0"		
25														
30														
35														

COMPLETION DEPTH: 18.6 ft.

DATE: 5/22/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: Dry

AT COMPLETION: Dry

AT 24 HOURS: Backfilled



LOG OF BORING NO.DH-I

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% < #200	HAND PENETROMETER, TSF ■				BLOWS PER FT	
								LAB. COHESION, TSF ▲					
					Surface Description=Grass Rootmat: 3 inches			0.4	0.8	1.2	1.6		
								WATER CONTENT, % ●					
								PL	LL				
								20	40	60	80		
0					El.=429.4								
			1	13	FILL: Gravelly Lean Clay brown, orange-brown, and dark brown, trace red, with shale and sandstone gravel, trace rootlets and sand	FILL						8	
			2	15									11
			3	11									12
5			4	2									14
					El.=420.9								
10			5	7	LEAN TO FAT CLAY very stiff, light gray, orange-brown, red, and light brown, with rootlets and sandstone fragments	CL- CH					3.5	25	
					El.=415.9								
15			6	2	SANDSTONE slightly weathered, very soft to soft, light brown and dark gray	ROCK						50/2"	
					El.=410.8								
20			7	0	BOTTOM OF BORING AND AUGER REFUSAL AT ABOUT 18 ½ FEET							50/0"	
25													
30													
35													

COMPLETION DEPTH: 18.6 ft.

DATE: 5/22/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: Dry

AT COMPLETION: Dry

AT 24 HOURS: Backfilled



LOG OF BORING NO.DH-J

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	%<#200	HAND PENETROMETER, TSF ■				BLOWS PER FT	
								LAB. COHESION, TSF ▲					
								0.4	0.8	1.2	1.6		
								WATER CONTENT, % ●					
								PL	LL				
								20	40	60	80		
0					Surface Description=Sand: 3 inches								
			1	16	FILL: Sand brown, trace rounded pebbles								7
			2	15		FILL							18
			3	11									22
5			4	14	FILL: Fat Clay dark gray, with shale gravel and rounded pebbles	FILL							16
			5	13	LEAN CLAY medium stiff, brown, orange-brown, and light gray	CL							4
10													
			6	13	HIGHLY WEATHERED SHALE, with sandstone seams very soft, brown	ROCK							38/6", 50/4"
15													
					BOTTOM OF BORING AND AUGER REFUSAL AT ABOUT 16 FEET								
20													
25													
30													
35													

COMPLETION DEPTH: 16 ft.

DATE: 5/30/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: Dry

AT COMPLETION: Dry

AT 24 HOURS: Backfilled



LOG OF BORING NO.DH-K

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% <#200	HAND PENETROMETER, TSF ■				BLOWS PER FT	
								LAB. COHESION, TSF ▲					
					Surface Description=Grass Rootmat: 3 inches			0.4	0.8	1.2	1.6		
								WATER CONTENT, % ●					
								PL	LL				
								20	40	60	80		
0			1	14	FILL: Silt brown and dark brown, with sand and pebbles, trace rootlets El.=432.9	FILL		●					18
			2	9	FILL: Gravelly Lean Clay orange-brown, brown, dark brown, and gray El.=430.9	FILL		●					21
5			3	13	LEAN TO FAT CLAY very stiff, red and orange-brown, trace ferrous nodules and staining El.=429.4	CL-CH		●				4.5	22
			4	15	FAT CLAY very stiff, light gray, red, and orange-brown, trace dark brown ferrous staining El.=427.9	CH		●	—			4.5	21
10			5	13	SHALE moderately weathered, very soft, light brown, light gray, and orange-brown El.=424.4	ROCK		●				4.5+	23/6", 50/1"
15			6	9	SHALE slightly weathered, soft, gray and dark gray El.=414.4	ROCK		●					30/6", 50/3"
20			7	1	SHALE slightly weathered, soft, gray and dark gray El.=414.3	ROCK							50/1"
25					BOTTOM OF BORING AND AUGER REFUSAL AT ABOUT 18 1/2 FEET								
30													
35													

COMPLETION DEPTH: 18.6 ft.

DATE: 5/23/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: Dry

AT COMPLETION: Dry

AT 24 HOURS: Backfilled



LOG OF BORING NO.DH-L

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001

Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% <#200	HAND PENETROMETER, TSF				BLOWS PER FT	
								LAB. COHESION, TSF					
					Surface Description=Grass Rootmat: 4 inches			0.4	0.8	1.2	1.6		
								WATER CONTENT, %					
								PL	-----		LL		
								20	40	60	80		
0					El.=430.0								
			1	17	FILL: Mixture of Gravelly Lean Clay and Sand	FILL							13
			2	15	dark gray, dark brown and orange-brown, with sandstone gravel and sticks								14
			3	12	FAT CLAY							4.5	14
5			4	11	very stiff, reddish brown, light brown, and light gray - with sand seams and pockets below about 5 feet	CH						4.5	15
			5	15	SHALE								40/6", 50/4"
10					moderately weathered, very soft, light gray, light brown, and white	ROCK							
			6	5	SHALE, with thin sandstone seams slightly weathered, soft, dark gray and gray	ROCK							50/5"
					El.=416.5								
15					INTERBEDDED SANDSTONE-SHALE								
					fresh, hard, dark gray and light gray								
					El.=413.0								
20			Run 1	60	Run 1: 17 to 22 feet REC=100% RQD=63% UCS=7,151 psi at about 18 feet UCS=8,856 psi at about 22 feet	ROCK							
					Run 2: 22 to 27 feet								
25			Run 2	60	REC=100% RQD=85%								
					El.=403.0								
					AUGER REFUSAL AT ABOUT 17 FEET								
30					BOTTOM OF BORING AT ABOUT 27 FEET								
35													

COMPLETION DEPTH: 27 ft.

DATE: 6/4/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: Dry

AT COMPLETION: N/A

AT 24 HOURS: Backfilled



LOG OF BORING NO.DH-M

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% <#200	HAND PENETROMETER, TSF				BLOWS PER FT	
								LAB. COHESION, TSF					
					Surface Description=Grass Rootmat: 2 inches			0.4	0.8	1.2	1.6		
								WATER CONTENT, %					
								PL	LL				
								20	40	60	80		
0					El.=429.8								
			1	4	FILL: Sand, trace rounded pebbles brown								11
			2	0		FILL	5						22
			3	6									19
5			4	15	El.=424.3 FILL: Fat Clay dark gray, with broken shale gravel	FILL							13
			5	11	El.=421.3 LEAN CLAY very stiff, reddish brown, light brown, and light gray	CL					2.25		15
10			6	17	El.=416.3 FAT CLAY very stiff to hard, light gray, orange-brown, and brown, trace sand and sandstone fragments	CH							26/6", 50/6"
15					El.=415.3 SHALE moderately weathered, very soft, brown, light brown, and light gray	ROCK							
			7	2	El.=411.3 SHALE, with thin sandstone seams slightly weathered, very soft to soft, gray and dark gray	ROCK							50/2"
20					El.=408.8 BOTTOM OF BORING AND AUGER REFUSAL AT ABOUT 21 FEET								
25													
30													
35													

COMPLETION DEPTH: 21 ft.

DATE: 5/29/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: 13.5 ft

AT COMPLETION: 13.5 ft

AT 24 HOURS: Backfilled

LOG OF BORING NO.DH-N

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% <#200	HAND PENETROMETER, TSF				BLOWS PER FT
								LAB. COHESION, TSF				
					Surface Description=Grass Rootmat: 3 inches			0.4	0.8	1.2	1.6	
								WATER CONTENT, %				
								PL	LL			
								20	40	60	80	
0			1	15	FILL: Crushed Shale with Clay brown, dark brown, and black, trace sand El.=432.0	FILL						21
			2	13	FILL: Gravelly Lean Clay orange-brown, light brown, red, and gray, with sandstone gravel El.=430.0	FILL						12
5			3	12	LEAN TO FAT CLAY very stiff, light brown, orange-brown, and reddish brown, trace rootlets El.=428.5	CL-CH						14
			4	17								
10			5	16	SHALE moderately weathered, very soft, light brown, orange-brown, and light gray, trace sand El.=423.5	ROCK						55
15			6	13								61
20			7	1	SHALE slightly weathered, soft, light brown and gray El.=413.5	ROCK						50/1"
					El.=413.4 BOTTOM OF BORING AND AUGER REFUSAL AT ABOUT 18 1/2 FEET							

COMPLETION DEPTH: 18.6 ft.

DATE: 5/23/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: Dry

AT COMPLETION: Dry

AT 24 HOURS: Backfilled



LOG OF BORING NO.DH-P

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	%<#200	HAND PENETROMETER, TSF ■				BLOWS PER FT	
								LAB. COHESION, TSF ▲					
					Surface Description=Grass Rootmat: 2 inches			0.4	0.8	1.2	1.6		
								WATER CONTENT, % ●					
								PL	LL				
								20	40	60	80		
0					El.=431.7								
			1	6	FILL: Gravelly Lean Clay dark gray, with broken shale gravel	FILL		●					12
			2	6	El.=429.7			●					8
			3	8	FILL: Mixture of Gravelly Clay and Clay Clods	FILL		●					7
5			4	10	reddish brown, yellowish brown, brown, and grayish brown, with broken shale gravel			●					6
					El.=426.7	FILL							
					FILL: Crushed Shale, with clay dark gray								
			5	6	El.=423.2			●					27
10					LEAN CLAY	CL							
					very stiff, reddish brown, light gray, and yellowish brown, with silt pockets								
			6	8	El.=418.2			●					34/6", 50/5"
15					SHALE	ROCK							
					moderately weathered, very soft, brown, light brown, light gray and yellowish brown, with sand lenses and thin sandstone seams								
			7	1	El.=413.2								50/1"
20					SHALE, with sandstone seams slightly weathered, very soft to soft, brown and grayish brown	ROCK							
					El.=409.7								
					BOTTOM OF BORING AND AUGER REFUSAL AT ABOUT 22 FEET								
25													
30													
35													

COMPLETION DEPTH: 22 ft.

DATE: 5/29/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: Dry

AT COMPLETION: Dry

AT 24 HOURS: Backfilled



LOG OF BORING NO.DH-Q

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% <#200	HAND PENETROMETER, TSF ■				BLOWS PER FT	
								LAB. COHESION, TSF ▲					
					Surface Description=Grass Rootmat: 3 inches			0.4	0.8	1.2	1.6		
								WATER CONTENT, % ●					
								PL	LL				
								20	40	60	80		
0					El.=431.5								
			1	7	FILL: Sand, with clay clods, trace rounded pebbles brown	FILL						12	
			2	5									8
			3	6									7
5			4	8									6
					El.=423.0								
10			5	4	SHALE moderately weathered, very soft, light brown, dark brown, and light gray	ROCK						29	
					- with sandstone seams below about 13½ feet							82	
15			6	10									
					El.=413.0	ROCK						50/0"	
20			7	0	SHALE slightly weathered, soft, dark gray and gray								
					El.=411.5								
					BOTTOM OF BORING AND AUGER REFUSAL AT ABOUT 20 FEET								
25													
30													
35													

COMPLETION DEPTH: 20 ft.

DATE: 5/29/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: Dry

AT COMPLETION: Dry

AT 24 HOURS: Backfilled



LOG OF BORING NO.DH-R

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% < #200	HAND PENETROMETER, TSF ■				BLOWS PER FT
								LAB. COHESION, TSF ▲				
					Surface Description=Grass Rootmat: 2 inches			0.4	0.8	1.2	1.6	
								WATER CONTENT, % ●				
								PL	LL			
								20	40	60	80	
0					Surface Description=Grass Rootmat: 2 inches							
			1	4	FILL: Sandy Lean Clay orange-brown, light brown, and dark brown, with rootlets, wood pieces (sticks), and organics	FILL						11
			2	0								18
			3	0	FILL: Lean Clay dark brown and reddish brown, with pebbles	FILL						14
5			4	2								11
					FILL: Lean Clay orange-brown, grayish brown, and dark brown, trace rootlets, and wood pieces (bark)	FILL						
			5	18		CL-CH					2.5	12
10					LEAN TO FAT CLAY very stiff, red, orange-brown, light gray, and light brown, trace sand							
					El.=424.0							
					El.=422.5							
15					BOTTOM OF BORING AT ABOUT 10 FEET							
20												
25												
30												
35												

COMPLETION DEPTH: 10 ft.

DATE: 5/21/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: 4 ft.

AT COMPLETION: 4 ft.

AT 24 HOURS: Backfilled



LOG OF BORING NO.DH-S

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001

Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% <#200	HAND PENETROMETER, TSF ■				BLOWS PER FT
								LAB. COHESION, TSF ▲				
					Surface Description=Grass Rootmat: 4 inches			0.4	0.8	1.2	1.6	
								WATER CONTENT, % ●				
								PL	LL			
								20	40	60	80	
0												
			1	13	FILL: Gravelly Lean Clay brown, dark gray, and dark brown El.=431.9	FILL						13
			2	12	FILL: Mixture of Lean to Fat Clay and Gravelly Lean Clay El.=429.9	FILL						11
			3	11	reddish brown, brown, and dark gray El.=427.9	FILL						15
5			4	12	FILL: Lean Clay brown, trace shale gravel El.=425.9	FILL						9
					FILL: Crushed Shale Gravel dark gray, with clay El.=423.4	FILL						
10			5	14	LEAN CLAY, with sand and silt pockets medium stiff, reddish brown, light gray, and light brown El.=418.4	CL					4.0	8
15			6	12	SHALEY LEAN CLAY very stiff, brown and light gray El.=408.4	CL						23
20			7	13		CL						29
25			8	0	SHALE, with thin sandstone seams moderately weathered, soft, dark gray and gray El.=407.9	ROCK						50/0"
			Run 1	60	INTERBEDDED SANDSTONE AND SHALE fresh, hard, light gray and gray El.=401.4	ROCK						
30			Run 2	37	Run 1: 24 to 29 feet REC=100% RQD=63% UCS=9,402 psi at about 24 feet UCS=8,298 psi at about 29 feet	ROCK						
35					SHALE							

COMPLETION DEPTH: 34 ft.

DATE: 6/4/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: Dry

AT COMPLETION: N/A

AT 24 HOURS: Backfilled



LOG OF BORING NO.DH-S

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% < #200	HAND PENETROMETER, TSF ■				BLOWS PER FT
								LAB. COHESION, TSF ▲				
								0.4	0.8	1.2	1.6	
								WATER CONTENT, % ●				
								PL	LL			
								20	40	60	80	
40					slightly weathered, very soft, dark gray Run 2: 29 to 34 feet REC=62% RQD=8% El.=397.9 AUGER REFUSAL AT ABOUT 24 FEET BOTTOM OF BORING AT ABOUT 34 FEET							
45												
50												
55												
60												
65												
70												

LOG OF BORING NO.DH-T

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	%<#200	HAND PENETROMETER, TSF ■				BLOWS PER FT	
								LAB. COHESION, TSF ▲					
					Surface Description=Grass Rootmat: 4 inches			0.4	0.8	1.2	1.6		
								WATER CONTENT, % ●					
								PL			LL		
								20	40	60	80		
0					El.=431.3								
			1	17	FILL: Gravelly Lean Clay dark brown and dark gray, with shale gravel	FILL						11	
			2	12	- changing color to brown, reddish brown, and dark gray								11
			3	17									8
5			4	13	SILTY CLAY stiff, gray and brownish gray, with rootlets, (apparent original topsoil)	CL-ML							11
			5	12	LEAN CLAY very stiff, reddish brown, yellowish brown, and light gray	CL						4.5+	17
10													
			6	14	SHALE moderately weathered, very soft, brown and orange-brown	ROCK							32/6", 50/5"
15													
			7	4	SHALE , with sandstone seams slightly weathered, soft, brown and gray	ROCK							50/4"
20													
			Run 1	47	INTERBEDDED SANDSTONE AND SHALE fresh, hard, light gray and dark gray	ROCK							
25					Run 1: 21 to 26 feet REC=78% RQD=48% UCS=8,243 psi at about 22½ feet	ROCK							
			Run 2	51	SHALE fresh, soft, dark gray	ROCK							
30					Run 2: 26 to 31 feet REC=85% RQD=60%								
					El.=404.3								
					INTERBEDDED SANDSTONE AND SHALE fresh, soft, light gray and dark gray								
35					El.=400.3								

COMPLETION DEPTH: 31 ft.

DATE: 6/5/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: Dry

AT COMPLETION: N/A

AT 24 HOURS: Backfilled



LOG OF BORING NO. DH-T

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% < #200	HAND PENETROMETER, TSF ■				BLOWS PER FT
								LAB. COHESION, TSF ▲				
								0.4	0.8	1.2	1.6	
								WATER CONTENT, % ●				
								PL	LL			
								20	40	60	80	
					AUGER REFUSAL AT ABOUT 21 FEET							
					BOTTOM OF BORING AT ABOUT 31 FEET							
40												
45												
50												
55												
60												
65												
70												

LOG OF BORING NO. DH-U

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% <#200	HAND PENETROMETER, TSF ■				BLOWS PER FT		
								LAB. COHESION, TSF ▲						
					Surface Description=Grass Rootmat: 3 inches			0.4	0.8	1.2	1.6			
								WATER CONTENT, % ●						
								PL	LL					
								20	40	60	80			
0					El.=431.8									
			1	17	FILL: Lean Clay brown, grayish brown and orange	FILL							8	
			2	13	brown, with shale gravel									6
			3	16										5
5			4	15	- with sand and sandstone fragments below about 5 feet									7
			5	12	SHALEY FAT CLAY stiff to very stiff, red, gray, and light brown, trace sand seams	CH						4.5	12	
10			6	15	SHALE moderately weathered, very soft, brown and gray	ROCK							76	
15					El.=414.8									
					BOTTOM OF BORING AND AUGER REFUSAL AT ABOUT 17 FEET									
20														
25														
30														
35														

COMPLETION DEPTH: 17 ft.

DATE: 5/29/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: Dry

AT COMPLETION: Dry

AT 24 HOURS: Backfilled



LOG OF BORING NO. DH-V

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% <#200	HAND PENETROMETER, TSF ■				BLOWS PER FT		
								LAB. COHESION, TSF ▲						
					Surface Description=Grass Rootmat: 3 inches			0.4	0.8	1.2	1.6			
								WATER CONTENT, % ●						
								PL	LL					
								20	40	60	80			
0					El.=431.6									
			1	17	FILL: Gravelly Lean Clay brown, grayish brown, and orange-brown	FILL							9	
			2	15										6
			3	17										5
5			4	8									3.5	7
					El.=425.6	SILTY CLAY medium stiff, orange-brown and brown, with sand and sandstone fragments	CL-ML							
			5	12	El.=423.1	SANDY LEAN CLAY very stiff, reddish brown, light brown, light gray, and yellowish brown	CL							12
			6	11	El.=418.1	SHALE moderately weathered, very soft, brown, grayish brown, and yellowish brown	ROCK							76
15			7	1	El.=413.1	SHALE , with sandstone seams slightly weathered, soft, dark gray, gray, and brown	ROCK							50/1"
20			Run 1	60	El.=411.6	INTERBEDDED SANDSTONE AND SHALE fresh, soft to moderately hard, dark gray and light gray	ROCK							
25			Run 2	60		Run 1: 20 to 25 feet REC=100% RQD=48% UCS=2,401 psi at about 21½ feet Run 2: 25 to 30 feet REC=100% RQD=11% UCS=7,388 psi at about 26 feet	ROCK							
30					El.=404.6	SHALE fresh, soft, dark gray								
35					El.=401.6	AUGER REFUSAL AT ABOUT 20								

COMPLETION DEPTH: 30 ft.

DATE: 6/4/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: Dry

AT COMPLETION: N/A

AT 24 HOURS: Backfilled



LOG OF BORING NO. DH-V

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% < #200	HAND PENETROMETER, TSF ■				BLOWS PER FT
								LAB. COHESION, TSF ▲				
								0.4	0.8	1.2	1.6	
								WATER CONTENT, % ●				
								PL	LL			
								20	40	60	80	
					FEET							
					BOTTOM OF BORING AT ABOUT 30 FEET							
40												
45												
50												
55												
60												
65												
70												

LOG OF BORING NO. DH-W

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% < #200	HAND PENETROMETER, TSF				BLOWS PER FT	
								LAB. COHESION, TSF					
					Surface Description=Grass Rootmat: 2 inches			0.4	0.8	1.2	1.6		
								WATER CONTENT, %					
								PL	LL				
								20	40	60	80		
0					El.=432.2								
			1	11	<u>FILL: Gravelly Lean Clay</u> orange-brown, brown, gray, and black, with crushed shale, with and sandstone gravel, trace sand							4.5+	16
			2	16								3.0	19
			3	5		FILL							15
5			4	3	- becomes wet at about 5 feet below existing grade								12
					El.=423.7								
10			5	7	<u>LEAN TO FAT CLAY</u> very soft, grayish brown, orange-brown, and reddish brown, trace rootlets	CL- CH							WOH*
					El.=418.7								
15			6	13	<u>LEAN TO FAT CLAY</u> stiff, light gray, red, orange-brown, and light brown	CL- CH							8
					El.=413.7	ROCK							50/1"
20			7	1	<u>SANDSTONE</u> slightly weathered, hard, light brown and dark gray								
					El.=413.6								
					BOTTOM OF BORING AND AUGER REFUSAL AT ABOUT 18 ½ FEET								
25					*Weight of Hammer, 0 bpf								
30													
35													

COMPLETION DEPTH: 18.6 ft.

DATE: 5/23/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: 5 ft.

AT COMPLETION: 15 ft.

AT 24 HOURS: Backfilled

LOG OF BORING NO.DH-X

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% <#200	HAND PENETROMETER, TSF ■				BLOWS PER FT
								LAB. COHESION, TSF ▲				
					Surface Description=Grass Rootmat: 3 inches			0.4	0.8	1.2	1.6	
								WATER CONTENT, % ●				
								PL			LL	
								20	40	60	80	
0					El.=431.8							
			1	10	FILL: Crushed Shale dark gray and dark brown, with clay	FILL		●				16
			2	9	El.=429.8			●				14
			3	13	FILL: Lean Clay brown and grayish brown, with shale gravel			●				18
5			4	13		FILL		●				14
					El.=423.3							
10			5	1	FILL: Sandstone Gravel grayish brown, with sand	FILL						3
					El.=418.3							
15			6	18	SHALE moderately weathered, very soft, brown, light gray, orange-brown, with sand seams	ROCK		●				47
					El.=413.3							
20			7	3	SHALE, with sandstone seams slightly weathered, very soft to soft, brown and grayish brown	ROCK		●				50/3"
					El.=409.8							
25					BOTTOM OF BORING AND AUGER REFUSAL AT ABOUT 22 FEET							
30												
35												

COMPLETION DEPTH: 22 ft.

DATE: 5/29/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: Dry

AT COMPLETION: Dry

AT 24 HOURS: Backfilled



LOG OF BORING NO.DH-Y

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% < #200	HAND PENETROMETER, TSF ■				BLOWS PER FT
								LAB. COHESION, TSF ▲				
					Surface Description=Grass Rootmat: 4 inches			0.4	0.8	1.2	1.6	
								WATER CONTENT, % ●				
								PL	LL			
								20	40	60	80	
0					El.=431.5							
			1	15	FILL: Mixture of Sand and Lean to Fat Clay	FILL		●				15
			2	12	brown, reddish brown, and yellowish brown, with rounded pebbles and shale gravel			●				12
			3	13				●				6
5			4	1	FILL: Lean Clay, with shale gravel light brown, brown, and orange-brown	FILL		●				8
			5	12				●				12
10					El.=421.5 BOTTOM OF BORING AT ABOUT 10 FEET							
15												
20												
25												
30												
35												

COMPLETION DEPTH: 10 ft.

DATE: 6/6/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: Dry

AT COMPLETION: Dry

AT 24 HOURS: Backfilled



LOG OF BORING NO.DH-Z

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% < #200	HAND PENETROMETER, TSF ■				BLOWS PER FT
								LAB. COHESION, TSF ▲				
					Surface Description=Grass Rootmat: 4 inches			0.4	0.8	1.2	1.6	
								WATER CONTENT, % ●				
								PL	LL			
								20	40	60	80	
0					El.=416.6							
			1	17	FILL: Silty Clay orange-brown, reddish brown, and dark brown, with sand and sticks	FILL		●	—			11
			2	18	El.=414.6							
			3	16	SHALEY LEAN CLAY hard, light brown, light gray, orange-brown, and red, with sandstone fragments	CL		●				39
5			4	11	El.=411.6							
					ROCK							
			5	0	SHALE moderately weathered, very soft, gray and light brown							38/6", 50/1"
					El.=408.0							6/6", 50/5"
10					BOTTOM OF BORING AND AUGER REFUSAL AT ABOUT 8 ½ FEET							50/0"
15												
20												
25												
30												
35												

COMPLETION DEPTH: 8.6 ft.

DATE: 5/20/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: Dry

AT COMPLETION: Dry

AT 24 HOURS: Backfilled



LOG OF BORING NO. DH-AA

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% <#200	HAND PENETROMETER, TSF ■				BLOWS PER FT	
								LAB. COHESION, TSF ▲					
					Surface Description=Grass Rootmat: 3 inches			0.4	0.8	1.2	1.6		
								WATER CONTENT, % ●					
								PL	LL				
								20	40	60	80		
0					El.=431.6								
			1	8	<u>FILL: Sandy Lean Clay</u> dark brown and orange-brown, with shale gravel and rounded pebbles	FILL							15
			2	1									15
			3	14									13
5			4	16	<u>FILL: Gravelly Lean Clay</u> dark gray and dark brown, with broken shale gravel and wood pieces	FILL							6
			5	9	<u>LEAN CLAY</u> medium stiff, light brown, brown, and reddish brown, with sand seams	CL						2.5	6
10			6	3	<u>SHALE</u> soft, dark gray	ROCK							50/3"
15			Run 1	42	<u>SANDSTONE</u> , with clay seams very soft to soft, moderately weathered, gray and brownish gray	ROCK							
					<u>Run 1: 17 to 25 feet</u> REC=71% RQD=11%								
20			Run 2	58	<u>SHALE</u> moderately hard to hard, moderately weathered, dark gray, with clayey joints and slickensides	ROCK							
25					<u>Run 2: 22 to 27 feet</u> REC=97% RQD=10%								
30					El.=404.6 AUGER REFUSAL AT ABOUT 17 FEET								
35					BOTTOM OF BORING AT ABOUT 27 FEET								

COMPLETION DEPTH: 27 ft.

DATE: 6/5/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: Dry

AT COMPLETION: N/A

AT 24 HOURS: Backfilled



LOG OF BORING NO. DH-BB

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% <#200	HAND PENETROMETER, TSF ■				BLOWS PER FT		
								LAB. COHESION, TSF ▲						
					Surface Description=Grass Rootmat: 4 inches			0.4	0.8	1.2	1.6			
								WATER CONTENT, % ●						
								PL			LL			
								20	40	60	80			
0					El.=431.9									
			1	17	FILL: Lean Clay brown and orange-brown, with broken shale gravel and sand, trace sticks - no sticks observed below about 3½ feet	FILL						12		
			2	15										18
			3	13										16
5			4	15										17
			5	14										9
10														
			6	13	El.=418.4	CL						57		
15					El.=414.9									
					BOTTOM OF BORING AND AUGER REFUSAL AT ABOUT 17 FEET									
20														
25														
30														
35														

COMPLETION DEPTH: 17 ft.

DATE: 6/6/2024

RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: Dry

AT COMPLETION: Dry

AT 24 HOURS: Backfilled



LOG OF BORING NO.DH-CC

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 24-35001 Location: Refer to Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	%<#200	HAND PENETROMETER, TSF ■				BLOWS PER FT
								LAB. COHESION, TSF ▲				
					Surface Description=Grass Rootmat: 3 inches			0.4	0.8	1.2	1.6	
								WATER CONTENT, % ●				
								PL	LL			
								20	40	60	80	
0			1	13	<u>FILL: Sandy Lean Clay</u> orange-brown, reddish brown, and brown, with shale and sandstone gravel	FILL						10
			2	11	<u>LEAN TO FAT CLAY</u>	CL-CH						32/6", 50/3"
			3	8	hard, orange-brown, gray, red, and light brown, with sandstone fragments							12/6", 50/5"
5			4	11	<u>HIGHLY WEATHERED SANDSTONE</u> very soft, light brown and gray	ROCK						39/6", 50/4"
10			5	13	<u>SHALEY LEAN CLAY</u> very stiff, brown, reddish brown, and dark brown	CL						19
15			6	9	<u>HIGHLY WEATHERED SHALE</u> very soft, brown and light brown, trace sand	ROCK						32/6", 50/3"
20			7	0	BOTTOM OF BORING AND AUGER REFUSAL AT ABOUT 18 1/2 FEET							50/0"
25												
30												
35												

COMPLETION DEPTH: 18.6 ft.

DATE: 5/23/2024

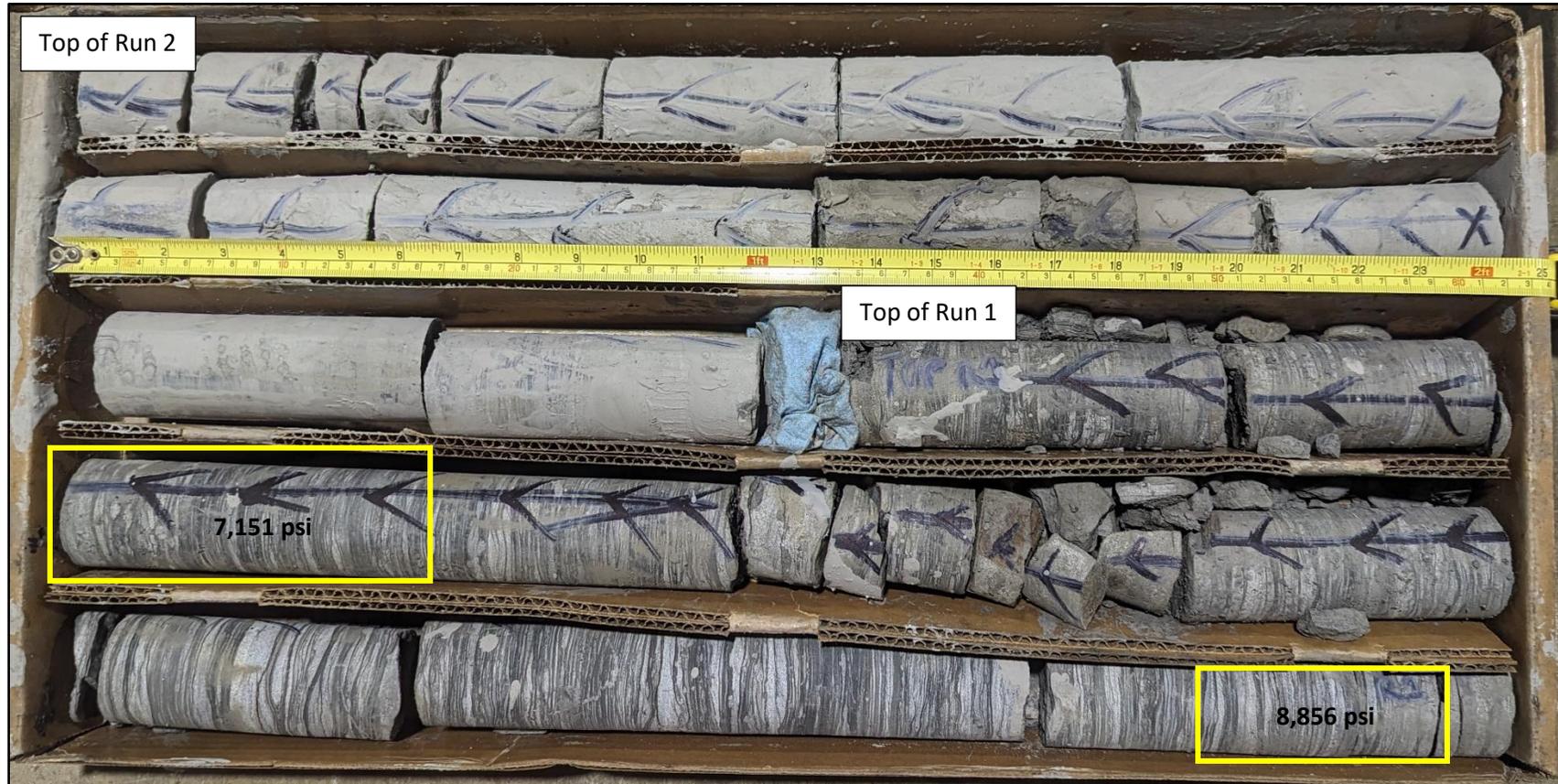
RIG: Diedrich D-50, Track-Mounted Rig, Automatic Hammer

DEPTH TO WATER: DURING DRILLING: Dry

AT COMPLETION: Dry

AT 24 HOURS: Backfilled





Boring DH-L

Run 1: 17 to 22 feet: REC = 100%, RQD = 63%

Run 2: 22 to 27 feet: REC = 100%, RQD = 85%



Boring DH-S

Run 1: 24 to 29 feet: REC = 100%, RQD = 63%

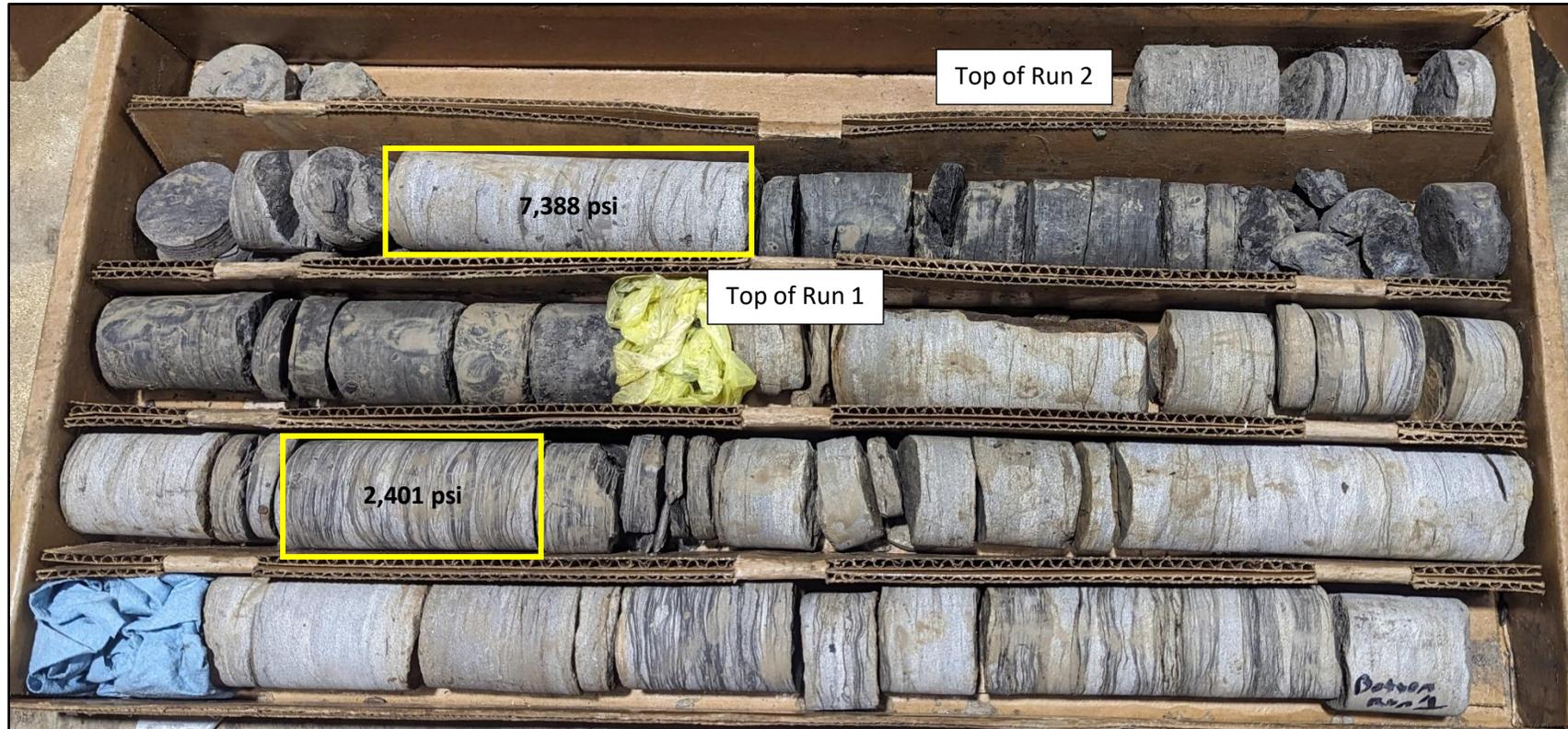
Run 2: 29 to 34 feet: REC = 62%, RQD = 8%



Boring DH-T

Run 1: 21 to 26 feet: REC = 78%, RQD = 48%

Run 2: 26 to 31 feet: REC = 85%, RQD = 60%



Boring DH-V

Run 1: 20 to 25 feet: REC = 100%, RQD = 48%

Run 2: 25 to 30 feet: REC = 100%, RQD = 11%



Boring DH-AA

Run 1: 17 to 22 feet: REC = 71%, RQD = 11%

Run 2: 22 to 27 feet: REC = 97%, RQD = 10%



Boring DH-L

Run 1: 17 to 22 feet: REC = 100%, RQD = 63%

Run 2: 22 to 27 feet: REC = 100%, RQD = 85%

LOG OF BORING NO.B-1

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 23-35033

Location: Shown on attached Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% <#200	HAND PENETROMETER, TSF ■				BLOWS PER FT
								LAB. COHESION, TSF ▲				
					Surface Description= Grass Cover Root Mat - 3 inches			0.4	0.8	1.2	1.6	
								WATER CONTENT, % ●				
								PL			LL	
								20	40	60	80	
0					El.=431.0							
			1	18	FILL - predominantly lean clay brown, with shale gravel							18
2.5			2	7	- predominantly sandstone gravel with clay below about 2 feet, light brown and grayish brown							46/6", 50/3"
			3	5	- predominantly mixture of sandstone gravel and clay below about 3½ feet, dark brown, light gray, and grayish brown	FILL						50/5"
5			4	2								50/2"
7.5												
			5	18	SILTY CLAY, with rootlets (original topsoil) stiff, dark brown	CL-ML						14
10					El.=422.0							
					LEAN CLAY very stiff, light gray, orange-brown, and reddish brown	CL						
12.5												
			6	7	WEATHERED SANDY SHALE very soft, intensely weathered, brown and dark brown							21/6", 50/1"
15					El.=417.5							
17.5						ROCK						

COMPLETION DEPTH: 20 ft.

DATE: 12/5/2023

RIG: Diedrich D-50, Track-Mounted, Auto Hammer Assisted

DEPTH TO WATER: DURING DRILLING: Dry

AT COMPLETION: Dry

AT 24 HOURS: Backfilled



LOG OF BORING NO.B-1

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 23-35033

Location: Shown on attached Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	%<#200	HAND PENETROMETER, TSF ■				BLOWS PER FT	
								LAB. COHESION, TSF ▲					
								0.4	0.8	1.2	1.6		
								WATER CONTENT, % ●					
								PL	LL				
								20	40	60	80		
			7	1	<p style="text-align: right;">El.=412.5</p> <p>SANDY SHALE soft, moderately weathered, dark gray, with thin sandstone seams</p>	ROCK							50/1"
20					<p style="text-align: right;">El.=411.0</p> <p>AUGER REFUSAL AND BOTTOM OF BORING AT ABOUT 20 FEET</p>								
22.5													
25													
27.5													
30													
32.5													
35													

LOG OF BORING NO.B-2

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 23-35033

Location: Shown on attached Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	%<#200	HAND PENETROMETER, TSF ■				BLOWS PER FT	
								LAB. COHESION, TSF ▲					
								0.4	0.8	1.2	1.6		
								WATER CONTENT, % ●					
								PL	LL				
								20	40	60	80		
			8	2	El.=409.5 SANDY SHALE moderately weathered, dark gray and orange, with sandstone seams	ROCK							50/2"
20			9	0	El.=407.9 AUGER REFUSAL AND BOTTOM OF BORING AT ABOUT 20 FEET								50/1"
22.5													
25													
27.5													
30													
32.5													
35													

LOG OF BORING NO.B-3

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 23-35033

Location: Shown on attached Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% < #200	HAND PENETROMETER, TSF				BLOWS PER FT	
								LAB. COHESION, TSF					
					Surface Description= Grass Cover Root Mat - 5 inches			0.4	0.8	1.2	1.6		
								WATER CONTENT, %					
								PL	LL				
								20	40	60	80		
0					El.=432.0								
			1	15	FILL - predominantly lean clay with silt seams brown								5
2.5			2	18	- predominantly a mixture of lean clay and silty sand, brown, dark brown, and orange-brown below about 2 feet, trace gravel and wood pieces								16
			3	5		FILL							30
5			4	0									12
7.5													
			5	12	El.=423.5 SILTY CLAY, with rootlets (original topsoil) very stiff, dark brown	CL-ML							25
10					El.=423.0 FAT CLAY very stiff, light gray, brown, and reddish brown, laminated	CH							
12.5													
			7	15	El.=418.5 WEATHERED CLAYEY SHALE very soft, intensely weathered, brown, dark brown, gray, and orange-brown, with thin fat clay seams and sandstone seams	ROCK							97
15													
17.5													

COMPLETION DEPTH: 20 ft.

DATE: 12/5/2023

RIG: Diedrich D-50, Track-Mounted, Auto Hammer Assisted

DEPTH TO WATER: DURING DRILLING: 18.5 ft

AT COMPLETION: Dry

AT 24 HOURS: Backfilled



LOG OF BORING NO.B-3

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 23-35033

Location: Shown on attached Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% < #200	HAND PENETROMETER, TSF ■				BLOWS PER FT	
								LAB. COHESION, TSF ▲					
								0.4	0.8	1.2	1.6		
								WATER CONTENT, % ●					
								PL	LL				
								20	40	60	80		
			8	13	WEATHERED SANDY SHALE very soft, intensely weathered, brown, dark brown, and grayish brown El.=413.5'	ROCK		●					28/6", 50/3"
20					AUGER REFUSAL AND BOTTOM OF BORING AT ABOUT 20 FEET El.=412.0'								
22.5													
25													
27.5													
30													
32.5													
35													

LOG OF BORING NO.B-4

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 23-35033

Location: Shown on attached Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% <#200	HAND PENETROMETER, TSF ■				BLOWS PER FT
								LAB. COHESION, TSF ▲				
								0.4	0.8	1.2	1.6	
								WATER CONTENT, % ●				
								PL	-----		LL	
								20	40	60	80	
0					Surface Description= Crushed Gravel El.=430.0							
			1	14	CRUSHED GRAVEL = 6 inches El.=429.6							
					FILL - predominantly poorly graded sand, with clay brown and orange	FILL						13
2.5			2	0								13
					POSSIBLE FILL - predominantly sandy lean clay to clayey sand tan, brown and dark gray, moist El.=426.5	FILL	57					5
5			4	14	CLAYEY SAND El.=425.0 very loose, brown, red and orange	SC	42					3
7.5												
					CLAYEY SAND, with gravel very dense, tan and orange, with residual shale structure, fat clay pockets and shale fragments El.=421.5	SC						60
10			6	8	WEATHERED SANDY SHALE El.=420.0 very soft, intensely weathered, brown, light gray, and orange, with sandstone seams							50/2"
12.5												
						ROCK						50/5"
15			7	11								
17.5												

COMPLETION DEPTH: 20.08 ft.

DEPTH TO WATER: DURING DRILLING: Dry

DATE: 11/30/2023

AT COMPLETION: Dry

RIG: Geoprobe 3100GT, Truck-Mounted, Auto Hammer Assisted

AT 24 HOURS: Backfilled



LOG OF BORING NO.B-4

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 23-35033

Location: Shown on attached Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	%<#200	HAND PENETROMETER, TSF ■				BLOWS PER FT	
								LAB. COHESION, TSF ▲					
								0.4	0.8	1.2	1.6		
								WATER CONTENT, % ●					
								PL	LL				
								20	40	60	80		
			8	2	El.=411.5 SANDY SHALE soft, moderately weathered, dark gray and orange, with sandstone seams	ROCK							50/2"
20			9	1	El.=409.9 AUGER REFUSAL AND BOTTOM OF BORING AT ABOUT 20 FEET								50/1"
22.5													
25													
27.5													
30													
32.5													
35													

LOG OF BORING NO.B-5

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 23-35033

Location: Shown on attached Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% <#200	HAND PENETROMETER, TSF ■				BLOWS PER FT
								LAB. COHESION, TSF ▲				
					Surface Description= Grass Cover Root Mat - 5 inches			0.4	0.8	1.2	1.6	
								WATER CONTENT, % ●				
								PL	LL			
								20	40	60	80	
0					El.=432.0							
1			1	18	POSSIBLE FILL - predominantly silty clayey sand, with gravel orange, red, dark brown and dark gray, with shale fragments							11
2.5			2	14	- predominantly clayey sand with shale fragments below about 2 feet		47					20
3			3	16	- predominantly silty sand, with shale and wood fragments below about 3½ feet	FILL						11
5			4	13								10
7.5												
10			5	18	El.=423.5 SANDY LEAN CLAY medium stiff to very stiff, orange, red and gray						3.0	6
11			6	14		CL					3.0	16
12.5												
15			7	15	El.=418.5 CLAYEY SHALE soft, intensely weathered, light gray, orange and tan, with fat clay seams and sandstone seams	ROCK						38
17.5												

COMPLETION DEPTH: 20.58 ft.

DEPTH TO WATER: DURING DRILLING: Dry

DATE: 11/30/2023

AT COMPLETION: Dry

RIG: Geoprobe 3100GT, Truck-Mounted, Auto Hammer Assisted

AT 24 HOURS: Backfilled

LOG OF BORING NO.B-5

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 23-35033

Location: Shown on attached Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	%<#200	HAND PENETROMETER, TSF ■				BLOWS PER FT
								LAB. COHESION, TSF ▲				
								0.4	0.8	1.2	1.6	
								WATER CONTENT, % ●				
								PL	LL			
								20	40	60	80	
					El.=413.5							
20			8	13	<u>WEATHERED SANDY SHALE</u> soft, intensely weathered, light gray and tan, with fat clay seams	ROCK		●				13/6" 50/3"
			9	1	El.=411.4 AUGER REFUSAL AND BOTTOM OF BORING AT ABOUT 20½ FEET							50/1"
22.5												
25												
27.5												
30												
32.5												
35												

LOG OF BORING NO.B-6

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 23-35033

Location: Shown on attached Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	%<#200	HAND PENETROMETER, TSF				BLOWS PER FT
								LAB. COHESION, TSF	WATER CONTENT, %			
								0.4	0.8	1.2	1.6	
								PL	LL			
								20	40	60	80	
0					Surface Description= Concrete							
					CONCRETE = 5 inches							
					CRUSHED GRAVEL = 1 inch							
			1	18	FILL - predominantly sandy lean clay, with gravel							4
2.5			2	11	brown, orange and gray, with shale fragments and ferrous nodules							7
			3	9	- predominantly clayey sand, with shale fragments below about 2 feet	FILL						6
5			4	0								5
7.5												
			5	10	POSSIBLE FILL - predominantly clayey sand, with gravel	FILL	38					2
10			6	16	SANDY LEAN CLAY							5
					medium stiff, orange, red, and brown, with ferrous nodules							
12.5												
			7	6	- soft below about 13½ feet	CL						4
15												
17.5					SANDSTONE							

COMPLETION DEPTH: 27.5 ft.

DEPTH TO WATER: DURING DRILLING: Dry

DATE: 11/30/2023

AT COMPLETION: Dry

RIG: Geoprobe 3100GT, Truck-Mounted, Auto Hammer Assisted

AT 24 HOURS: Backfilled

LOG OF BORING NO.B-6

AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road, Ozark, Arkansas



Fayetteville, AR

Project No.: 23-35033

Location: Shown on attached Boring Location Diagram

DEPTH, FT	SYMBOL	SAMPLES	SAMPLE No.	RECOVERY (in.)	DESCRIPTION OF MATERIAL	USCS	% <#200	HAND PENETROMETER, TSF ■				BLOWS PER FT
								LAB. COHESION, TSF ▲				
								0.4	0.8	1.2	1.6	
								WATER CONTENT, % ●				
								PL	LL			
								20	40	60	80	
20			Run 1		<u>SANDSTONE</u> soft, intensely weathered, brown, orange, and gray <u>RUN 1: 17½ to 22½ feet</u> REC = 48% RQD = 0%	ROCK						
22.5					<u>RUN 2: 22½ to 27½ feet</u> REC = 38% RQD = 0%							
25			Run 2		El.=406.0 <u>SANDY SHALE</u> very soft, intensely weathered, dark gray, with fat clay seams	ROCK						
27.5					El.=402.5 AUGER REFUSAL AT ABOUT 17½ FEET BOTTOM OF BORING AT ABOUT 27½ FEET							
30												
32.5												
35												



Boring B-11

Run 1: 17.5 to 22.5 feet: REC = 48%, RQD = 0%

Run 2: 22.5 to 27.5 feet: REC = 38%, RQD = 0%

SOIL CLASSIFICATION LEGEND

APPARENT CONSISTENCY OF COHESIVE SOILS (PECK, HANSON & THORNBURN 1974, AASHTO 1988)				
Descriptor	SPT N ₆₀ (blows/foot)*	Pocket Penetrometer, Qp (tsf)	Torvane (tsf)	Field Approximation
Very Soft	< 2	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	2 – 4	0.25 – 0.50	0.12 – 0.25	Easily penetrated several inches by thumb
Medium Stiff	5 – 7	0.50 – 1.0	0.25 – 0.50	Penetrated several inches by thumb w/moderate effort
Stiff	8 – 12	1.0 – 2.0	0.50 – 1.0	Readily indented by thumbnail
Very Stiff	12 – 30	2.0 – 4.0	1.0 – 2.0	Indented by thumb but penetrated only with great effort
Hard	> 30	> 4.0	> 2.0	Indented by thumbnail with difficulty

* Using SPT N₆₀ is considered a crude approximation for cohesive soils.

APPARENT DENSITY OF COHESIONLESS SOILS (AASHTO 1988)	
Descriptor	SPT N ₆₀ Value (blows/foot)
Very Loose	0 – 3
Loose	4 – 8
Medium Dense	9 – 29
Dense	30 – 49
Very Dense	≥ 50

MOISTURE (ASTM D2488-06)	
Descriptor	Criteria
Dry	Absence of moisture, dusty, dry to the touch, well below optimum moisture content (per ASTM D698 or D1557)
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table, well above optimum moisture content (per ASTM D698 or D1557)

PERCENT OR PROPORTION OF SOILS (ASTM D2488-06)	
Descriptor	Criteria
Trace	Particles are present but estimated < 5%
Few	5 – 10%
Little	15 – 25%
Some	30 – 45%
Mostly	50 – 100%
Percentages are estimated to nearest 5% in the field. Use "about" unless percentages are based on laboratory testing.	

SOIL PARTICLE SIZE (ASTM D2488-06)	
Descriptor	Size
Boulder	> 12 inches
Cobble	3 to 12 inches
Gravel - Coarse Fine	¾ inch to 3 inches No. 4 sieve to ¾ inch
Sand - Coarse Medium Fine	No. 10 to No. 4 sieve (4.75mm) No. 40 to No. 10 sieve (2mm) No. 200 to No. 40 sieve (.425mm)
Silt and Clay ("fines")	Passing No. 200 sieve (0.075mm)

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D2488)				
Major Division		Group Symbol	Description	
Coarse Grained Soils (more than 50% retained on #200 sieve)	Gravel (50% or more retained on No. 4 sieve)	Clean Gravel	GW	Well-graded gravels and gravel-sand mixtures, little or no fines
		Gravel with fines	GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
			GM	Silty gravels and gravel-sand-silt mixtures
	Sand (> 50% passing No. 4 sieve)	Clean sand	GC	Clayey gravels and gravel-sand-clay mixtures
			SW	Well-graded sands and gravelly sands, little or no fines
		Sand with fines	SP	Poorly-graded sands and gravelly sands, little or no fines
SM			Silty sands and sand-silt mixtures	
Fine Grained Soils (50% or more passing #200 sieve)	Silt and Clay (liquid limit < 50)	SC	Clayey sands and sand-clay mixtures	
		ML	Inorganic silts, rock flour and clayey silts	
		CL	Inorganic clays of low-medium plasticity, gravelly, sandy & lean clays	
	Silt and Clay (liquid limit > 50)	OL	Organic silts and organic silty clays of low plasticity	
		MH	Inorganic silts and clayey silts	
		CH	Inorganic clays or high plasticity, fat clays	
Highly Organic Soils		OH	Organic clays of medium to high plasticity	
		PT	Peat, muck and other highly organic soils	



GRAPHIC SYMBOL LEGEND		
SPT	⊗	Standard Penetration Test (2" OD), ASTM D1586
GRAB	▴	Grab Sample
ST		Shelby Tube, ASTM D1587 (pushed)
AUGER	■	Boring Advanced Through Drilling
CORE		Rock coring

ROCK CLASSIFICATION LEGEND

WEATHERING DESCRIPTORS FOR INTACT ROCK (USBR, 2001)						
Descriptor	Chemical Weathering-Discoloration-Oxidation		Mechanical Weathering and Grain Boundary Conditions	Texture and Solutioning		General Characteristics
	Body of Rock	Fracture Surfaces		Texture	Solutioning	
Fresh	No discoloration, not oxidized	No discoloration or oxidation	No separation, intact (tight)	No change	No solutioning	Hammer rings when crystalline rocks are struck
Slightly Weathered	Discoloration or oxidation limited to surface or short distance from fractures; some feldspar crystals are dull	Minor or complete discoloration or oxidation of most surfaces	No visible separation, intact (tight)	Preserved	Minor leaching of some soluble minerals may be noted	Hammer rings when crystalline rocks are struck; body of rock not weakened
Moderately Weathered	Discoloration or oxidation extends from fractures usually throughout; Fe-Mg minerals are "rusty," feldspar crystals are "cloudy"	All fracture surfaces are discolored or oxidized	Partial separation of boundaries visible	Generally preserved	Soluble minerals may be mostly leached	Hammer does not ring when rock is struck; body of rock is slightly weakened
Intensely Weathered	Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent or chemical alteration produces in-situ disaggregation	All fracture surfaces are discolored or oxidized; surfaces are friable	Partial separation; rock is friable; granitics are disaggregated in semi-arid conditions	Altered by chemical disaggregation such as via hydration or argillation	Leaching of soluble minerals may be complete	Dull sound when struck with hammer; usually can be broken with moderate to heavy manual pressure or by light hammer blow; rock is significantly weakened
Decomposed	Discolored or oxidized throughout, but resistant minerals such as quartz may be unaltered; all feldspars and Fe-Mg minerals are completely altered to clay		Complete separation of grain boundaries (disaggregation)	Resembles a soil; partial or complete remnant rock structure may be preserved; leaching of soluble minerals usually complete		Can be granulated by hand; resistant minerals such as quartz may be present as "stringers" or "dikes"

RELATIVE STRENGTH OF INTACT ROCK	
Descriptor	Uniaxial Compressive Strength (psi)
Extremely Hard	> 30,000
Very Hard	14,500 – 30,000
Hard	7,000 – 14,500
Moderately Hard	3,500 – 7,000
Soft	700 – 3,500
Very Soft	150 – 700
Extremely Soft	< 150

BEDDING SPACING (modified USBR, 2001)	
Descriptor	Thickness or Spacing
Massive	> 10 feet
Very thickly bedded	3 to 10 feet
Thickly bedded	1 to 3 feet
Moderately bedded	3-5/8 inches to 1 foot
Thinly Bedded	1-1/4 inches to 3-5/8 inches
Very thinly bedded	3/8 inch to 1-1/4 inches
Laminated	< 3/8 inch

CORE RECOVERY CALCULATION (%)
= $\frac{\text{length of recovered core pieces}}{\text{total length of core run}} \times 100\%$

RQD CALCULATION (%)
= $\frac{\text{length of intact core pieces} > 4 \text{ in}}{\text{total length of core run (inches)}} \times 100\%$



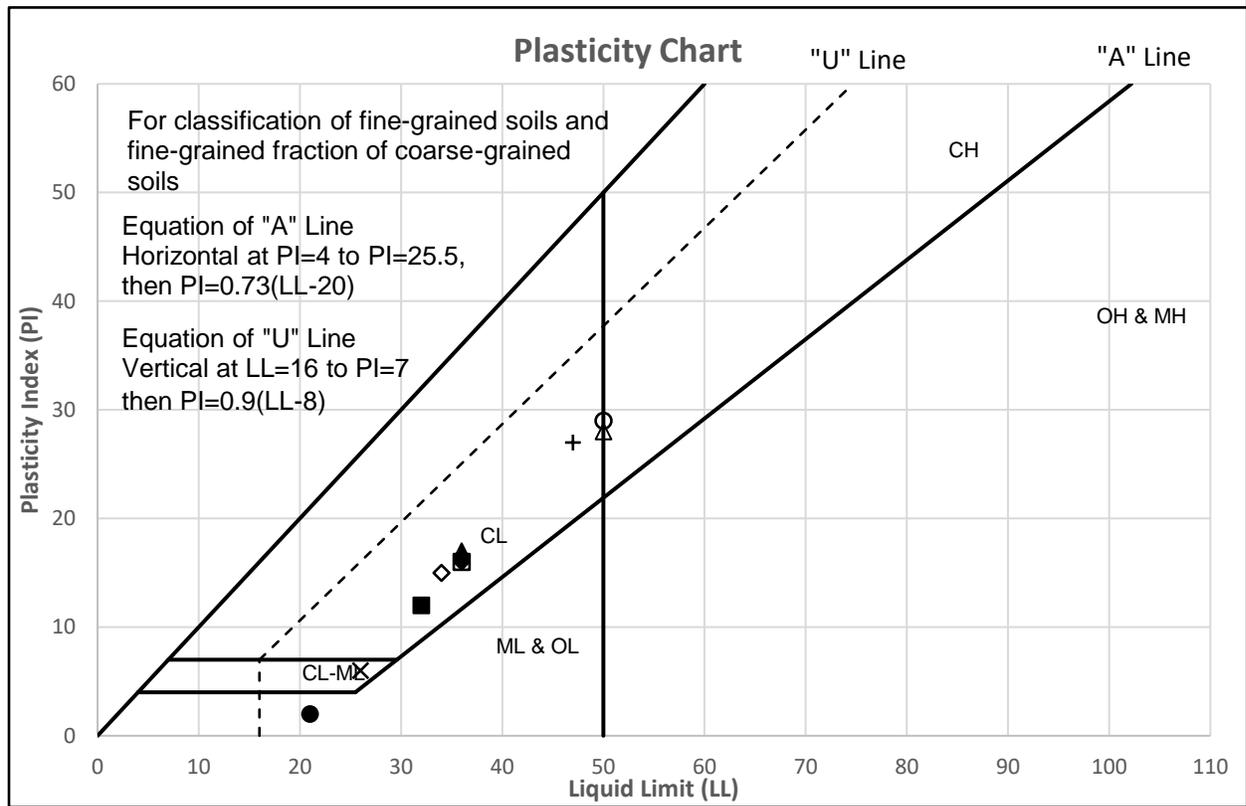
ROCK HARDNESS (modified USBR, 2001)	
Descriptor	Criteria
Extremely hard	Cannot be scratched with pocket knife or sharp pick; can only be chipped with repeated heavy hammer blows
Very hard	Cannot be scratched with pocket knife or sharp pick; breaks with repeated heavy hammer blows
Hard	Can be scratched with pocket knife or sharp pick with heavy pressure, heavy hammer blows required to break specimen
Moderately hard	Can be scratched with pocket knife or sharp pick with light or moderate pressure; breaks with moderate hammer blows
Moderately soft	Can be grooved 1/16 inch with pocket knife or sharp pick with moderate or heavy pressure; breaks with light hammer blow or heavy hand pressure
Soft	Can be grooved or gouged with pocket knife or sharp pick with light pressure; breaks with light to moderate hand pressure
Very soft	Can be readily indented, grooved, or gouged with fingernail, or carved with pocket knife; breaks with light hand pressure



APPENDIX B

Results of Laboratory Classification Tests
Grain Size Distribution
Results of Unconfined Compression Strength Tests

Results of Laboratory Classification Tests



	Boring No	Depth (ft)	LL	PL	PI	% Fines	USCS Classification
■	DH-A, S-2	2 - 3.5	32	20	12	---	Lean Clay, CL
□	DH-D, S-2	2 - 3.5	36	20	16	---	Lean Clay, CL
◆	DH-D, S-3	3.5 - 5	36	20	16	---	Lean Clay, CL
◇	DH-H, S-1	0.5 - 2	34	19	15	---	Lean Clay, CL
●	DH-K, S-1	0.5 - 2	21	19	2	---	Silt, ML
○	DH-K, S-4	5 - 6.5	50	21	29	---	Fat Clay, CH
▲	DH-L, S-2	2 - 3.5	36	19	17	---	Lean Clay, CL
△	DH-L, S-3	3.5 - 5	50	22	28	---	Fat Clay, CH
+	DH-O, S-4	5 - 6.5	47	20	27	---	Lean to Fat Clay, CL-CH
×	DH-Z, S-1	0.5 - 2	26	20	6	---	Silty Clay, CL-ML

Planned AECC Fitzhugh Generating Station Improvements
6006 Lock and Dam Road
Osark, Arkansas

GTS Project No. 24-35001



GTS, Inc.

Geotechnical & Testing Services

16220 Alexander Road, Suite A
Alexander, Arkansas 72002

Office: (501) 794-3500

Office Locations

Fayetteville, Arkansas
Fort Smith, Arkansas
Tulsa, Oklahoma
Dallas, Texas

PROJECT: AECC Fitzhugh Generating Station
6006 Lock and Dam Rd **DATE:** 6/18/2024
Ozark, Arkansas

JOB NO: 24-35001

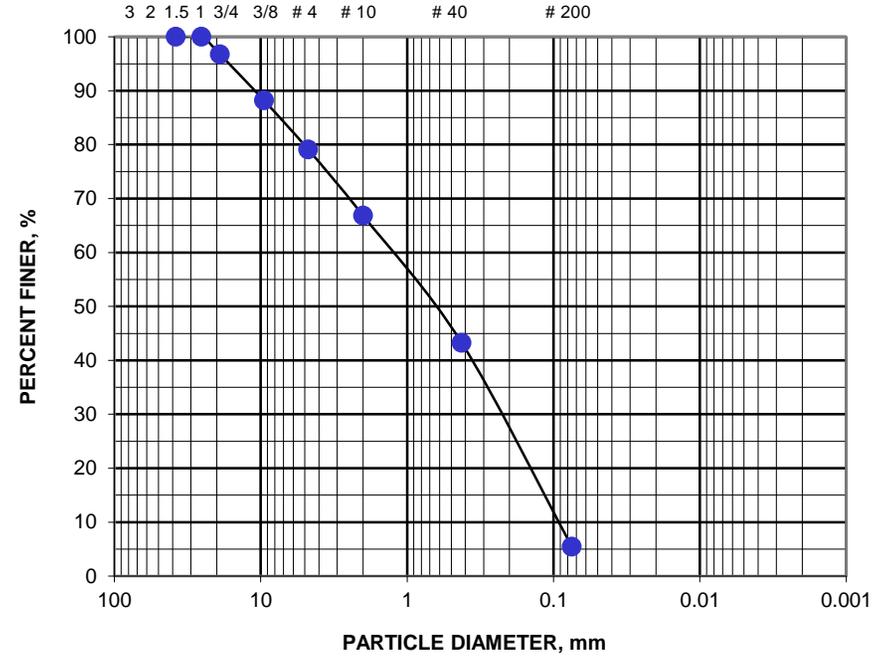
		SIEVE SIZE	PERCENT PASSING
BORING NO.	DH-M	3.00"	100
SAMPLE NO.	S-3	1.50"	100
		1.00"	100
DEPTH (FT)	3.5 - 5	3/4"	97
		3/8"	88
LIQUID LIMIT	Not Tested	No. 4	79
		No. 10	67
PLASTIC LIMIT	Not Tested	No. 40	43
		No. 200	5
PLASTICITY INDEX	Not Tested	MOISTURE CONTENT (%)	4

VISUAL DESCRIPTION	brown, trace rounded pebbles
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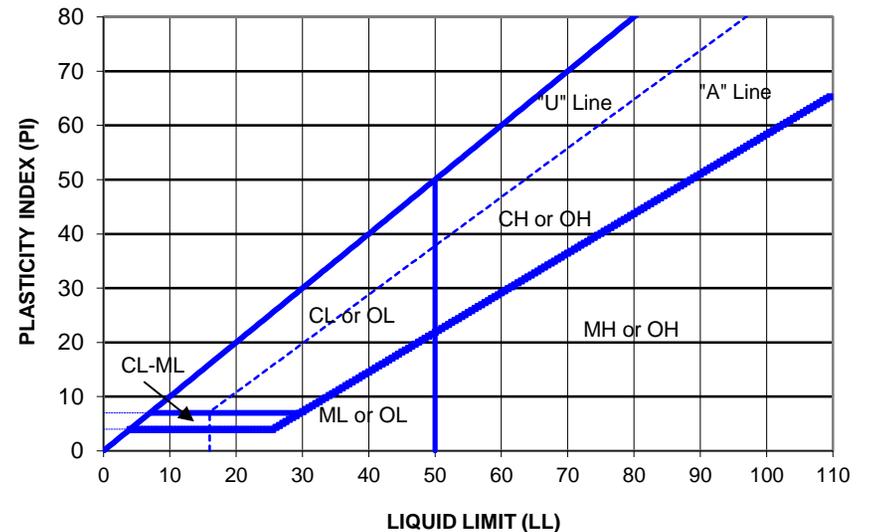
ASTM DESCRIPTION	AASHTO CLASSIFICATION	AASHTO GI
Poorly Graded Sand with Clay and Gravel, SP-SC	A-2-6	0

GRAIN SIZE DISTRIBUTION CURVE

U.S. STANDARD SIEVE OPENINGS IN INCHES & STANDARD SIEVE NUMBERS



PLASTICITY CHART



GTS Project No. 24-35001
AECC Fitzhugh Power Generating Station Improvements
6006 Lock and Dam Road
Ozark, Arkansas
Results of Unconfined Compression Strength Tests



Rock Core ID #	Sample Depth (ft)	Weight of Core (lbs)	Cylinder Diameter (in)	Cylinder Height (in)	Area (sq in)	L/D	Date Tested	Load (lbs)	Unconfined Compressive Strength (psi)	Unit Weight (pcf)
DH-L	18	1.12	1.85	4.40	2.67	2.4	6/17/2024	19,130	7,151	164
DH-L	22	1.16	1.85	4.54	2.69	2.5	6/17/2024	23,780	8,856	164
DH-S	24	1.06	1.88	4.37	2.79	2.3	6/17/2024	26,230	9,402	150
DH-S	29	1.21	1.85	4.81	2.68	2.6	6/17/2024	22,250	8,298	163
DH-T	22.5	0.99	1.81	4.12	2.59	2.3	6/17/2024	21,320	n/a	161
DH-T	26.5	1.29	1.82	5.22	2.61	2.9	6/17/2024	n/a	not tested	164
DH-V	21.5	0.94	1.85	3.77	2.69	2.0	6/17/2024	6,460	2,401	160
DH-V	26	1.23	1.85	4.86	2.70	2.6	6/17/2024	19,950	7,388	162



APPENDIX C

Drilled Pier Foundation Design Tables



APPENDIX C: Design Table A.1

Axial Compression and Uplift Design Capacities

TABLE A.1

**GENERALIZED PROFILE AT EXISTING GRADE
AXIAL COMPRESSION AND UPLIFT
DESIGN CAPACITIES
PLANNED FITZHUGH GENERATING STATION IMPROVEMENTS
AECC THOMAS B. FITZHUGH POWER GENERATING STATION
OZARK, ARKANSAS**

Soil Layer	Depth to Bottom of Soil Layer (feet)	Effective Unit Weight (pcf)	Undrained Shear Strength (psf)	Friction Angle (degrees)	Ultimate Side Friction ^{1,2}		Ultimate Bearing Pressure ³ (psf)
					Initial Value (psf)	Increase per Foot of Depth (psf)	
1	13.5	115	1,500	0	825	---	9,000
2	18.5	68	6,500	0	4000	---	60,000
3	34	78	10,000	0	6000	---	90,000

NOTES:

1. The ultimate side friction values are based on a rectangular pressure distribution for cohesive soils. The top 3 feet of soils should be ignored.
2. For uplift conditions, the skin friction should be multiplied by 0.9 for clays and 1.0 for rock.
3. A minimum depth of 2 feet or a depth equivalent to 1 pier diameter (D), whichever is greater, of penetration into the bearing material is required.
4. Design depth to subsurface water is about 13.5 feet.
5. The foundation designer should apply appropriate factors of safety consistent with the structure use and industry standards.

TABLE A.2
GENERALIZED PROFILE AT ELEVATION 423 FEET
AXIAL COMPRESSION AND UPLIFT
DESIGN CAPACITIES
PLANNED FITZHUGH GENERATING STATION IMPROVEMENTS
AEC THOMAS B. FITZHUGH POWER GENERATING STATION
OZARK, ARKANSAS

Soil Layer	Depth to Bottom of Soil Layer (feet)	Effective Unit Weight (pcf)	Undrained Shear Strength (psf)	Friction Angle (degrees)	Ultimate Side Friction ^{1,2}		Ultimate Bearing Pressure ³ (psf)
					Initial Value (psf)	Increase per Foot of Depth (psf)	
1	5	115	1,500	0	869	---	---
2	10	130	6,500	0	1950	---	39,000
3	25.5	78	10,000	0	3000	---	90,000

NOTES:

1. The ultimate side friction values are based on a rectangular pressure distribution for cohesive soils, and a triangular distribution for cohesionless soils. The top 4 feet of soils should be ignored.
2. For uplift conditions, the skin friction should be multiplied by 0.7 for sands and gravels, 0.9 for clays, and 1.0 for rock.
3. A minimum depth of 2 feet or a depth equivalent to 1 pier diameter (D), whichever is greater, of penetration into the bearing material is required. Alternately, it is acceptable to use an end bearing pressure calculated by taking a weighted average of the unit end bearing pressure value within 2D of the bottom of the bearing elevation.
4. Design depth to subsurface water is about 5 feet.
5. The foundation designer should apply appropriate factors of safety consistent with the structure use and industry standards.



APPENDIX C: Design Table B.1

Lateral Capacity Analyses Design Soil and Rock Parameters

TABLE B.1

**GENERALIZED PROFILE AT EXISTING GRADE
LATERAL CAPACITY ANALYSES
DESIGN SOIL AND ROCK PARAMETERS FOR
UNDRAINED CONDITIONS
PLANNED FITZHUGH GENERATING STATION IMPROVEMENTS
AECC THOMAS B. FITZHUGH POWER GENERATING STATION
OZARK, ARKANSAS**

Soil Layer	LPILE Soil Type	Depth to Soil Layer		LPILE Soil Modulus k ² (pci)	Effective Unit Weight (pcf)	Undrained Shear Strength ⁴ (psf)	Internal Friction Angle (degrees)	RQD ³ (%)	LPILE Soil Strain Factor e ₅₀ /k _{rm}	
		Top (feet)	Bottom (feet)							
1	Stiff Clay without Free Water	3	0	13.5	525	115	1500	0	----	0.008
2	Weak Rock	9	13.5	18.5	20,000	68	100	0	0	0.0005
3	Weak Rock	9	18.5	34	20,000	78	100	0	25	0.0005

NOTES:

1. Design depth to subsurface water is about 13.5 feet.
2. Value given for Weak Rock is E_{ri} in psi.
3. Value given for RQD estimated from field data and sample examination.
4. Uniaxial compressive strength for rock, in psi.

TABLE B.2

**GENERALIZED PROFILE AT ELEVATION 423 FEET
LATERAL CAPACITY ANALYSES
DESIGN SOIL AND ROCK PARAMETERS FOR
UNDRAINED CONDITIONS
PLANNED FITZHUGH GENERATING STATION IMPROVEMENTS
AECC THOMAS B. FITZHUGH POWER GENERATING STATION
OZARK, ARKANSAS**

Soil Layer	LPILE Soil Type	Depth to Soil Layer		LPILE Soil Modulus k ² (pci)	Effective Unit Weight (pcf)	Undrained Shear Strength ⁴ (psf)	Internal Friction Angle (degrees)	RQD ³ (%)	LPILE Soil Strain Factor e ₅₀ /k _{rm}
		Top (feet)	Bottom (feet)						
1	Stiff Clay without Free Water	3	0	525	115	1500	0	----	0.008
2	Weak Rock	9	5	18,056	130	90	0	0	0.0005
3	Weak Rock	9	10	20,000	78	100	0	25	0.0005

NOTES:

1. Design depth to subsurface water is about 5 feet.
2. Value given for Weak Rock is E_r in psi.
3. Value given for RQD estimated from field data and sample examination.
4. Uniaxial compressive strength for rock, in psi.



APPENDIX C: Design Table C.1

MFAD 5.0 /HFAD 5.0 Analyses Design Soil and Rock Parameters

TABLE C.1

**GENERALIZED PROFILE AT EXISTING GRADE
MFAD 5.0™ / HFAD 5.0™ ANALYSES
DESIGN SOIL AND ROCK PARAMETERS
PLANNED FITZHUGH GENERATING STATION IMPROVEMENTS
AECC THOMAS B. FITZHUGH POWER GENERATING STATION
OZARK, ARKANSAS**

Layer Number	Layer Type	Depth to Bottom of Layer (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Effective Friction Angle (degrees)	Undrained Soil Shear Strength (ksf)	Ultimate Rock/Concrete Bond Strength (ksf)
1	Soil	13.5	115	0.97	0	1.5	---
2	Weak Rock	18.5	130	440	33	2.5	7
3	Weak Rock	34	140	1440	39	3.7	25

NOTES:

1. Design depth to subsurface water is about 13.5 feet.

TABLE C.2

**GENERALIZED PROFILE AT ELEVATION 423 FEET
MFAD 5.0TM / HFAD 5.0TM ANALYSES
DESIGN SOIL AND ROCK PARAMETERS
PLANNED FITZHUGH GENERATING STATION IMPROVEMENTS
AECC THOMAS B. FITZHUGH POWER GENERATING STATION
OZARK, ARKANSAS**

Layer Number	Layer Type	Depth to Bottom of Layer (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Effective Friction Angle (degrees)	Undrained Soil Shear Strength (ksf)	Ultimate Rock/Concrete Bond Strength (ksf)
1	Soil	5	115	0.97	0	1.5	---
2	Weak Rock	10	130	440	33	2.5	7
3	Weak Rock	25.5	140	1440	39	3.7	25

NOTES:

1. Design depth to subsurface water is about 5 feet.