INITIAL SAFETY FACTOR ASSESSMENT

40 CFR 257.73 (e)

Ash Pond

Kammer Site

Moundsville, West Virginia

May, 2026

Prepared for: Franklin Realty

Prepared by: American Electric Power Service Corporation

1 Riverside Plaza

Columbus, OH 43215

Kammer Ash Pond

Initial Safety Factor Assessment

PREPARED BY Dan Murphy DATE _____

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Dan Murphy, P.E.

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APPROVED BY David Anthony Miller DATE 04.23.2026

David Anthony Miller, P.E.

Director- Ash Management Services

I certify to the best of my knowledge, information, and belief that the information contained in this safety factor assessment meets the requirements of 40 CFR § 257.73(e)

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Attachment A: Initial Safety Factor Assessment Report

1.0 OBJECTIVE

The "Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals From Electric Utilities; Legacy CCR Surface Impoundments", 89 Fed. Reg. 38950 (May 8, 2024) (amending 40 C.F.R. §257) requires owners and operators of facilities with a legacy coal combustion residual (CCR) surface impoundment to prepare an initial safety factor assessment document for each legacy CCR surface impoundment at the facility.

The Ash Pond at the Kammer Site is subjected to this rule

2.0 DESCRIPTION OF THE CCR UNIT

The Former Kammer Site is located at 7897 Energy Road, Moundsville West Virginia. The latitude/longitude of the facility is: 39°50'25"N / 80°49'22" W. The Ash Pond is approximately 20 acres. The Kammer Power Plant was placed in service in 1958 and subsequently retired in May of 2015.

The Ash Pond is located near the Ohio River on the south side of the plant property. The Ash Pond is created by dikes on three sides of the impoundment. The Ash Pond abuts a 345 kV substation on the northern side. The exterior slopes are generally 2 horizontal: 1 vertical or flatter while the interior slopes are generally 1.75 horizontal on 1 vertical or flatter. The crest of the dike is at elevation 640 ft-msl and the bottom of the pond is noted as elevation 612.5 ft-msl on record drawings. Original grades varied across the Ash Pond site between 625 and 638 ft-msl.

In its current configuration, the Ash Pond is separated into a northern portion and a southern portion by a splitter dike for controlling flow and to create a working surface for excavation equipment. The splitter dike has a concrete flume at the eastern end of the dike which allows water to pass to the southern portion of the pond.

The discharge structure is a pipe and riser type structure located at the southern end of the Ash Pond. The riser structure is made of reinforced concrete and sloped to match the interior slope of the dike. The outlet pipe is a 36" concrete pipe that outlets 10 feet below the navigational pool of Hanibal Lock and Dam. The pond water surface elevation is controlled by stop logs that are inserted into groove on the riser structure. The main inflow into the Ash Pond would have come from the north when the plant was operational.

3.0 SAFETY FACTOR ASSESSMENT 257.73(e)

The Initial Safety Factor Assessment was prepared by Civil and Environmental Consultants, Inc. and is included as Attachment A.

The most critical failure surfaces of the perimeter dike of the Ash Pond (defined as those with the lowest computed FS that could result in a dike breach exposing the CCR material to the Ohio River) meet the required FS values. Therefore, it is concluded that the Kammer Ash Pond dikes are stable and meet the stability FS required by 40 CFR §257.73(e).

ATTACHMENT A

Initial Safety Factor Assessment Report

January 16, 2026

Mr. Dan Murphy – Engineering Principal
American Electric Power
8500 Smiths Mill Road
New Albany, OH 43054
dsmurphy1@aep.com

Dear Mr. Murphy:

Subject: Initial Safety Factor Assessment Report
AEP Kammer Plant Ash Pond
Moundsville, West Virginia
CEC Project 345-817-0004

Civil & Environmental Consultants, Inc. (CEC), presents our Initial Safety Factor (ISF) Assessment Report for the Ash Pond located within American Electric Power (AEP) Kammer Plant (Kammer) in Moundsville, West Virginia. This report presents a summary of the encountered subsurface conditions, laboratory data, geotechnical engineering analyses, and dike slope stability safety factor conclusions in accordance with the requirements set forth for legacy Coal Combustion Residual (CCR) impoundments as stated in the Code of Federal Regulations (CFR) §257.73(e).

The explorations and preparation of this report were performed in general accordance with the Consulting Contract 20007918 Blanket Contract 296070x103 between American Electric Power and CEC dated 11/3/2009, and AEP's authorized Change Order with CEC's Confirming Proposal for Professional Services dated April 28, 2025 under AEP's Purchase Order No. 81411574.

CEC appreciates this opportunity to provide continued services to AEP for Kammer. We look forward to serving as your geotechnical and environmental engineering consultant throughout the project. Please contact us if you have any questions regarding the information presented in this report.

Sincerely,

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.,

John B. Gronnett IV, P.E.
Project Manager

Anthony P. Amicon, P.E.
Vice President

Attachments: Initial Safety Factor Assessment Report

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INITIAL SAFETY FACTOR ASSESSMENT REPORT

AEP KAMMER PLANT ASH POND
MOUNDSVILLE, WEST VIRGINIA

Prepared for:

AMERICAN ELECTRIC POWER
1 RIVERSIDE PLAZA
COLUMBUS, OHIO 43215

Prepared by:

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
CINCINNATI, OHIO

CEC Project 345-817-0004

January 16, 2026

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ENGINEER'S VERIFICATION STATEMENT

I hereby certify that the Initial Safety Factor Assessment has been performed in accordance with the requirements outlined in the Code of Federal Regulations (CFR) §257.73(e).

Anthony P. Amicon, P.E.
Civil & Environmental Consultants, Inc.

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this report is to evaluate the factors of safety (FS) associated with the American Electric Power (AEP) Kammer Plant legacy Ash Pond exterior embankments (i.e., dikes) at selected critical locations in accordance with the requirements of CFR §257.73(e).

In specific, CFR §257.73(e) states that:

> (1): *The owner or operator must conduct an initial and periodic safety factor assessments for each CCR unit and document whether the calculated factors of safety for each CCR unit achieve the minimum safety factors specified in paragraphs (e)(1)(i) through (iv) of this section for the critical cross section of the embankment. The critical cross section is the cross section anticipated to be the most susceptible of all cross sections to structural failure based on appropriate engineering considerations, including loading conditions. The safety factor assessments must be supported by appropriate engineering calculations.*
>
> > *(i) The calculated static factor of safety under the long-term, maximum storage pool loading condition must equal or exceed 1.50.*
> >
> > *(ii) The calculated static factor of safety under the maximum surcharge pool loading condition must equal or exceed 1.40.*
> >
> > *(iii) The calculated seismic factor of safety must equal or exceed 1.00.*
> >
> > *(iv) For dikes constructed of soils that have susceptibility to liquefaction, the calculated liquefaction factor of safety must equal or exceed 1.20.*
>
> *(2) The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the initial assessment and each subsequent periodic assessment specified in paragraph (e)(1) of this section meets the requirements of this section.*

1.2 SCOPE OF SERVICES

The scope of services performed by Civil & Environmental Consultants, Inc. (CEC), to meet the intended purpose included: review of published geologic data, review historical information provided by AEP (i.e., reports, photographs, drawings, etc.), observance of current site conditions, collection of soil and rock samples from borings, laboratory testing of selected soil samples

obtained from the borings, performance of geotechnical engineering analyses, and preparation of this summary report. The developed information and conclusions contained within this summary report include the following:

- A summary of the project information;
- A review of our field and laboratory test procedures and the results of testing conducted;
- A review of subsurface soil and water conditions encountered in the borings;
- A summary of the geotechnical engineering analyses performed (i.e., slope stability and liquefaction); and,
- Conclusions related to the conformance of the Ash Pond with the requirements set forth in CFR §257.73(e).

This report has been prepared for AEP to be used solely in evaluating the Ash Pond as it relates to CFR §257.73(e). The report has not been prepared for use in design, determining volumes, nor for use by other parties, and may not contain sufficient information for purposes not specifically addressed herein.

1.3 STANDARD OF CARE

The services performed by CEC were conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the geotechnical engineering profession practicing contemporaneously under similar conditions in the locality of the project. No other warranty, expressed or implied, is made. Appendix I contains a document entitled "Important Information About This Geotechnical-Engineering Report." This document further explains the realities of geotechnical engineering and the limitations that exist in evaluating geotechnical issues.

2.0 PROJECT INFORMATION

The former AEP Kammer Plant (Kammer) is located near Moundsville, West Virginia and bordered to the east by West Virginia State Highway 2 and to the west by the Ohio River. The Ash Pond is situated in the approximate southwestern quadrant of Kammer between the Ohio River and the Baltimore and Ohio Railroad. The approximate location of Kammer is depicted on the enclosed Site Location Map (Figure 1). The approximate limits of the Ash Pond are depicted on the enclosed Site and Vicinity Aerial Map (Figure 2).

The following sections discuss our understanding of the historical information (i.e., drawings, aerial photographs, design documents, etc.) and current conditions/water levels at the Ash Pond.

2.1 HISTORICAL INFORMATION

Kammer was operated by AEP beginning in 1958 and ceased operations in 2015. Based on historical photographs provided by AEP and a historical design plan titled "Excavation Plan" prepared by Ohio Power Company and dated March 16, 1966 (Historical Plans), a single 'triangular' shaped pond was excavated to an elevation of about 612.5 feet above mean sea level (amsl) and the material excavated was re-used to construct a perimeter dike. The Historical Plans indicate that the interior slope of the perimeter dike was to be constructed at a uniform slope of 1.75 Horizontal to 1 Vertical (1.75H:1V). Further, the exterior slope of the perimeter dike adjacent to the Ohio River was to be constructed at a slope of 2.5H:1V with a crest width of 10 feet and top of dike elevation between 639 and 641 feet amsl. The pond outlet was planned to consist of a 36-inch diameter reinforced concrete pipe (RCP) located at the southwest corner of the pond exiting into the Ohio River.

At the time of construction, the Ohio River normal pool elevation was at approximately 610 feet amsl. In 1965, the Pike Island Lock and Dam was completed upstream of Kammer and in 1975 the Hannibal Lock and Dam was completed downstream of Kammer. The addition of these locks and dams raised the Ohio River normal pool to the current normal pool elevation of about 623 feet amsl in the vicinity of Kammer.

Around 2006, the larger pond appears to have been subdivided into multiple smaller ponds by constructing interior 'splitter' dikes. The splitter dikes were constructed to allow access for excavators to clean out the pond.

Based on the information contained in a letter from United States Army Corps of Engineers (USACE) dated September 23, 2002, rip rap was planned to be installed atop an approximately 785 feet long section of the southwest, exterior dike slope adjacent to the Ohio River. Cross sections in this document depict the rip rap was planned to have a tiered installation as follows: 1) about 4 feet thick from elevation 620 to 628 feet amsl; 2) 3 feet thick from 628 to 634 feet amsl; and, 3) 2 feet thick from 634 to 640 feet amsl.

2.2 CURRENT TOPOGRAPHY AND WATER LEVELS

Based on the existing topography obtained from a survey performed by CEC dated August, 2025 and included on Figure 3 (Boring Location Plan), the perimeter dikes of the Ash Pond have a crest elevation of about 639 to 641 feet amsl. The exposed portion of the exterior slope of the perimeter dike of the Ash Pond adjacent to the Ohio River (i.e., above normal pool elevation of about 623 feet amsl) has a gradient ranging from approximately 0.5H:1V to 3H:1V. Below the water surface of the Ohio River, the ground surface becomes less steep with a downward gradient of about 3H:1V to 6H:1V.

The water level in the Ash Pond was near 630 feet amsl (i.e., at the spillway structure outlet impounded water was overtopping the weir notches that have been set at about elevation 630 feet amsl) at the time of the survey.

3.0 SITE INVESTIGATION AND EXPLORATION PROGRAM

3.1 FIELD EXPLORATIONS

The soil and groundwater conditions were explored by drilling eleven test borings (designated as Borings AP-2 through AP-9, BG-2, BG-4, and MW-1). The test boring locations were selected by CEC to provide general coverage along the western exterior dike of the Ash Pond (adjacent to the Ohio River) and establish a west to east cross section across the footprint of the Ash Pond that were suitable to evaluate subsurface soil and groundwater conditions for slope stability analyses. The boring program was performed concurrently with the groundwater monitoring program for the Ash Pond, which included the installation of deep monitoring wells at each of the referenced boring locations. The groundwater monitoring details are contained in a separate report.

Each test boring location and ground surface elevation was established in the field by CEC surveyors. The individual test boring logs (included within Appendix II) include the established test boring coordinate location (based on West Virginia State Plane North NAD83) and corresponding ground surface elevation. The approximate boring locations are depicted on Figure 2 (Site and Vicinity Aerial Map) and Figure 3 (Boring Location Plan) enclosed within this report.

A pre-drilling program was performed to confirm underground utilities were not present prior to performing boring procedures. The pre-drilling was accomplished between May and June, 2025. R.B. Jergens Construction, Inc. (Jergens), was subcontracted by CEC to attempt vacuum excavations to an approximate depth of 6 feet below ground surface (bgs) at each planned boring location prior to beginning the drilling. During advancement of these excavations, at approximate 1-foot intervals, a grab sample of the excavated material was collected using a shovel, post hole digger or hand auger. The excavations were backfilled with sand.

Subsequent to the pre-drilling, a test boring exploration program was initiated. CEC subcontracted RockWater Drilling, Inc. (RockWater) to perform the drilling services using an all-terrain vehicle (ATV) mounted drill rig, equipped with 4.25-inch inner diameter hollow-stem augers. In

order to evaluate the subsurface conditions, the borings were extended as appropriate through fill, native soils, and bedrock to the termination depths, which varied from approximately 23 to 88 feet bgs. As each boring was advanced, disturbed soil samples were obtained at selected depths. The disturbed soil samples were generally obtained at 2.5-foot intervals to a depth of 20 feet bgs, and then at 5 feet intervals using a split-spoon sampler in accordance with the Standard Penetration Test (SPT) (American Society for Testing and Materials [ASTM] D-1586). The SPT sampling consisted of driving a 2-inch outer diameter split barrel sampler using a 140-pound hammer freely falling a distance of 30 inches. The number of blows required to drive the sampler over three successive 6-inch increments was recorded. The first 6-inch increment is considered a seating interval and was not used to estimate soil conditions. The sum of blows for the second and third driving increments is considered the SPT value or "N" value of the soil. The N value is used to estimate the relative density of coarse-grained soil or the consistency of fine-grained soil. Where the split spoon sampler is advanced less than 6 inches in 50 blows, it is indicated as 50 over the number of inches per 6-inch interval. CEC field personnel also obtained undisturbed soil samples using a 3-inch inside diameter Shelby Tube sampler (in accordance with ASTM D-1587). The soil/rock samples obtained during the boring program were visually observed in the field by the CEC field representative and preserved for review by the CEC Geotechnical Engineer and for potential laboratory testing.

Due to significant heaving caused by artesian groundwater pressures associated with the Ohio River, RockWater switched to a sonic drilling method in Boring AP-3 between depths of approximately 45 and 65 feet. The Sonic drill rig was equipped with a 4-inch diameter inner core barrel and outer steel casing that is 7 inches in diameter (both in 10-foot long sections) in general accordance with ASTM D-6914 (Standard Practice for Sonic Drilling for Site Characterization).

Groundwater level measurements were obtained during the drilling operations. After completing the borings, groundwater monitoring wells were installed in each boring with the details contained in a separate report. The exception was Borings AP-8 and AP-9, which were grouted after removal of the augers.

The field exploration program was coordinated by the Geotechnical Engineer. A CEC representative, under the direction of the Geotechnical Engineer, supervised the drilling and sampling operations, and performed the following specific duties: 1) reviewed soil and rock samples recovered from the test borings; 2) described the soil color, texture, apparent origin, and relative moisture content of the soil samples obtained; 3) preserved representative portions of the soil and rock samples; 4) prepared a field log of each boring; 5) made seepage and groundwater observations; and, 6) estimated unconfined shear strength value of soil specimens exhibiting cohesion (using a Hand Penetrometer). The field logs were reviewed and modified by the Geotechnical Engineer, as needed, based on a review of the developed field information and soil and rock samples. The final boring logs are included in Appendix II. Appendix II also contains a summary of the definitions for standard terms and symbols used in the boring logs.

3.2 LABORATORY TESTING

Prior to shipment to the laboratory, the soil and bedrock samples obtained from the investigation program were visually reviewed by CEC's Geotechnical Engineer to aid in the evaluation of the engineering properties of the subsurface soils and rock. The information was used to modify the soil and rock descriptions contained on the field logs where necessary. In addition, representative samples were selected for laboratory testing. The laboratory program, performed by Geotechnical Testing Services, Inc. (GTS), included:

- ASTM D 2216 – Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- ASTM D 422/6913 – Standard Test Method for Particle-Size Analysis of Soils/ Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis
- ASTM D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort
- ASTM D2487 – Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
- ASTM D4318 – Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- ASTM D2850 – Standard Test Method for Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils

- ASTM D4767 – Standard Test Method for Consolidated Undrained Triaxial Compression Test for Cohesive Soils
- ASTM D3080 – Standard Test Method for Direct Shear Test of Soils Under Consolidated Drained Conditions

The individual laboratory data sheets and results are included in Appendix III. A summary of the laboratory test results is presented in Table 1 (enclosed separately). The final boring logs also include the moisture content, Atterberg Limits, and grain size test results in graphical form.

4.0 EXPLORATORY FINDINGS

4.1 SITE GEOLOGY

According to United States Geological Survey (USGS), the primary natural overburden soil type consists of Quaternary Alluvial Deposits comprised of sand, gravel, silt, and clay along the Ohio River basin. Based on the USGS, bedrock in the vicinity of the site belongs to the Monongahela Group formed during the Paleozoic-Pennsylvanian age, which consists of sandstone, shale, siltstone, coal, and limestone layers.

4.2 SUBSURFACE CONDITIONS

The subsurface soils encountered during CEC's explorations are described on each test boring log presented in Appendix II. These logs represent CEC's interpretation of the subsurface conditions encountered at each boring location based on field logs prepared by CEC's field representative, visual review of the soil samples by the Geotechnical Engineer, and laboratory test results. The lines designating the interfaces between various soil/rock strata on the boring logs represent the approximate interface location: the actual transition between strata may be gradual and indistinct. The subsurface soil, rock, and groundwater characterizations included herein, including summary test data, are based on the subsurface findings from the geotechnical explorations performed by CEC between May and August, 2025 and monitoring well readings in August 2025.

In addition to the individual boring logs, two Subsurface Diagrams have been prepared and included with this report (Figures 4 and 5) which are based on Cross Sections A-A' and B-B' as depicted on the Boring Location Plan (Figure 3). The Subsurface Diagrams includes a graphical interpretation of the soil/rock strata identified in the borings, representative boring data (N values, Hand Penetrometer readings and groundwater levels), current ground surface, 1966 ground surface, 1966 proposed ground surface, Ohio River normal pool elevation, interpreted ground water surface, existing roadway, and a general interpretation of the soil/rock strata between the borings. At Cross Section A-A', the exterior slope was planned to be 2.5H:1V, suggesting that fill was placed atop the exterior slope to establish the current ground surface sometime after

construction. Because of this, we have separated the dike fill into "1966 Dike Fill" and "Dike Fill after 1966".

The subsurface explorations generally encountered about 2 to 8 inches of surficial material (generally topsoil) atop existing fill soils. The previously placed fill was present in each boring to a depth of about 8.5 and 23.5 feet bgs. The fill primarily consisted of relatively compact soils that were variable with respect to composition. The natural deposits encountered underlying the existing fill, are generally characterized as alluvium. Based on variations in the material type, the alluvial deposits are separated into two distinct layers defined as Upper and Lower Alluvium. The Upper Alluvium generally consists of weaker cohesive soils to a depth of about 33.5 to 48.5 feet bgs or elevations of about 591 to 629 feet amsl. The Lower Alluvium (underlying the Upper Alluvium) was generally medium dense granular soils that extend to the bedrock surface at a depth of about 63 to 84 feet bgs or between elevation 569 and 619 feet amsl. The following subsections present a more detailed description of the encountered subsurface conditions.

4.2.1 Surficial Materials

Topsoil was encountered at the ground surface in each boring except Borings AP-4 and AP-5 and measured approximately 2 to 5 inches in thickness (averaging about 3 inches thick). Gravel (roadway base material) was present in Borings AP-4 and AP-5 and measured approximately 5 to 8 inches in thickness. The surficial material thicknesses measured at each of the boring locations is documented on the individual Boring logs in Appendix II.

4.2.2 Existing Fill

Fill materials were encountered to depths of between about 8.5 and 23.5 feet bgs or to elevations between about 618.5 and 651.5 feet amsl. Overall, the existing fill material identified by the test boring program generally consisted of non-CCR fill material. However, at select locations and depths CCR material was visually identified during the sampling. A general description of the Non-CCR Fill Material and CCR Fill Material are provided in the following subsections.

4.2.2.1 Non-CCR Fill Material

Soil visually identified as previously placed non-CCR fill was encountered beneath the surficial material in each of the borings. Overall, previously placed non-CCR fill was encountered to a depth of about 8.5 to 23.5 feet bgs. The non-CCR fill is variable with respect to composition and comprised of soils described on the boring logs as lean clay, sandy lean clay, gravelly lean clay, silt, sandy silt, clayey sand, well-graded sand, poorly-graded sand, well-graded gravel, and poorly-graded gravel using the Unified Soil Classification System (USCS).

Based on Atterberg Limits test results from select samples, the Liquid Limit values range from 27 to 44 and Plastic Limit values range from 15 to 21 percent, respectively. Moisture content results from representative soil samples of the cohesive, non-CCR fill generally ranged from about 15 to 22 percent with an average of 18 percent. In addition, two Standard Proctor tests were performed on recompacted samples of the fill material that yielded maximum dry densities of 108.5 and 113.9 pound per cubic foot (pcf) with associated optimum moisture contents of 15.6 and 13.6 percent, respectively.

With regard to consistency, the cohesive non-CCR fill soils were generally described as stiff to very stiff with unconfined compressive strength values (estimated by means of a Hand Penetrometer) ranging from about 1.0 to 2.5 tons per square foot (tsf) with an average of about 1.5 tsf and N values generally ranging from about 4 to 15 blows per foot (bpf) with an average of about 9 bpf. Two Consolidated Undrained Triaxial Compressive Strength tests performed on a relatively undisturbed samples of the fill material yielded moist unit weights of 118.9 to 125.1 pcf, effective shear strengths of 32.9 and 34.3 degrees with 0.6 and 0.4 pounds per square inch (psi) cohesion, respectively, and total shear strengths (R Envelope) of 12.7 and 23.0 degrees with 2.2 and 0.7 psi cohesion, respectively. A Direct Shear test performed on a relatively undisturbed sample of the fill material yielded a moist unit weight of 119.5 pcf and an effective shear strength of 33.1 degrees with 0.9 psi cohesion. An Unconsolidated Undrained Triaxial Compressive Strength test performed on a relatively undisturbed sample of the fill yielded a moist unit weight of 130.2 pcf and an undrained shear strength of 12.4 psi.

4.2.2.2 CCR Fill Material

The presence of CCR was encountered in Borings AP-2, AP-6, AP-8, AP-9, and BG-2. The CCR fill material consisted of bottom ash described on the test boring logs as poorly-graded sand and silty sand in accordance with the USCS, fly ash described on the test boring logs as silt in accordance with the USCS, or non-CCR fill intermixed with bottom ash/fly ash material. Table 2 below summarizes the locations and depths/elevations of observed CCR material.

Table 2: Summary of CCR Data

Boring No.	Approximate CCR Depths (feet bgs)	Approximate Elevations (feet amsl)	CCR Description
AP-2	4.0-5.0	637.6-636.6	Poorly-graded sand intermixed with bottom ash
	5.0-6.0	636.6-635.6	Poorly-graded sand (Bottom Ash)
	6.0-7.3	635.6-634.3	Silt intermixed with fly ash
	7.3-8.5	634.3-633.1	Poorly-graded sand intermixed with bottom ash
AP-6	4.0-5.0	634.3-635.3	Lean clay with sand intermixed with bottom ash
AP-8	8.5-16.3	626.0-618.2	Silty sand (Bottom Ash)
AP-9	6.5-16.5	628.3-618.3	Silt (Fly Ash)
BG-2	18.5-23.5	633.9-628.9	Silty sand intermixed with bottom ash

4.2.3 Alluvium

Alluvium was encountered beneath the existing fill material in the borings. Overall, the alluvial deposits were encountered at depths of about 8.5 to 23.5 feet bgs. A distinct variation within the alluvial strata across the explorations is the transition from relatively weak cohesive alluvium to medium dense granular alluvium at a depth of about 33.5 to 48.5 feet bgs or elevations of about 591 to 629 feet amsl. As a result of this distinct stratum change, our description of the natural soil strata has been separated into two soil layers which are designated herein as: 1) Upper Alluvium; and, 2) Lower Alluvium. Additional detail regarding these soil strata is provided in the following subsections.

4.2.3.1 Upper Alluvium

The upper alluvial soils were encountered immediately beneath the existing fill with the exception of Boring BG-2, which did not encounter the upper alluvium. The upper alluvium is variable with respect to composition. However, in general, the upper alluvium is cohesive soil that transitions into granular soil. Overall, the soils are described on the boring logs as lean clay, sandy lean clay, sandy silt, sandy silty clay, fat clay, clayey gravel, silty sand, well-graded sand, and poorly-graded sand in accordance with USCS.

Based on Atterberg Limits test results from select samples, the Liquid Limit values range from 22 to 60 and Plastic Limit values range from 14 to 26 percent, respectively. Moisture content results from representative soil samples of the upper cohesive alluvium generally ranged from about 18 to 23 percent with an average of 20 percent.

With regard to consistency, the cohesive alluvial deposits were generally described as very soft to stiff with unconfined compressive strength values (estimated by means of a Hand Penetrometer) ranging from about 0.25 to 1.5 tsf with an average of about 0.75 tsf and N values generally ranging from 0 (weight of hammer) to about 5 bpf, with an average of about 2 bpf. Granular alluvial deposits in this stratum were generally described as very loose to loose with corresponding N values ranging from 1 to 9 bpf with an average of 4 bpf. A Consolidated Undrained Triaxial Compressive Strength test performed on a relatively undisturbed sample of the upper alluvium yielded a moist unit weight of 130.9 pcf, an effective shear strength of 31.6 degrees with 0.8 psi cohesion and a total shear strength (R envelope) of 15.2 degrees with 3.0 psi cohesion. Two Direct Shear tests performed on relatively undisturbed samples of the upper alluvium yielded moist unit weights of 124.0 to 125.3 pcf and effective shear strengths of 29.0 and 33.7 degrees with 0.6 and 0.4 psi cohesion, respectively. Two Unconsolidated Undrained Triaxial Compressive Strength tests performed on relatively undisturbed samples of the upper alluvium yielded moist unit weights of 129.3 to 135.4 pcf and undrained shear strengths of 3.6 and 6.2 psi.

4.2.3.2 Lower Alluvium

The lower alluvial soils were encountered immediately beneath the upper alluvial soils except for Boring BG-2. The lower alluvium was generally granular and comprised of soils described on the boring logs as silty sand, well-graded sand, poorly-graded sand, and poorly-graded gravel in accordance with USCS. The granular alluvial deposits were generally described as medium dense to dense with corresponding N values ranging from 11 to 40 bpf with an average of 21 bpf. In Boring BG-4, a cohesive stratum of sandy silt was identified between depths of about 43.5 to 48.5 feet bgs.

4.2.4 Residuum

Naturally occurring residual soils (Residuum), derived from complete weathering of the parent bedrock, was encountered underlying the lower alluvium in Boring AP-6 at a depth of about 48.5 feet bgs, corresponding to an elevation of about 575 feet amsl. The residual soil was visually classified as lean clay per USCS.

4.2.5 Bedrock

Highly weathered shale bedrock with thin interbedded limestone layers was visually observed in each of the borings except for Borings AP-8 and AP-9. The encountered bedrock surface appears to be relatively level in the north-south direction (adjacent to the Ohio River) at a depth of about 63 to 83.5 feet bgs (elevations between about 569 to 575 feet amsl). Perpendicular to the Ohio River (east-west direction), the bedrock surface appears to slope downward from east to west from a depth of about 48.5 to 83.5 feet bgs (elevations between about 569 to 618.5 feet amsl). Auger refusal on bedrock was encountered in each boring except at Borings AP-3, AP-8, AP-9, MW-1D, and BG-4.

4.2.6 Groundwater

Groundwater was immediately observed during drilling in each of the borings at depths ranging

from approximately 6.5 to 28.5 feet bgs (between elevations about 621 and 652 feet amsl).

The groundwater levels from the monitoring wells installed at each boring were obtained after drilling (with the exception of Borings AP-8 and AP-9). Table 3 below summarizes the locations and depths/elevations of the measured groundwater in August 2025.

Table 3: Summary of Groundwater Readings in Monitoring Wells from August 2025

Boring No.	Top of Well (feet amsl)	Approximate Depth to Water (feet)	Approximate Elevation to Water (feet amsl)
AP-2	644.0	20.8	623.2
AP-3	642.9	19.9	623.1
AP-4	642.0	19.0	623.0
AP-5	641.5	18.3	623.3
AP-6	641.6	18.1	623.5
AP-7	642.5	18.8	623.7
MW-1	640.4	17.2	623.2
BG-2	654.9	31.6	623.3
BG-4	669.5	44.2	625.4

5.0 GEOTECHNICAL ENGINEERING ANALYSES

Geotechnical engineering analyses were performed to evaluate the FS associated with the Kammer legacy Ash Pond exterior dikes in accordance with the requirements of CFR §257.73(e). The following subsections describe the selection of the critical cross sections, our selected material design parameters, our interpretation of the loading conditions with associated results of the slope stability analyses, and our evaluation of the liquefaction potential for the Ash Pond dike and foundation soils.

5.1 CRITICAL CROSS SECTION LOCATIONS

CEC utilized the current and historical information described in Section 2.0 in order to select two critical cross section locations for our slope stability analyses. In specific, the locations were selected based on the current and historic slope geometry, proximity to the Ohio River flooding potential, the width of the dike, the proximity of a potential failure surface to expose CCR, and the subsurface soil/groundwater data. Cross Sections A-A' and B-B' (Figures 4 and 5) are depicted on the Boring Location Plan (Figure 3).

5.2 MATERIAL PARAMETER SELECTIONS

With respect to the soil design parameters for slope stability analyses, CEC established values that reflect our interpretation of the soil boring data, laboratory test results, and geotechnical engineering correlations based on site specific soil properties. Table 4 summarizes the material shear strength and unit weight values used in the slope stability and liquefaction analyses.

TABLE 4: MATERIAL DESIGN PARAMETERS					
Soil Description	**Unit Weight (pcf)**	**Effective (Drained) Shear Strength Parameters**		**Total (Undrained) Shear Strength Parameters**	
		c' (psf)	**φ' (degrees)**	**c (psf)**	**φ (degrees)**
1966 Dike Fill	124	50	32	1,000	0
Dike Fill after 1966	124	150	32	1,000	0
CCR	90	0	24	100	0
Upper Alluvium	129	50	31	500	0
Lower Alluvium	130	0	33	0	33
Rock	140	10,000	0	10,000	0
Rip Rap	150	0	38	0	38

5.3 SLOPE STABILITY ANALYSES

CEC developed models at the two selected critical cross sections to analyze the slope stability FS using the software entitled Geostudio by Seequent. The software utilizes two-dimensional (2D) limit equilibrium slope stability techniques to calculate an overall FS. The GLE/Morgensten-Price method was used to evaluate the failure surfaces for the stability analyses. The computer models were developed from CEC's interpretation of the available information which included: 1) the current ground surface; 2) the 1966 existing and proposed ground surfaces; 3) test boring and soil laboratory test data; 4) Ohio River normal pool elevation; 5) water levels in the Ash Pond in August 2025; 6) water level readings from the monitoring wells in August 2025; and, 7) the 1000-year rainfall event in 24 hours, which results in a maximum water level in the Ash Pond of about 633.8 feet amsl (refer to the Initial Inflow Design Flood Assessment [IDF] Report). A surcharge load of about 250 psf was assumed at the ground surface to model vehicle traffic atop the existing roadway.

The FS was evaluated for the exterior slopes of the dike. Further, Cross Section B-B' was analyzed with the presence of the rip rap modification described in Section 2.1. As discussed in Section 2.1,

rip rap was planned to be installed atop an approximately 785 feet long section of the southwest, exterior dike slope adjacent to the Ohio River. For corresponding analyses that included the rip rap as planned, the exterior slope model included: 1) 4 feet thick rip rap layer from elevation 620 to 628 feet amsl; 2) a 3 feet thick rip rap layer from 628 to 634 feet amsl; and, 3) a 2 feet thick rip rap layer from 634 to 640 feet amsl.

The FS was evaluated for both shallow and deep-seated potential failure surfaces. Shallow failure surfaces generally yielded lower factors of safety; however, these are not considered critical to overall dike stability, as their occurrence would not be expected to result in a release of the impounded CCR material. The most critical failure surfaces for this analysis were defined as those with the lowest computed FS that could result in a dike breach exposing the CCR material to the Ohio River (i.e., failure surfaces extending into the CCR).

The following loading conditions were evaluated based on the legacy CCR requirements.

5.3.1 Long Term Maximum Storage Pool Loading Condition

Given that the CCR unit is not active, the long-term maximum storage pool condition was established assuming the steady-state or 'normal' groundwater conditions as follows: the normal pool water level of the Ohio River (elevation 623 feet amsl), the water level in the dike utilizing the monitoring well readings from August 2025, and the water level within the Ash Pond at the time of the recent survey performed by CEC in August 2025. Since the embankment has been constructed for decades, it was assumed that the pore pressures have dissipated and 'drained' conditions apply such that effective stress parameters are appropriate to determine slope stability. Table 5 summarizes the overall lowest FS and the critical FS for each cross section and associated slope.

TABLE 5 - LONG-TERM MAXIMUM STORAGE POOL SLOPE STABILITY RESULTS

Cross Section	Slope	FS (Overall Lowest)	Critical FS (To Expose CCR)	Reference No.
A-A'	Exterior	0.98	1.90	IV-1
B-B'	Exterior	1.86	2.23	IV-2

5.3.2 Maximum Surcharge Pool Loading Condition

The maximum surcharge pool loading condition was analyzed using the 1000-year rainfall event in 24 hours as established in the IDF Report. Under this condition, the maximum water level in the Ash Pond is about 633.8 feet amsl, assuming the Ohio River remains at the normal pool water level. The subsurface water level within the perimeter dike was assumed to be linear between the Ohio River normal pool and the maximum flood level inside the Ash Pond. Table 6 summarizes the overall lowest FS and the critical FS for each cross section and associated slope.

TABLE 6 - MAXIMUM SURCHARGE POOL SLOPE STABILITY RESULTS

Cross Section	Slope	FS (Overall Lowest)	Critical FS (To Expose CCR)	Reference No.
A-A’	Exterior	0.99	1.79	V-1
B-B’	Exterior	1.76	2.06	V-2

5.3.3 Seismic Loading Condition

Shear wave accelerations due to an earthquake was added to the model for the long-term maximum storage pool condition by inputting a seismic coefficient that is equal to the Peak Ground Acceleration (PGA). The PGA for the site is estimated to be about 0.085g based on the United States Geologic Survey (USGS) seismic hazard map information for a seismic loading event with a 2 percent probability of exceedance in 50 years, equivalent to a return period of 2,475 years. Table 7 summarizes the overall lowest FS and the critical FS for each cross section and associated slope after applying the shear wave acceleration.

TABLE 7 – SEISMIC SLOPE STABILITY RESULTS

Cross Section	Slope	FS (Overall Lowest)	FS (To Expose CCR)	Reference No.
A-A’	Exterior	0.86	1.43	VI-1
B-B’	Exterior	1.49	1.61	VI-2

5.3.4 Rapid Drawdown Slope Stability

CFR §257.73(e) does not include a requirement for a rapid drawdown analysis; however, the stability of the dike was evaluated under rapid drawdown conditions considering the Ash Pond is located adjacent to the Ohio River. We have assumed an acceptable FS of 1.1 for the rapid drawdown condition based on minimum guidance for typical dam type structures outlined in USACE's EM 1110-2-1902 dated October 31, 2003. At each cross-section location described in Section 5.1, the exterior dike slopes short-term conditions were evaluated assuming the water level was at the crest of the slope and is lowered instantaneously to the normal pool elevation (i.e., exterior slope lowered to elevation 623 feet amsl for the normal pool of the Ohio River).

The Duncan, Wright, Wong 3 Stage (1990) Method (3 Stage Method) was utilized for the analyses and requires total stress 'R' envelope parameters from the CU Triaxial testing. In addition, the 3 Stage Method utilizes the effective shear strength of the soil. CEC established the values for the "rapid" drawdown that reflect our interpretation of the laboratory test results for materials in Table 8.

TABLE 8 – RAPID DRAWDOWN DESIGN PARAMETERS

Soil Description	Unit Weight (pcf)	Effective (Long Term) Shear Strength Parameters		Total Stress R Envelope Shear Strength Parameters	
		c' (psf)	φ' (degrees)	cR' (psf)	φR' (degrees)
1966 Dike Fill	124	50	32	100	21
Dike Fill after 1966	124	150	32	100	21
CCR	90	0	24	0	24
Upper Alluvium	129	50	31	400	15
Lower Alluvium	130	0	33	0	33
Rock	140	10,000	0	10,000	0
Rip Rap	150	0	38	0	38

Table 9 summarizes the overall lowest FS and the critical FS for each cross section and associated slope.

TABLE 9 – SUMMARY OF DRAWDOWN STABILITY ANALYSES				
Cross Section	**Slope**	**FS (Overall Lowest)**	**FS (To Expose CCR)**	**Reference No.**
A-A’	Exterior	0.38	1.14	VII-1
B-B’	Exterior	1.06	1.48	VII-2

5.4 LIQUEFACTION

The perimeter dikes of the Ash Pond were evaluated for the susceptibility of being impacted by a seismic event due to foundation soil liquefaction in accordance with CFR §257.73(e). The boring data, laboratory results and groundwater levels were utilized in our evaluation to determine the liquefaction potential of the soils. Specifically, the assessment of coarse-grained soils was conducted in accordance with the criteria outlined in “Soil Liquefaction During Earthquakes” by Idriss and Boulanger (2008) while fine-grained soils were evaluated using the procedure proposed by Bray and Sancio (2006) in the “Assessment of the Liquefaction Susceptibility of Fine-Grained Soils”. A description of the coarse and fine-grained assessment for liquefaction potential is provided in the following subsections.

5.4.1 Coarse Grained Soils

In 2008, Idriss and Boulanger presented a spreadsheet to calculate the FS for soil liquefaction, where a FS less than 1.2 indicates liquefaction potential. The calculations require an expected PGA (0.085g) and earthquake magnitude (6.13), which were estimated from the USGS seismic hazard map. In addition to the USGS information, the boring and laboratory data (N-values, water levels, unit weights, and fine contents) were required to estimate the FS for liquefaction. Based on our assessment of the coarse-grained soils within the existing perimeter dike using the procedure outlined by Idriss and Boulanger, the coarse-grained soils encountered have a FS greater than 1.2.

5.4.2 Fine Grained Soils

An assessment by Bray and Sancio was utilized to evaluate the fine-grained soils for liquefaction susceptibility. Research performed by Bray and Sancio published in 2006 gives the following conditions that must be met (based on the soils plasticity and water content) in order for the soil to be considered non-liquefiable.

- If a soil does have some plasticity, even if the Plasticity Index (PI) is less than 12, it may be considered non-liquefiable, provided that the water content is less than 85 percent of the Liquid Limit (LL);
- If the PI is greater than 12, the soil may be considered non-liquefiable, provided that the water content is less than 80 percent of the LL; and,
- If the PI is greater than 18, the soil may be considered non-liquefiable.

Based on our assessment of the fine-grained foundation soils supporting the existing perimeter dikes using the procedure outlined by Bray and Sancio, the fine-grained soils encountered are considered to be non-liquefiable.

6.0 CONCLUSIONS

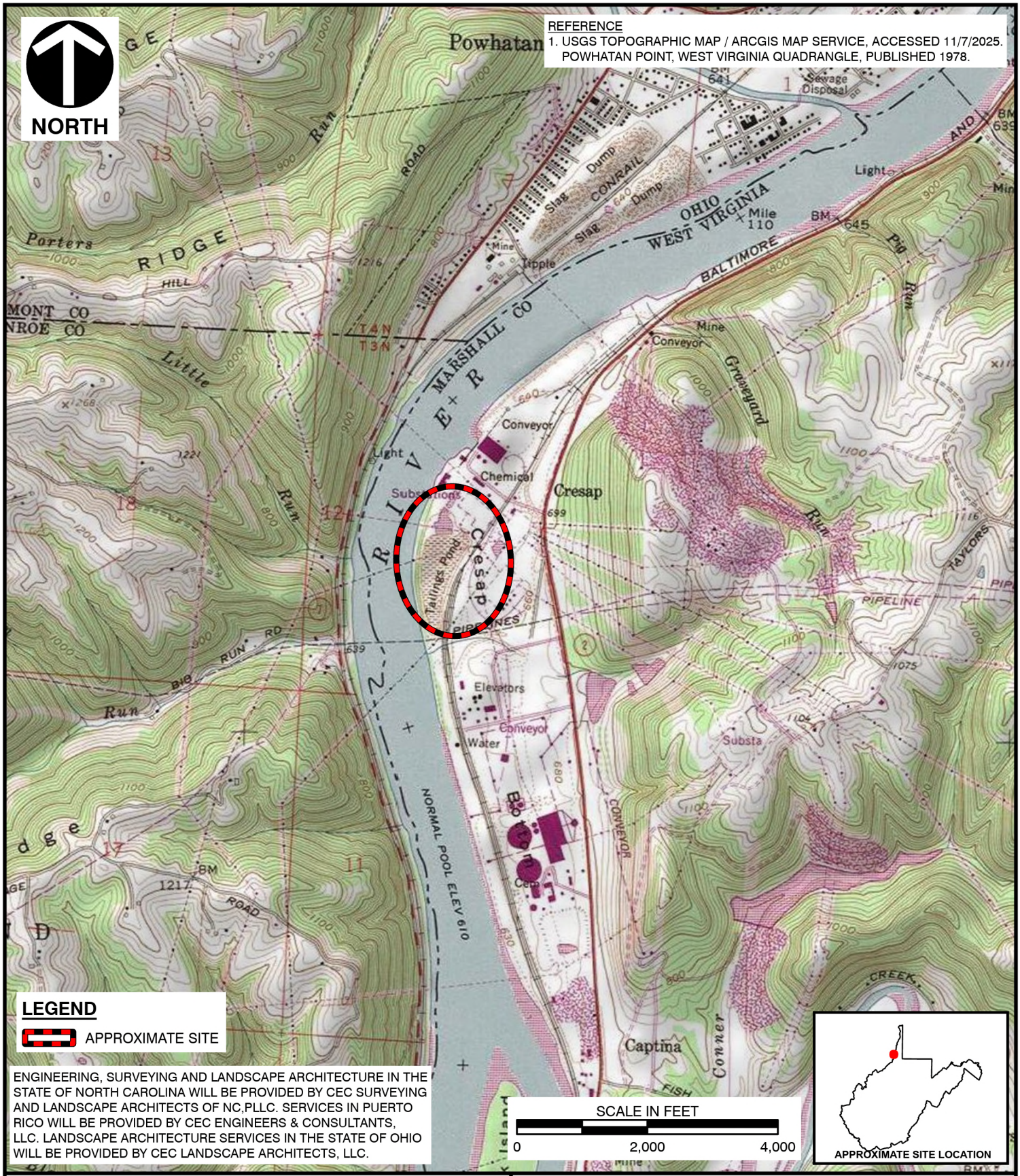
Based on our analyses, as presented in Section 5.0 of this report, the most critical failure surfaces of the perimeter dike of the Ash Pond (defined as those with the lowest computed FS that could result in a dike breach exposing the CCR material to the Ohio River) meet the required FS values. Therefore, CEC concludes that the Kammer Ash Pond dikes are stable and meet the stability FS required by CFR §257.73(e). Table 10 below provides a summary of the slope stability analyses. Based on our evaluations, the soils have a FS greater than 1.2 for soil liquefaction or were considered to be non-liquefiable.

TABLE 10 – SUMMARY OF SLOPE STABILITY ANALYSES

Cross Section	Scenario	CCR Rule	Calculated Critical FS	Required FS per CCR Rule	Acceptable
A-A'	Maximum Storage Pool	257.74(e)(1)(i)	1.90	1.5	yes
	Maximum Surcharge Pool	257.74(e)(1)(ii)	1.79	1.4	yes
	Seismic	257.74(e)(1)(iii)	1.43	1.0	yes
	Rapid Drawdown	Not specified	1.14	1.1[(1)]	yes
B-B'	Maximum Storage Pool	257.74(e)(1)(i)	2.23	1.5	yes
	Maximum Surcharge Pool	257.74(e)(1)(ii)	2.06	1.4	yes
	Seismic	257.74(e)(1)(iii)	1.61	1.0	yes
	Rapid Drawdown	Not Specified	1.48	1.1[(1)]	yes

(1) Assumed using USACE's EM 1110-2-1902

FIGURES



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AMERICAN ELECTRIC POWER
INITIAL SAFETY FACTOR ASSESSMENT
AEP KAMMER PLANT
MOUNDSVILLE, WEST VIRGINIA

SITE LOCATION MAP

DRAWN BY:	SDS	CHECKED BY:	JBG	APPROVED BY:	APA*	FIGURE NO:	1
DATE:	11/7/2025	SCALE:	1"=2,000'	PROJECT NO:	345-817-0004		

*Hand Signature on file

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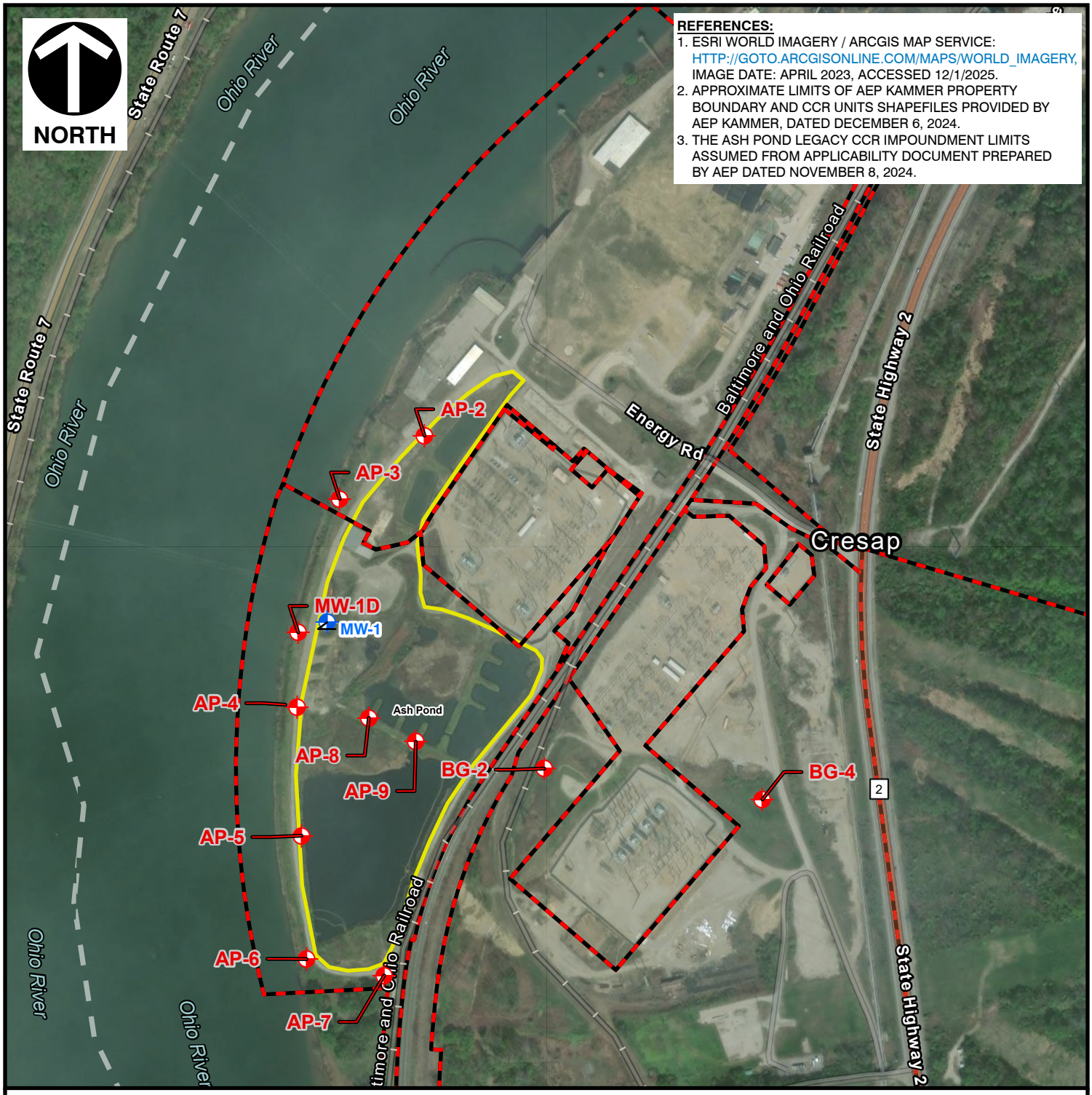

REFERENCES:

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2. APPROXIMATE LIMITS OF AEP KAMMER PROPERTY BOUNDARY AND CCR UNITS SHAPEFILES PROVIDED BY AEP KAMMER, DATED DECEMBER 6, 2024.
3. THE ASH POND LEGACY CCR IMPOUNDMENT LIMITS ASSUMED FROM APPLICABILITY DOCUMENT PREPARED BY AEP DATED NOVEMBER 8, 2024.

LEGEND

- APPROXIMATE LIMITS OF AEP KAMMER PROPERTY BOUNDARY
- ASH POND LEGACY CCR IMPOUNDMENT
- EXISTING MONITORING WELL LOCATION
- GEOTECHNICAL BORING AND MONITORING WELL LOCATION (SHALLOW & DEEP)

SCALE IN FEET

0 500 1,000

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MOUNDSVILLE, WEST VIRGINIA

SITE AND VICINITY AERIAL MAP

DRAWN BY:	SDS	CHECKED BY:	JBG	APPROVED BY:	APA*	FIGURE NO:	2
DATE:	12/1/2025	SCALE:	1"=500'	PROJECT NO:	345-817-0004		

*Hand Signature on file

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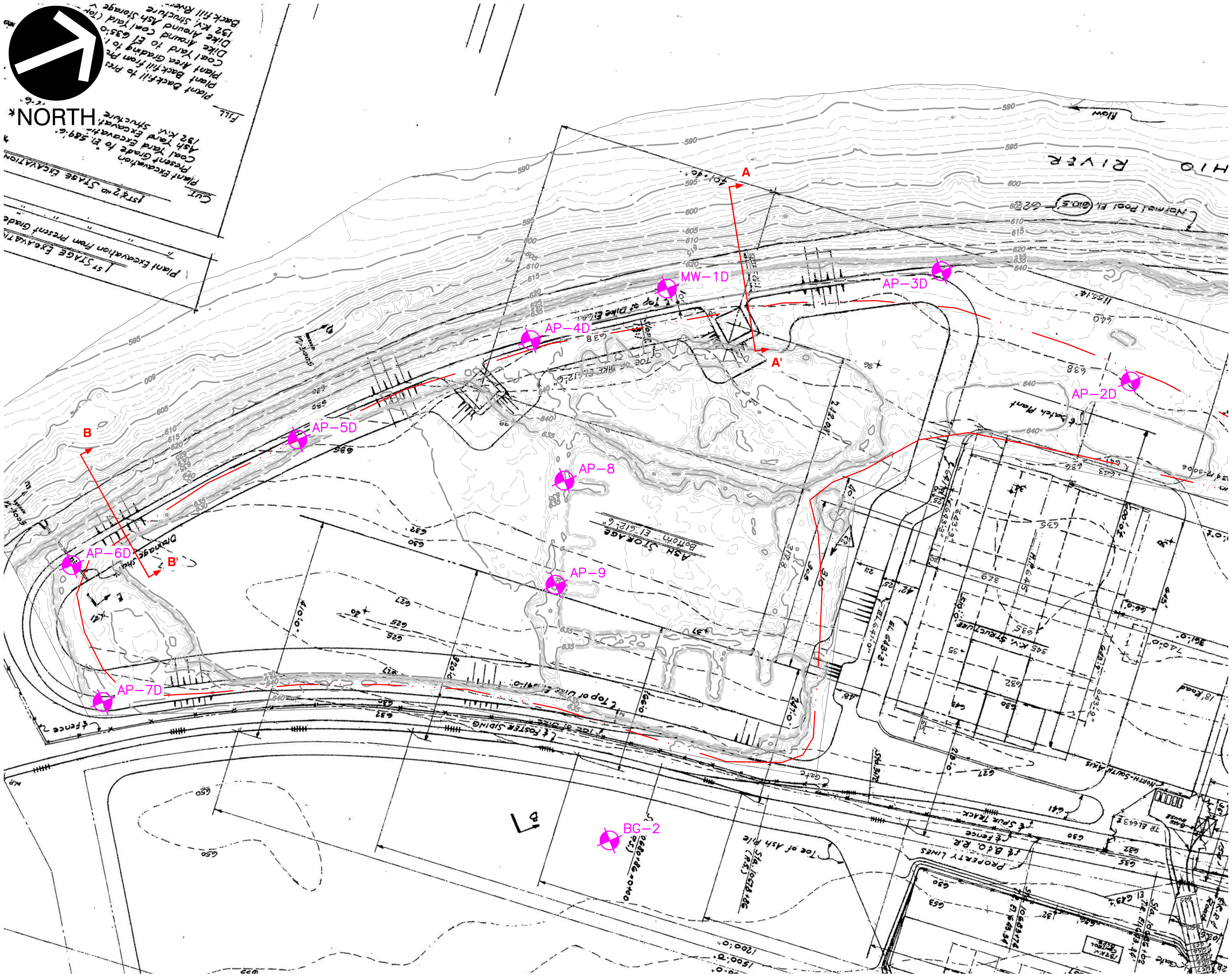

LEGEND

AP-1D	SOIL BORING LOCATION AND NUMBER
630	1966 EXISTING CONTOUR
630	2025 INDEX (MAJOR) EXISTING CONTOUR
	2025 INTERMEDIATE (MINOR) EXISTING CONTOUR
A A'	CROSS SECTION LOCATION
	ASSUMED LIMITS OF ASH POND LEGACY CCR IMPOUNDMENT

SCALE IN FEET

0 200 400

REFERENCES

1. TOPOGRAPHIC INFORMATION FROM SURVEY BY CIVIL & ENVIRONMENTAL CONSULTANTS DATED AUGUST 2025.
2. HISTORICAL TOPOGRAPHY AND LAYOUT SHOWN FROM DRAWING TITLED "EXCAVATION PLAN" BY OHIO POWER COMPANY, DATED MARCH 16, 1966.
3. THE ASH POND LEGACY CCR IMPOUNDMENT LIMITS ASSUMED FROM APPLICABILITY DOCUMENT PREPARED BY AEP DATED NOVEMBER 8, 2024.

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MOUNDSVILLE, WEST VIRGINIA

BORING LOCATION PLAN

DRAWN BY: LRY	CHECKED BY: JO	APPROVED BY: APA	FIGURE NO.: 3
DATE: OCTOBER 2025	DWG SCALE: 1"=200'	PROJECT NO: 345-817-0004	

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Cincinnati, Ohio 45242

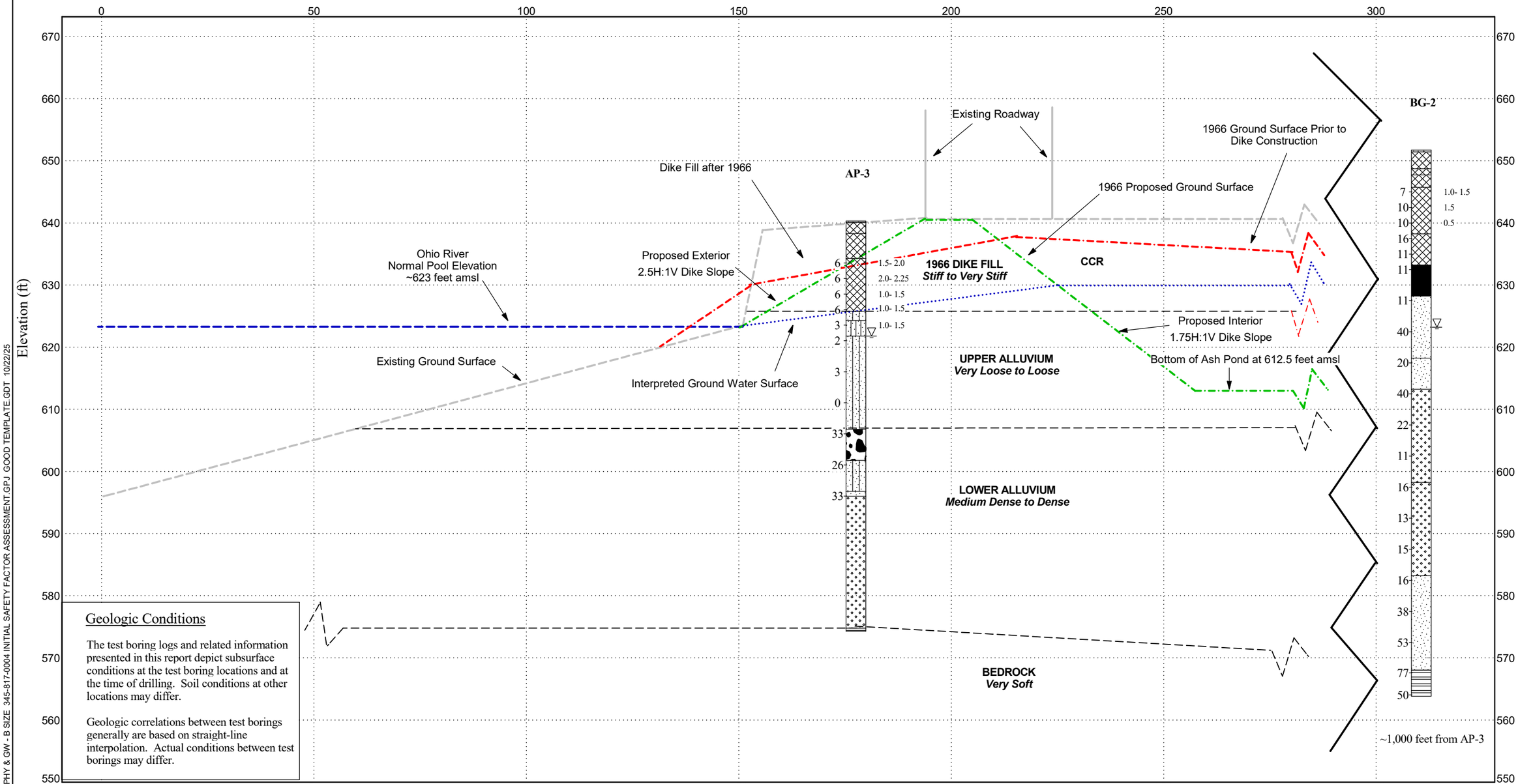
SUBSURFACE DIAGRAM
Cross Section A-A'
Figure 4

CLIENT American Electric Power
PROJECT NUMBER 345-817-0004
PROJECT NAME Kammer-Initial Safety Factor Assessment
PROJECT LOCATION Moundsville, West Virginia

LEGEND

Borehole Number
N Value
Recovery-(RQD)
Pocket Pen. (tsf)

- Water Level At Time of Drilling
- Water Level At End of Drilling
- Water Level After Drilling
- Topsoil
- Existing Fill
- CCR
- Sandy Silt
- Silty Sand
- Poorly-Graded Sand
- Well-Graded Sand
- Well-Graded Gravel
- Shale



Geologic Conditions

The test boring logs and related information presented in this report depict subsurface conditions at the test boring locations and at the time of drilling. Soil conditions at other locations may differ.

Geologic correlations between test borings generally are based on straight-line interpolation. Actual conditions between test borings may differ.

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SUBSURFACE DIAGRAM
Cross Section B-B'
Figure 5

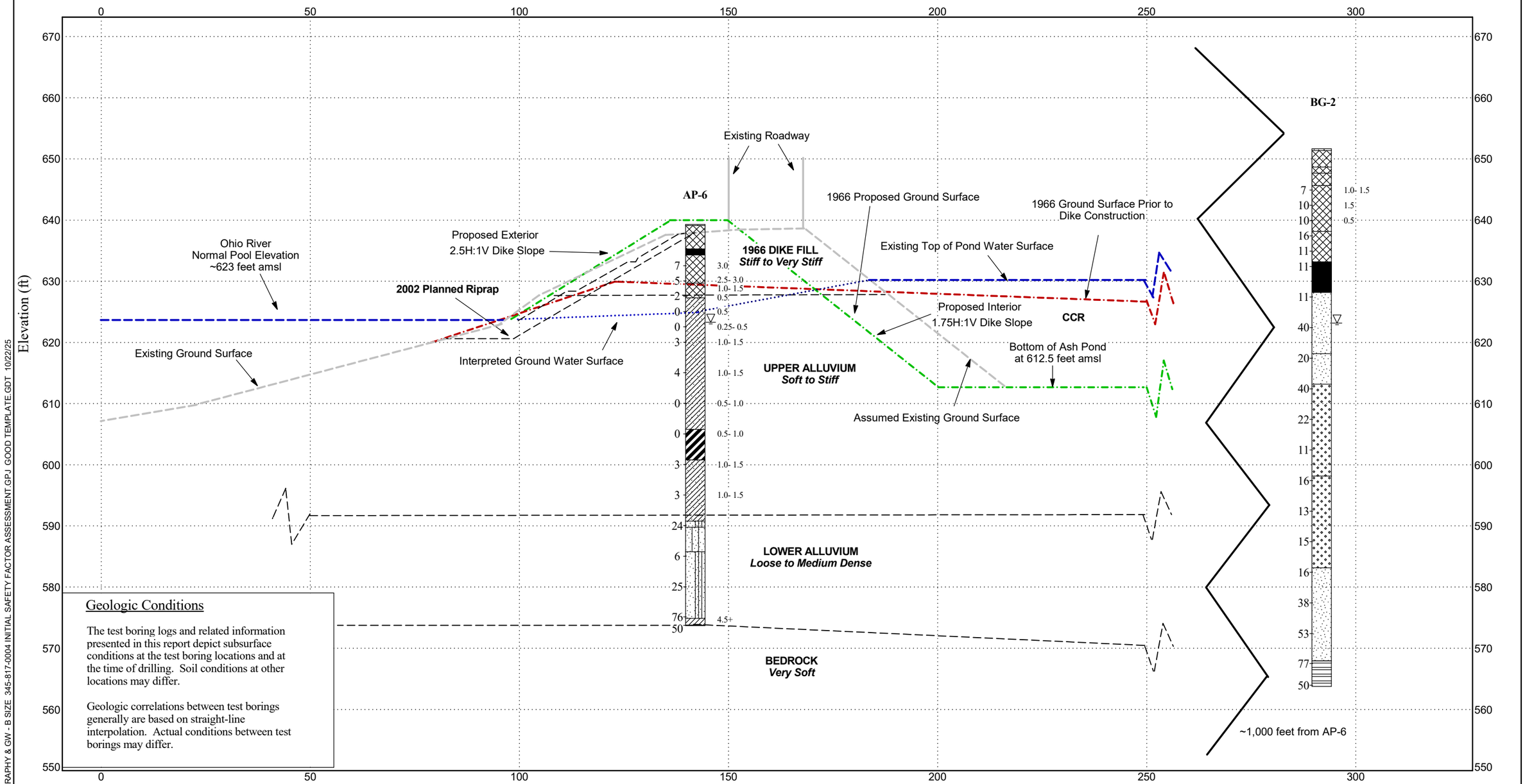
CLIENT American Electric Power
PROJECT NUMBER 345-817-0004
PROJECT NAME Kammer-Initial Safety Factor Assessment
PROJECT LOCATION Moundsville, West Virginia

LEGEND

Borehole Number
N Value
Recovery-(RQD)
Pocket Pen. (tsf)

- Water Level At Time of Drilling
- Water Level At End of Drilling
- Water Level After Drilling

- Topsoil
- Existing Fill
- CCR
- Sandy Lean Clay
- Lean Clay
- Fat Clay
- Silty Sand
- Poorly-Graded Sand
- Poorly-Graded Sand with Silt
- Well-Graded Sand
- Shale



Geologic Conditions

The test boring logs and related information presented in this report depict subsurface conditions at the test boring locations and at the time of drilling. Soil conditions at other locations may differ.

Geologic correlations between test borings generally are based on straight-line interpolation. Actual conditions between test borings may differ.

TABLES

Table 1: Summary of Laboratory Test Results

Test Boring	Sample Type	Sample Depth (ft bgs)	Geologic Origin	USCS Description	USCS Group Symbol	Atterberg Limits			Effective Stress (Peak)		Total Stress		Total Stress (R Envelope)		Standard Proctor		One Pt Wet Density (pcf)	One Pt Dry Density (pcf)	One Pt Moisture (%)	ODOT Curve	ODOT Maximum Dry Density (pcf)	ODOT Optimum Moisture (%)	Percent Compaction (%)	Difference from Optimum Moisture (%)	In-place Moisture Content (%)	In-place Wet Denisty (pcf)	In-place Dry Density (pcf)	Percent fines (%)
						LL (%)	PL (%)	PI (%)	Friction Angle (degrees)	Cohesion (psi)	Friction Angle (degrees)	Cohesion (psi)	Friction Angle (degrees)	Cohesion (psi)	Optimum Moisture Content (%)	Maximum Dry Density (pcf)												
AP-2	SS	13.5-15	ALL	Sandy Silty Clay w/ Gravel	CL-ML	23	16	7	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	14.2	-	-	64.1
AP-3	SS	18.5-20	ALL	Silty Sand	SM	NP	NP	NP	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	19.6	-	-	40.5
AP-4	SS	13.5-15	ALL	Sandy Lean Clay	CL	29	18	11	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	17.7	-	-	63.1
AP-5	ST	3-5	FILL	Lean Clay with Sand	CL	33	19	14	34.3	0.4	-	-	23.0	0.7	-	-	113.1	88.0	28.5	V	89.9	27.4	103%	-6.1	21.3	118.9	92.9	81.9
AP-5	BS	6-8	FILL	Sandy Lean Clay	CL	44	21	23	-	-	-	-	-	-	15.6	108.5	-	-	-	-	-	-	-	+4.5	20.1	-	-	79.1
AP-5	ST	13-15	ALL	Clayey Sand	SC	22	14	8	33.7	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18.4	125.3	105.8	42.3
AP-5	ST	20-22	ALL	Sandy Lean Clay	CL	39	18	21	-	-	0.0	3.6	-	-	-	-	-	-	-	-	-	-	-	-	18.1	135.4	114.5	59.7
AP-5	ST	23-25	ALL	Sandy Lean Clay	CL	35	18	17	29.0	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21.0	124.0	102.5	53.2
AP-5	SS	33.5-34.5	ALL	Silty Sand	SM	NP	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22.3	-	-	23.3
AP-6	SS	33.5-35	ALL	Fat Clay	CH	60	26	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47.2	-	-	88.9
AP-7	ST	3-5	FILL	Sandy Lean Clay	CL	29	17	12	-	-	0.0	12.4	-	-	-	-	129.0	109.6	17.7	M	112.0	15.8	99%	+2.1	17.9	130.2	110.9	66.5
AP-7	ST	8-10	FILL	Clayey Sand	SC	31	16	15	32.9	0.6	-	-	12.7	2.2	-	-	-	-	-	-	-	-	-	-	21.7	125.1	101.6	47.8
AP-7	ST	11-13	FILL	Sandy Lean Clay	CL	33	15	18	33.1	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21.5	119.5	98.3	56.7
AP-7	BS	11-13	FILL	Sandy Lean Clay	CL	27	17	10	-	-	-	-	-	-	13.6	113.9	-	-	-	-	-	-	86%	+5.0	18.6	-	-	59.4
AP-7	ST	14-16	ALL	Sandy Lean Clay	CL	35	17	18	-	-	0.0	6.2	-	-	-	-	-	-	-	-	-	-	-	-	20.2	129.3	106.2	57.1
AP-7	ST	18-20	ALL	Sandy Lean Clay	CL	34	16	18	31.6	0.8	-	-	15.2	3.0	-	-	-	-	-	-	-	-	-	-	23.4	130.9	106.8	57.6
MW-10	SS	8.5-10	FILL	Well Graded Gravel w/ Silt & Sand	GW-GM	NP	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.6	-	-	8.0
Maximum						60	26	34	34.3	0.9	0.0	12.4	23.0	3.0	15.6	113.9	129.0	109.6	28.5		112.0	27.4	103%	+5.0	47.2	135.4	114.5	88.9
Minimum						22	14	7	29.0	0.4	0	3.6	12.7	0.7	13.6	108.5	113.1	88.0	17.7		89.9	15.8	86%	-6.1	3.6	118.9	92.9	8.0
Average						34	18	16	32.4	0.6	0.0	7.4	17.0	2.0	14.6	111.2	121.1	98.8	23.1		101.0	21.6	96%	+1.4	20.4	126.5	104.4	55.8

APPENDIX I

IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL-ENGINEERING REPORT

Important Information about This

Geotechnical-Engineering Report

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

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

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

Understand the Geotechnical-Engineering Services Provided for this Report

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

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

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

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

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

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

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

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

Read this Report in Full

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

You Need to Inform Your Geotechnical Engineer About Change

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

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

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

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

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

This Report's Recommendations Are Confirmation-Dependent

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

This Report Could Be Misinterpreted

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

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

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

Give Constructors a Complete Report and Guidance

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

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

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

GEOPROFESSIONAL BUSINESS ASSOCIATION

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APPENDIX II

TEST BORING LOGS

Rock Types

Rock Name	Characteristics	Symbol
Claystone	Clay sized particles that are consolidated, lacking fissility.	
Coal	Black and shiny, can break into cubes or conchoidally.	
Conglomerate	Gravel sized grains and larger held together by finer material, called a breccia if clasts are angular.	
Limestone	Effervesses w/ diluted HCl, can be composed of clay up to gravel particles (fossils).	
Sandstone	Primarily sand sized particles modified w/ the descriptor fine, medium, or coarse.	
Shale	Clay sized particles, shale has fissility which is a horizontal sheet-like or laminated feature.	
Siltstone	Composed of silt, normally breaks as irregular chunks.	

Rock Quality Descriptions

Weathering

Completely Weathered: All rock material is decomposed and/or disintegrated. The original rock structure may still be intact.

Highly Weathered: More than half of the rock material is decomposed. Fresh rock is present only as a discontinuous framework or as corestones.

Moderately Weathered: Less than half of the rock material is decomposed. Fresh rock is present at a discontinuous framework or as corestones.

Slightly Weathered: Discoloration or staining indicates weathering of rock material on discontinuity surfaces. Rock may be discolored and softened.

Fresh: No visible signs of rock material weathering.

RQD

Descriptor	%
Very Poor	<25
Poor	25-50
Fair	50-75
Good	75-90
Excellent	>90

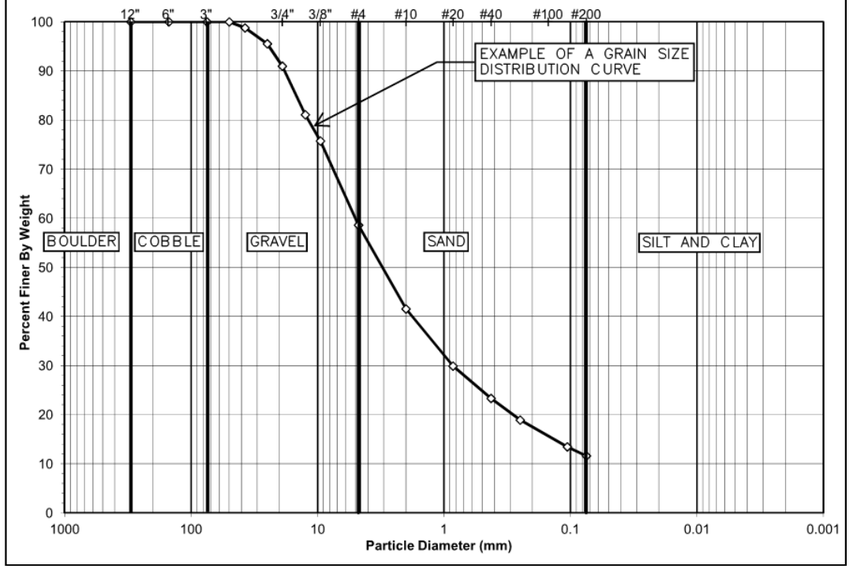
Brokenness

Descriptor	Fracture Spacing (in & ft)
Very Broken	<1 (<0.08)
Broken	1-3 (0.08-0.25)
Moderately Broken	3-6 (0.25-0.5)
Slightly Broken	>6 (>0.5)

Rock Hardness

Descriptor	Field Criterion	Relative Unconfined Compressive Strength
Very Hard	Difficult to break w/ Hammer	> 30,000 psi
Hard	Hand-held sample breaks w/ Hammer	8,000 to 30,000 psi
Medium Hard	Cannot scrape surface w/ knife	2,000 to 8,000 psi
Soft	Cutting or scraping w/ knife difficult	500 to 2,000 psi
Very Soft	Can be cut w/ knife	< 500 psi

Grain Size Distribution Curve



UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOILS
(more than 50% of material is larger than No. 200 sieve size.)

Clean Gravels (Less than 5% fines)

GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size

GW	Well-graded gravels, gravel-sand mixtures, little or no fines
GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines

Gravels with fines (More than 12% fines)

GM	Silty gravels, gravel-sand-silt mixtures
GC	Clayey gravels, gravel-sand-clay mixtures

Clean Sands (Less than 5% fines)

SANDS 50% or more of coarse fraction smaller than No. 4 sieve size

SW	Well-graded sands, gravelly sands, little or no fines
SP	Poorly graded sands, gravelly sands, little or no fines

Sands with fines (More than 12% fines)

SM	Silty sands, sand-silt mixtures
SC	Clayey sands, sand-clay mixtures

FINE-GRAINED SOILS
(50% or more of material is smaller than No. 200 sieve size.)

SILTS AND CLAYS Liquid limit less than 50%

ML	Inorganic silts and very fine sands, rock flour, silty of clayey fine sands or clayey silts with slight plasticity
CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
OL	Organic silts and organic silty clays of low plasticity

SILTS AND CLAYS Liquid limit 50% or greater

MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
CH	Inorganic clays of high plasticity, fat clays
OH	Organic clays of medium to high plasticity, organic silts

HIGHLY ORGANIC SOILS

PT	Peat and other highly organic soils

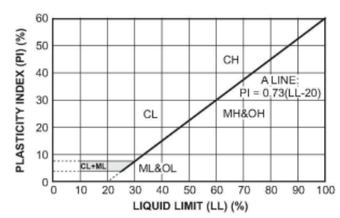
LABORATORY CLASSIFICATION CRITERIA

GW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
GP	Not meeting all gradation requirements for GW	
GM	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limits above "A" line with P.I. greater than 7	
SW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
SP	Not meeting all gradation requirements for GW	
SM	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in shaded zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols.
SC	Atterberg limits above "A" line with P.I. greater than 7	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent ..... GW, GP, SW, SP
More than 12 percent ..... GM, GC, SM, SC
5 to 12 percent ..... Borderline cases requiring dual symbols

PLASTICITY CHART



Glossary

Alluvial Soil or Alluvium: Soil deposited by water in a river, stream, floodplain, or delta.

Bedrock: Materials underlying soil or other unconsolidated surficial materials in which refusal is consistently encountered on lithified, undisturbed, natural bedrock.

Colluvial Soil or Colluvium: Incoherent soil on or at the base of a slope deposited by gravity or slope movement.

Fill: Soil derived from natural soil, rock, or processed materials that was placed by artificial methods, such as construction, waste disposal, or dumping.

Glacial Outwash: Soil, typically sand and gravel, deposited by glacial streams or meltwater in a preexisting valley or over a plain.

Glacial Till: Soil deposited by and underneath a glacier, generally consisting of a heterogeneous, unstratified mixture of clay, sand, gravel, and boulders.

N-Value: The blow count representation of the penetration resistance of the soil determined by the Standard Penetration Test (SPT). It is the sum of the number of blows required to drive the sampler the second and third 6-inch increments (sample depth interval of 6 to 18 inches) and is recorded in blows per foot (bpf). The N-value is considered to be an indication of the relative density of coarse-grained soils (sand and gravel) or consistency of fine-grained soils (silt and clay).

Pocket Pen (PP): Field penetration test performed using a hand-held penetrometer that estimates unconfined compressive strength of cohesive soil in tons per square foot (tsf).

Recovery %: Total length of rock core or soil sample retrieved divided by the total length of the core run or sample interval, expressed as a percentage.

Refusal: The depth at which greater than 50 SPT hammer blows are required to drive the sampling spoon 6 inches or less.

Residual Soil or Residuum: Soil derived from the physical or chemical weathering of the underlying parent bedrock, generally with N-values less than 30 and 50 bpf in cohesive and cohesionless materials, respectively.

Rock Quality Designation (RQD): The sum of the length of intact rock core pieces longer than 4 inches (excluding mechanical breaks) divided by the total length of the core run, expressed as a percentage.

Shelby Tube: A 2" to 3" diameter, thin walled sampling tube that is pushed into the soil to obtain a relatively undisturbed soil sample for geotechnical laboratory tests.

Split Spoon Sampler: A soil sampling tube which is driven, retrieved, and split-open lengthwise for removal and visual inspection, and testing of the soil obtained.

Standard Penetration Test (SPT) ASTM D1586 : Field penetration test consisting of driving a 2-inch outside diameter split-spoon sampler 18 inches using a 140-pound hammer free falling a distance of 30 inches. The number of blows required to advance the spoon through successive 6-inch increments is recorded to determine the N-value.

Weathered Rock: Materials derived from lithified, undisturbed, natural bedrock which are able to be sampled with a split-spoon. Cohesive and cohesionless materials generally have N-values greater than 30 and 50 bpf, respectively.

N-Value Rating

Fine-Grained Soils (Silt and Clay)

Consistency	Blows/ft	PP (tsf)
Very Soft	0-2	<0.25
Soft	3-4	0.25-0.5
Medium Stiff	5-8	0.5-1
Stiff	9-15	1-2
Very Stiff	16-32	2-4
Hard	>32	>4

Coarse-Grained Soils (Sand and Gravel)

Relative Density	Blows/ft
Very Loose	0-4
Loose	5-10
Medium Dense	11-30
Dense	31-50
Very Dense	>50

Unconsolidated Material

Term	Grain Size in mm (in)	Approximate Example Size
Clay and Silt	<.075	can't see grains to barely visible
Fine Sand	0.075 – 0.4	table salt to sugar
Med. Sand	0.4-2.0 (~<1/16)	openings in a window screen
Coarse Sand	2.0 - 4.75 (~1/16 – 1/8)	sidewalk salt
Gravel	4.75 – 75 (~1/8 – 3)	pea to tennis ball
Cobble	75 – 300 (3 – 12)	tennis ball to basketball
Boulder	>300 (>12)	larger than a basketball

Other Features – Used to describe other identifiable, pertinent features (e.g., angularity of coarse-grained soils, organics, construction debris, etc.)

Term	%
Trace	< 5
Few	5-15
Some	15-45

Moisture Content
Dry: Sample is dusty or obviously dry.
Moist: Anything that does not fit the definition of dry or wet.
Wet: Sample contains free water.

Civil & Environmental Consultants, Inc.

Definitions of Standard Terms and Symbols

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Cincinnati, Ohio 45242

BORING NUMBER AP-2

CLIENT American Electric Power
PROJECT NAME Kammer-Initial Safety Factor Assessment
CEC PROJECT NUMBER 345-817-0004
PROJECT LOCATION Moundsville, West Virginia
DATE STARTED 5/14/25 **COMPLETED** 7/31/25
GROUND ELEVATION 641.6 ft **HOLE SIZE** 10 inches
DRILLING CONTRACTOR RockWater Drilling, Inc.
GROUND WATER LEVELS:
DRILLING METHOD 4.25" I.D. Hollow Stem Augers; Automatic Hammer
▽ **AT TIME OF DRILLING** 18.5 ft / Elev 623.1 ft
LOGGED BY JO **CHECKED BY** JBG
AT END OF DRILLING Refer to Note 3
LOCATION N 492207.4, E 1597319.2
AFTER DRILLING Refer to Note 3

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)
641.6		TOPSOIL (3 inches)	0.0				
641.3		Dark Brown, Sandy Lean Clay, CL, Moist **(FILL)** *Noted geotextile fabric at 3" bgs.*		GB 1			
639.6		Brown, Clayey Gravel, GC, Moist **(FILL)**		GB 2			
638.6		Brown, Poorly Graded Gravel, GP, Moist **(FILL)**		GB 3			
637.6		Brown, Poorly Graded Sand, SP, Moist **(FILL)** *Noted intermixed bottom ash.*	5.0	GB 4			
636.6		Brown, Poorly Graded Sand, SP, Moist **(BOTTOM ASH)**		GB 5	78	3-5-7 (12)	0.5-1.0
635.6		Brown and Gray, Silt, ML, Moist, Medium Stiff **(FILL)** *Noted intermixed fly ash.*		SS 1			
634.3		Brown and Black, Poorly-Graded Sand, SP, Moist **(FILL)** *Noted intermixed bottom ash.*					
633.1		Brown, Lean Clay with Sand, CL, Moist, Very Stiff **(FILL)**	10.0	SS 2	100	1-2-4 (6)	2.0-2.5
				SS 3	100	1-2-3 (5)	2.0-3.0
628.1		Brown, SANDY SILTY CLAY WITH GRAVEL, CL-ML, Moist becoming Wet, Medium Stiff Becoming Soft to Very Soft **(ALLUVIUM)** ▽	15.0	SS 4	100	1-1-2 (3)	0.5
				SS 5	100	1-1-2 (3)	0.25-0.5
			20.0	SS 6	100	1-WH-1 (1)	0.25
			25.0	SS 7	100	WH-1-WH (1)	<0.25
613.1		Brown, Silty Sand with Gravel, SM, Wet, Loose **(ALLUVIUM)**	30.0	SS 8	78	1-3-5 (8)	
608.1		Brown, Well-Graded Sand with Silt and Gravel, SW-SM, Wet, Medium Dense Becoming Dense **(ALLUVIUM)**	35.0	SS 9	39	9-8-10 (18)	

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
□ FINES CONTENT (%) □
20 40 60 80

(Continued Next Page)

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BORING NUMBER AP-2

CLIENT American Electric Power
PROJECT NAME Kammer-Initial Safety Factor Assessment
CEC PROJECT NUMBER 345-817-0004
PROJECT LOCATION Moundsville, West Virginia

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)
		Brown, Well-Graded Sand with Silt and Gravel, SW-SM, Wet, Medium Dense Becoming Dense **(ALLUVIUM)** *(continued)*	35.0				
			40.0	SS 10	39	11-15-19 (34)	
598.1		Brown, Poorly-Graded Sand, SP, Wet, Medium Dense **(ALLUVIUM)**	45.0	SS 11	100	4-6-16 (22)	
593.1		Brown, Well-Graded Sand with Gravel, SW, Wet, Medium Dense **(ALLUVIUM)**	50.0	SS 12	100	10-10-6 (16)	
			55.0	SS 13	78	6-5-8 (13)	
583.1		Brown, Well-Graded Gravel with Sand, GW, Wet, Medium Dense **(ALLUVIUM)**	60.0	SS 14	50	10-15-10 (25)	
			65.0	SS 15	67	10-15-7 (22)	
574.6 574.3		Gray, Shale with Interbedded Limestone, Completely Weathered, Very Broken, Very Soft		SS 16	25	50/4"	
		Bottom of hole at 67.3 feet.					

Notes:
1) Vacuum extraction methods were performed to a depth of 6 feet prior to the auger boring, to identify whether shallow underground utilities were present. The auger boring with standard penetration tests began at a depth of 6 feet.
2) Auger refusal was encountered at a depth of about 67' bgs.
3) Deep well installed in borehole and shallow well installed in offset borehole. Refer to well logs.

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Civil & Environmental Consultants, Inc.
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BORING NUMBER AP-3

CLIENT American Electric Power
PROJECT NAME Kammer-Initial Safety Factor Assessment
CEC PROJECT NUMBER 345-817-0004
PROJECT LOCATION Moundsville, West Virginia
DATE STARTED 5/14/25 **COMPLETED** 7/30/25
GROUND ELEVATION 640.3 ft **HOLE SIZE** 10 inches
DRILLING CONTRACTOR RockWater Drilling, Inc.
GROUND WATER LEVELS:
DRILLING METHOD 4.25" I.D. Hollow Stem Augers; Automatic Hammer
AT TIME OF DRILLING 18.5 ft / Elev 621.8 ft
LOGGED BY JO **CHECKED BY** JBG
AT END OF DRILLING Refer to Note 3
LOCATION N 491966.5, E 1597006.1
AFTER DRILLING Refer to Note 3

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)
640.3	TOPSOIL (2 inches)	0.0				
640.1	Dark Brown, Sandy Lean Clay, CL, Moist **(FILL)**		GB 1			
638.3	Brown, Clayey Sand, SC, Moist **(FILL)**		GB 2			
			GB 3			
		5.0	GB 4			
634.3	Brown, Lean Clay with Sand, CL, Moist, Stiff to Very Stiff **(FILL)**		GB 5			
			SS 1	100	2-3-3 (6)	1.5-2.0
		10.0	SS 2	100	2-2-4 (6)	2.0-2.25
			SS 3	100	1-3-3 (6)	1.0-1.5
		15.0	SS 4	100	2-3-3 (6)	1.0-1.5
625.8	Brown, Silty Sand, SM, Moist, Loose to Very Loose **(ALLUVIUM)**					
624.3	Brown, Sandy Silt, ML, Moist, Stiff **(ALLUVIUM)**		SS 5	100	WH-1-2 (3)	1.0-1.5
621.8	Brown, SILTY SAND, SM, Wet, Very Loose **(ALLUVIUM)**	20.0	SS 6	100	WH-1-1 (2)	
		25.0	SS 7	100	WH-1-2 (3)	
		30.0	SS 8	100	WH-WH-WH (0)	
606.8	Brown, Well-Graded Gravel with Sand, GW, Wet, Dense **(ALLUVIUM)**	35.0	SS 9	39	11-17-16 (33)	

SPT N VALUE
20 40 60 80
PL MC LL
20 40 60 80
FINES CONTENT (%)
20 40 60 80

(Continued Next Page)

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BORING NUMBER AP-3

CLIENT American Electric Power **PROJECT NAME** Kammer-Initial Safety Factor Assessment

CEC PROJECT NUMBER 345-817-0004 **PROJECT LOCATION** Moundsville, West Virginia

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)
		Brown, Well-Graded Gravel with Sand, GW, Wet, Dense **(ALLUVIUM)** *(continued)*	35.0				
601.8		Brown, Silty Sand, SM, Wet, Medium Dense **(ALLUVIUM)**	40.0	SS 10	100	10-12-14 (26)	
596.8		Brown, Poorly-Graded Sand, SP, Wet, Dense **(ALLUVIUM)**		SS 11	100	30-22-11 (33)	
596.0		Brown, Well-Graded Sand with Gravel, SW, Wet, Dense	45.0				
			50.0				
			55.0	SONIC 1	67		
			60.0				
			65.0				
574.8		Gray, Shale with Interbedded Limestone, Completely Weathered, Very Broken, Very Soft					
575.3		Bottom of hole at 65.0 feet.					

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Notes:
1) Vacuum extraction methods were performed to a depth of 6 feet prior to the auger boring, to identify whether shallow underground utilities were present. The auger boring with standard penetration tests began at a depth of 6 feet.
2) About 23 feet of heave was observed in the augers at a depth of 45 feet. Sampling was resumed utilizing sonic drilling from a depth of 45 feet to the termination depth.
3) Deep well installed in borehole and shallow well installed in offset borehole. Refer to well logs.

Civil & Environmental Consultants, Inc.
10300 Alliance Road, Suite 300
Cincinnati, Ohio 45242

BORING NUMBER AP-4

CLIENT American Electric Power
PROJECT NAME Kammer-Initial Safety Factor Assessment
CEC PROJECT NUMBER 345-817-0004
PROJECT LOCATION Moundsville, West Virginia
DATE STARTED 5/14/25 **COMPLETED** 6/17/25
GROUND ELEVATION 639.3 ft **HOLE SIZE** 8 inches
DRILLING CONTRACTOR RockWater Drilling, Inc.
GROUND WATER LEVELS:
DRILLING METHOD 4.25" I.D. Hollow Stem Augers; Automatic Hammer
▽ **AT TIME OF DRILLING** 18.5 ft / Elev 620.8 ft
LOGGED BY JO **CHECKED BY** JBG
AT END OF DRILLING Refer to Note 3
LOCATION N 491233.1, E 1596841.4
AFTER DRILLING Refer to Note 3

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)
639.3		GRAVEL BASE (8 inches)	0.0				
638.6		Brown, Poorly Graded Gravel, GP, Moist, Loose **(FILL)** *Noted cobbles.*		GB 1			
637.3		Dark Gray, Lean Clay with Sand, CL, Moist, Hard becoming Stiff **(FILL)**		GB 2			4.5+
				GB 3			4.5+
			5.0	GB 4			1.0-1.5
633.3		Gray and Brown, Lean Clay with Sand, CL, Moist, Stiff to Very Stiff **(FILL)**		GB 5	56	4-5-7 (12)	1.0-2.5
				SS 1			
			10.0	SS 2	100	2-4-4 (8)	2.5-3.0
				SS 3	100	2-3-4 (7)	1.5-2.0
625.8		Brown, SANDY LEAN CLAY, CL, Moist, Stiff **(ALLUVIUM)**	15.0	SS 4	100	1-2-3 (5)	1.25-1.5
623.3		Brown, Silty Clay, CL-ML, Wet, Medium Stiff to Stiff **(ALLUVIUM)**		SS 5	100	WH-WH-WH (0)	0.75-1.5
620.8		Brown, Sandy Lean Clay, CL, Wet, Medium Stiff Becoming Very Soft **(ALLUVIUM)**	20.0	SS 6	100	WH-WH-1 (1)	0.5-1.0
			25.0	SS 7	100	WH-WH-WH (0)	0.25-0.5
			30.0	SS 8	0	1-WH-WH (0)	
605.8		Brown, Poorly-Graded Sand, SP, Wet, Medium Dense becoming Very Dense **(ALLUVIUM)**	35.0	SS 9	100	13-14-19 (33)	

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
□ FINES CONTENT (%) □
20 40 60 80

(Continued Next Page)

Civil & Environmental Consultants, Inc.
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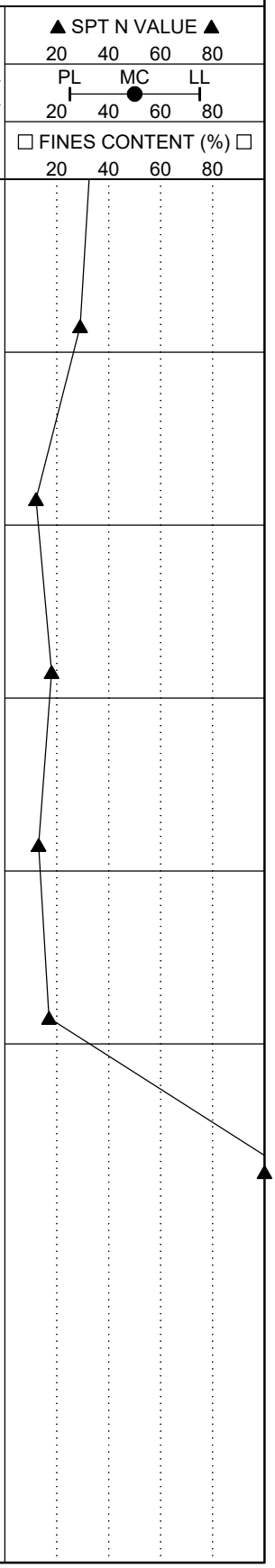
BORING NUMBER AP-4

CLIENT American Electric Power
PROJECT NAME Kammer-Initial Safety Factor Assessment
CEC PROJECT NUMBER 345-817-0004
PROJECT LOCATION Moundsville, West Virginia

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)
		Brown, Poorly-Graded Sand, SP, Wet, Medium Dense becoming Very Dense **(ALLUVIUM)** *(continued)*	35.0				
			40.0	SS 10	100	3-11-18 (29)	
			45.0	SS 11	61	2-5-7 (12)	
			50.0	SS 12	100	5-10-8 (18)	
			55.0	SS 13	100	3-5-8 (13)	
			60.0	SS 14	100	3-8-9 (17)	
				SS 15	100	50/5"	
575.4		Bottom of hole at 63.9 feet.					

Notes:
1) Vacuum extraction methods were performed to a depth of 6 feet prior to the auger boring, to identify whether shallow underground utilities were present. The auger boring with standard penetration tests began at a depth of 6 feet.
2) Auger refusal was encountered at a depth of about 65' bgs.
3) Deep well installed in borehole and shallow well installed in offset borehole. Refer to well logs.



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BORING NUMBER AP-5

CLIENT American Electric Power
PROJECT NAME Kammer-Initial Safety Factor Assessment
CEC PROJECT NUMBER 345-817-0004
PROJECT LOCATION Moundsville, West Virginia
DATE STARTED 5/14/25 **COMPLETED** 7/23/25
GROUND ELEVATION 639.1 ft **HOLE SIZE** 10 inches
DRILLING CONTRACTOR RockWater Drilling, Inc.
GROUND WATER LEVELS:
DRILLING METHOD 4.25" I.D. Hollow Stem Augers; Automatic Hammer
AT TIME OF DRILLING 18.5 ft / Elev 620.6 ft
LOGGED BY JO **CHECKED BY** JBG
AT END OF DRILLING Refer to Note 6
LOCATION N 490776.1, E 1596848.7
AFTER DRILLING Refer to Note 6

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)
639.1		GRAVEL BASE (5 inches)	0.0				
638.7		Brown, LEAN CLAY WITH SAND, CL, Moist, Stiff **(FILL)**		GB 1			1.0-1.5
				GB 2			1.0-1.5
			ST 1	GB 3			1.0-1.5
			5.0	GB 4			1.0-1.5
				GB 5			1.0-1.5
633.1		Brown, SANDY LEAN CLAY, CL, Moist, Stiff **(FILL)**		SS 1	78	1-3-3 (6)	1.5-1.75
630.6		Brown, Sandy Silt, ML, Stiff Becoming Medium Stiff **(ALLUVIUM)**	ST 2 10.0	SS 2	100	1-2-4 (6)	1.5-2.0
				SS 3	50	WH-WH-3 (3)	0.5-1.0
626.1		Brown, CLAYEY SAND, SC, Moist, Loose to Very Loose **(ALLUVIUM)**	ST 3 15.0	SS 4	100	WH-1-1 (2)	
				SS 5	100	1-WH-1 (1)	
620.6		Brown, SANDY LEAN CLAY, CL, Wet, Very Soft **(ALLUVIUM)**	20.0	SS 6	100	WH-WH-WH (0)	<0.25
			ST 4				
			ST 5 25.0	SS 7	100	WH-WH-1 (1)	<0.25

c' (psi)	φ' (degrees)	cR' (psi)	φR' (degrees)
0.4	34.3	0.7	23.0

c' (psi)	φ' (degrees)
0.4	33.7

c (psi)	φ (degrees)
3.6	0.0

c' (psi)	φ' (degrees)
0.6	29.0

▲ SPT N VALUE ▲ 20 40 60 80
PL MC LL 20 40 60 80
☐ FINES CONTENT (%) ☐ 20 40 60 80

CEC CUSTOM LOG 345-817-0004 INITIAL SAFETY FACTOR ASSESSMENT.GPJ GOOD TEMPLATE.GDT 11/5/25

(Continued Next Page)

Civil & Environmental Consultants, Inc.
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BORING NUMBER AP-5

CLIENT American Electric Power **PROJECT NAME** Kammer-Initial Safety Factor Assessment

CEC PROJECT NUMBER 345-817-0004 **PROJECT LOCATION** Moundsville, West Virginia

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)
		Brown, SANDY LEAN CLAY, CL, Wet, Very Soft **(ALLUVIUM)** *(continued)*	25.0				
			30.0	SS 8	100	WH-WH-WH (0)	<0.25
605.6		Brown, SILTY SAND, SM, Wet, Very Loose **(ALLUVIUM)**		SS 9	100	2-1-1 (2)	
604.4		Brown, Well-Graded Gravel, GW, Wet, Very Loose **(ALLUVIUM)**	35.0				
600.6		Brown, Poorly-Graded Sand with Silt, SP, Wet, Medium Dense **(ALLUVIUM)**		SS 10	78	WH-1-16 (17)	
599.6		Brown, Well-Graded Gravel with Sand, GW, Wet, Medium Dense **(ALLUVIUM)**	40.0				
			45.0	SS 11	33	7-10-8 (18)	
590.6		Brown, Poorly-Graded Sand with Silt, SP, Wet, Medium Dense **(ALLUVIUM)**	50.0	SS 12	100	5-6-13 (19)	

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

(Continued Next Page)

Civil & Environmental Consultants, Inc.
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BORING NUMBER AP-5

CLIENT American Electric Power **PROJECT NAME** Kammer-Initial Safety Factor Assessment

CEC PROJECT NUMBER 345-817-0004 **PROJECT LOCATION** Moundsville, West Virginia

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
585.6		Brown, Well-Graded Sand with Gravel, SW, Wet, Medium Dense **(ALLUVIUM)** *(continued)*	55.0	SS 13	100	19-22-5 (27)		
580.6		Brown, Poorly-Graded Sand, SP, Wet, Dense to Very Dense **(ALLUVIUM)**	60.0	SS 14	100	5-9-35 (44)		
			65.0	SS 15	100	10-44-48 (92)		
574.1		Bottom of hole at 65.0 feet.						

Notes:
1) Vacuum extraction methods were performed to a depth of 6 feet prior to the auger boring, to identify whether shallow underground utilities were present. The auger boring with standard penetration tests began at a depth of 6 feet.
2) About 2 feet of heave was observed in the augers at a depth of 35 feet. The heaved material was flushed from the augers using water. SPT sampling was resumed at a depth of 38.5 feet.
3) Auger refusal was encountered at a depth of about 65' bgs.
4) Shelby tube (ST-1 through ST-5) samples obtained from an offset borehole from 3' to 5', 8' to 10', 13' to 15', 20' to 22', and 23' to 25' with recoveries of 24, 17.5, 17, 24, and 24 inches, respectively.
5) Bulk sample obtained from 6 to 8 feet bgs.
6) Deep well installed in borehole and shallow well installed in offset borehole. Refer to well logs.

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BORING NUMBER AP-6

CLIENT American Electric Power
PROJECT NAME Kammer-Initial Safety Factor Assessment
CEC PROJECT NUMBER 345-817-0004
PROJECT LOCATION Moundsville, West Virginia
DATE STARTED 5/14/25 **COMPLETED** 7/22/25
GROUND ELEVATION 639.3 ft **HOLE SIZE** 10 inches
DRILLING CONTRACTOR RockWater Drilling, Inc.
GROUND WATER LEVELS:
DRILLING METHOD 4.25" I.D. Hollow Stem Augers; Automatic Hammer
▽ **AT TIME OF DRILLING** 16.0 ft / Elev 623.3 ft
LOGGED BY JO **CHECKED BY** JBG
AT END OF DRILLING Refer to Note 3
LOCATION N 490313.1, E 1596904.6
AFTER DRILLING Refer to Note 3

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)
639.3		TOPSOIL (2 inches)	0.0				
639.1		Brown and Gray, Lean Clay with Sand, CL, Moist **(FILL)** *Noted intermixed ash at 4.0' to 5.0' bgs.*		GB 1			
				GB 2			
				GB 3			
635.3			5.0	GB 4			
634.3		Brown, Lean Clay, CL, Moist, Very Stiff **(FILL)**		GB 5			
				SS 1	89	2-3-4 (7)	3.0
				SS 2	100	1-2-3 (5)	2.5-3.0
629.7		Brown, Sandy Lean Clay, CL, Moist, Stiff Becoming Medium Stiff **(FILL)** *Noted organic odor from 9.6 to 10 feet bgs.*	10.0				1.0-1.5
				SS 3	56	WH-WH-2 (2)	0.5
627.3		Brown and Gray, Sandy Lean Clay, CL, Moist Becoming Wet, Soft to Stiff **(ALLUVIUM)**		SS 4	17	WH-WH-WH (0)	0.5
		▽	15.0	SS 5	100	WH-WH-WH (0)	0.25-0.5
				SS 6	100	0-1-2 (3)	1.0-1.5
			20.0	SS 7	100	1-1-3 (4)	1.0-1.5
			25.0	SS 8	100	WH-WH-WH (0)	0.5-1.0
605.8		Gray, FAT CLAY, CH, Wet, Medium Stiff **(ALLUVIUM)**	30.0	SS 9	100	WH-WH-WH (0)	0.5-1.0
			35.0				

▲ SPT N VALUE ▲ 20 40 60 80
PL MC LL 20 40 60 80
☐ FINES CONTENT (%) ☐ 20 40 60 80

CEC CUSTOM LOG 345-817-0004 INITIAL SAFETY FACTOR ASSESSMENT.GPJ GOOD TEMPLATE.GDT 11/5/25

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BORING NUMBER AP-6

CLIENT American Electric Power **PROJECT NAME** Kammer-Initial Safety Factor Assessment

CEC PROJECT NUMBER 345-817-0004 **PROJECT LOCATION** Moundsville, West Virginia

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)
	Gray, FAT CLAY, CH, Wet, Medium Stiff **(ALLUVIUM)** *(continued)*	35.0				
600.8	Gray, Sandy Lean Clay, CL, Wet, Stiff **(ALLUVIUM)**	40.0	SS 10	100	WH-1-2 (3)	1.0-1.5
		45.0	SS 11	100	WH-WH-3 (3)	1.0-1.5
594.6	Noted few rock fragments at 44.7-45 feet bgs.					
590.8	Gray, Poorly-Graded Sand with Silt, SP-SM, Wet, Medium Dense **(ALLUVIUM)**	50.0	SS 12	100	8-8-16 (24)	
589.8	Gray, Silty Sand with Gravel, SM, Wet, Medium Dense **(ALLUVIUM)**					
585.8	Gray, Poorly-Graded Sand with Silt, SP-SM, Wet, Loose to Medium Dense **(ALLUVIUM)**	55.0	SS 13	100	2-3-3 (6)	
		60.0	SS 14	100	7-11-14 (25)	
		65.0	SS 15	113	11-26-50/4"	4.5+
574.9	Brown, Lean Clay, CL, Moist, Hard **(RESIDUUM)**					
573.8	Gray, Shale with Interbedded Limestone, Completely Weathered, Very Broken, Very Soft		SS 16	100	50/1"	
573.7	Bottom of hole at 65.6 feet.					

SPT N VALUE
20 40 60 80
PL MC LL
20 40 60 80
FINES CONTENT (%)
20 40 60 80

Notes:
1) Vacuum extraction methods were performed to a depth of 6 feet prior to the auger boring, to identify whether shallow underground utilities were present. The auger boring with standard penetration tests began at a depth of 6 feet.
2) Auger refusal was encountered at a depth of about 65.5' bgs.
3) Deep well installed in borehole and shallow well installed in offset borehole. Refer to well logs.

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BORING NUMBER AP-7

CLIENT American Electric Power
PROJECT NAME Kammer-Initial Safety Factor Assessment
CEC PROJECT NUMBER 345-817-0004
PROJECT LOCATION Moundsville, West Virginia
DATE STARTED 5/14/25 **COMPLETED** 7/15/25
GROUND ELEVATION 640.0 ft **HOLE SIZE** 10 inches
DRILLING CONTRACTOR RockWater Drilling, Inc.
GROUND WATER LEVELS:
DRILLING METHOD 4.25" I.D. Hollow Stem Augers; Automatic Hammer
AT TIME OF DRILLING 18.5 ft / Elev 621.5 ft
LOGGED BY JO **CHECKED BY** JBG
AT END OF DRILLING Refer to Note 6
LOCATION N 490271.8, E 1597154.5
AFTER DRILLING Refer to Note 6

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)
640.0	TOPSOIL (2 inches)	0.0				
639.8	Brown and Gray, SANDY LEAN CLAY, CL, Moist, Very Stiff Becoming Medium Stiff **(FILL)**		GB 1			1.5-2.0
			GB 2			
		ST 1	GB 3			1.0-1.5
		5.0	GB 4			1.0-1.5
			GB 5			1.0-1.5
			SS 1	89	5-5-8 (13)	3.5
632.0	Brown, CLAYEY SAND, SC, Wet, Loose **(FILL)**	ST 2	SS 2	100	2-2-4 (6)	
		10.0				
629.0	Brown, SANDY LEAN CLAY, CL, Moist, Medium Stiff **(FILL)**	ST 3	SS 3	72	WH-1-3 (4)	0.5-0.75
626.5	Brown to Gray, SANDY LEAN CLAY, CL, Moist, Very Soft to Medium Stiff **(ALLUVIUM)**	15.0	SS 4	100	WH-WH-WH (0)	0.25-0.5
		ST 4				
			SS 5	100	WH-WH-WH (0)	<0.25
		ST 5	SS 6	100	WH-WH-WH (0)	<0.25
		20.0				
		25.0	SS 7	100	WH-WH-WH (0)	<0.25

c (psi)	φ (degrees)
12.4	0.0

c' (psi)	φ' (degrees)	cR' (psi)	φR' (degrees)
0.6	32.9	2.2	12.7

c (psi)	φ (degrees)
6.2	0.0

c' (psi)	φ' (degrees)
0.9	33.1

c' (psi)	φ' (degrees)	cR' (psi)	φR' (degrees)
0.8	31.6	3	15.2

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

(Continued Next Page)

Civil & Environmental Consultants, Inc.
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Cincinnati, Ohio 45242

BORING NUMBER AP-7

CLIENT American Electric Power **PROJECT NAME** Kammer-Initial Safety Factor Assessment

CEC PROJECT NUMBER 345-817-0004 **PROJECT LOCATION** Moundsville, West Virginia

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)
		Brown to Gray, SANDY LEAN CLAY, CL, Moist, Very Soft to Medium Stiff **(ALLUVIUM)** *(continued)*	25.0				
			30.0	SS 8	100	WH-WH-WH (0)	0.5-1.0
			35.0	SS 9	100	WH-WH-WH (0)	<0.25
			40.0	SS 10	100	WH-WH-WH (0)	<0.25
596.5		Gray, Well-Graded Gravel with Silt and Sand, GW-GM, Wet, Medium Dense **(ALLUVIUM)**	45.0	SS 11	56	3-6-8 (14)	
591.5		Gray, Poorly-Graded Sand, SP, Wet, Loose **(ALLUVIUM)**					
590.5		Gray, Well-Graded Sand, SW, Wet, Loose **(ALLUVIUM)**	50.0	SS 12	83	2-3-5 (8)	

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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BORING NUMBER AP-7

CLIENT American Electric Power **PROJECT NAME** Kammer-Initial Safety Factor Assessment

CEC PROJECT NUMBER 345-817-0004 **PROJECT LOCATION** Moundsville, West Virginia

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)
586.5		Gray, Poorly-Graded Sand, SP, Wet, Medium Dense **(ALLUVIUM)** *(continued)*	55.0	SS 13	28	7-10-12 (22)	
			60.0	SS 14	78	13-11-8 (19)	
576.5		Gray, Poorly-Graded Sand with Gravel, SP, Wet, Medium Dense **(ALLUVIUM)**	65.0	SS 15	100	8-14-14 (28)	
573.5		Gray, Shale with Interbedded Limestone, Completely Weathered, Very Broken, Very Soft		SS 16	100	50/1"	
573.4		Bottom of hole at 66.6 feet.					

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Notes:
1) Vacuum extraction methods were performed to a depth of 6 feet prior to the auger boring, to identify whether shallow underground utilities were present. The auger boring with standard penetration tests began at a depth of 6 feet.
2) About 2 feet of heave was observed in the augers at a depth of 48.5 feet. The heaved material was flushed from the augers using water. SPT sampling was resumed at a depth of 53.5 feet.
3) Auger refusal was encountered at a depth of about 66.5' bgs.
4) Shelby tube (ST-1 through ST-5) samples obtained from an offset borehole from 3' to 5', 8' to 10', 11' to 13', 14' to 16', and 18' to 20' with recoveries of 21, 24, 24, 23, and 23.5 inches, respectively.
5) Bulk samples (BULK-1 and BULK-2) obtained from 11 to 13 feet bgs and from 16 to 18 feet bgs, respectively.
6) Deep well installed in borehole and shallow well installed in offset borehole. Refer to well logs.

Civil & Environmental Consultants, Inc.
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Cincinnati, Ohio 45242

BORING NUMBER AP-8

CLIENT American Electric Power
PROJECT NAME Kammer-Initial Safety Factor Assessment
CEC PROJECT NUMBER 345-817-0004
PROJECT LOCATION Moundsville, West Virginia
DATE STARTED 6/12/25 **COMPLETED** 6/12/25
GROUND ELEVATION 634.5 ft **HOLE SIZE** 8 inches
DRILLING CONTRACTOR RockWater Drilling, Inc.
GROUND WATER LEVELS:
DRILLING METHOD 4.25" I.D. Hollow Stem Augers; Automatic Hammer
AT TIME OF DRILLING 8.5 ft / Elev 626.0 ft
LOGGED BY JO **CHECKED BY** JBG
AT END OF DRILLING Backfilled With Grout Upon Completion
LOCATION N 491193.9, E 1597099.3
AFTER DRILLING Backfilled With Grout Upon Completion

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)
634.5		TOPSOIL (2 inches)	0.0				
634.3		Brown and Dark Gray, Lean Clay with Sand, CL, Moist, Hard Becoming Medium Stiff **(FILL)**		SS 1	78	5-7-8 (15)	4.5+
			5.0	SS 2	72	3-2-2 (4)	1.5-2.0
				SS 3	17	WH-1-1 (2)	0.5-1.0
626.0		Black, Silty Sand, SM, Wet, Very Loose **(BOTTOM ASH)**	10.0	SS 4	11	WH-WH-WH (0)	
				SS 5	100	WH-WH-WH (0)	<0.25
			15.0	SS 6	17	WH-1-WH (1)	
618.2		Brown, Sandy Silt, ML, Moist becoming Wet, Very Stiff Becoming Very Soft **(ALLUVIUM)** *Noted brown sand seam at 19-19.3'.*		SS 7	78	1-2-5 (7)	3.0
			20.0	SS 8	100	2-WH-WH (0)	<0.25 0.25
				SS 9	100	WH-WH-WH (0)	<0.25
			25.0	SS 10	100	WH-WH-2 (2)	<0.25
				SS 11	61	WH-WH-WH (0)	<0.25
			30.0	SS 12	100	WH-2-1 (3)	<0.25
				SS 13	100	WH-1-1 (2)	<0.25
601.0		Brown, Silty Sand with Gravel, SM, Wet, Very Dense **(ALLUVIUM)**	35.0	SS 14	100	21-34-28 (62)	
599.5		Bottom of hole at 35.0 feet.					

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Civil & Environmental Consultants, Inc.
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BORING NUMBER AP-9

CLIENT American Electric Power
PROJECT NAME Kammer-Initial Safety Factor Assessment
CEC PROJECT NUMBER 345-817-0004
PROJECT LOCATION Moundsville, West Virginia
DATE STARTED 6/11/25 **COMPLETED** 6/11/25
GROUND ELEVATION 634.8 ft **HOLE SIZE** 8 inches
DRILLING CONTRACTOR RockWater Drilling, Inc.
GROUND WATER LEVELS:
DRILLING METHOD 4.25" I.D. Hollow Stem Augers; Automatic Hammer
▽ **AT TIME OF DRILLING** 6.5 ft / Elev 628.3 ft
LOGGED BY JO **CHECKED BY** JBG
AT END OF DRILLING Backfilled With Grout Upon Completion
LOCATION N 491108.4, E 1597267.2
AFTER DRILLING Backfilled With Grout Upon Completion

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)
634.8		TOPSOIL (2 inches)	0.0				
634.6		Brown and Gray, Lean Clay with Sand, CL, Moist, Hard becoming Medium Stiff **(FILL)**		SS 1	78	11-11-12 (23)	4.5
				SS 2	33	2-3-1 (4)	1.5-2.0
			5.0				0.5-1.0
		▽		SS 3	100	1-1-WH (1)	0.5-1.0
628.3		Black, Silt, ML, Wet, Very Soft **(FLYASH)**		SS 4	0	WH-WH-WH (0)	
			10.0				
				SS 5	6	WH-WH-WH (0)	
				SS 6	100	WH-WH-WH (0)	<0.25
			15.0				
618.3		Brown, Sandy Silt, ML, Moist, Stiff to Very Stiff **(ALLUVIUM)**		SS 7	100	1-2-5 (7)	<0.25 1.5-2.0
				SS 8	100	WH-3-5 (8)	1.5-2.0
			20.0				
				SS 9	100	2-3-5 (8)	2.0-2.5
612.3		Bottom of hole at 22.5 feet.					

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Civil & Environmental Consultants, Inc.
10300 Alliance Road, Suite 300
Cincinnati, Ohio 45242

BORING NUMBER MW-1D

CLIENT American Electric Power
PROJECT NAME Kammer-Initial Safety Factor Assessment
CEC PROJECT NUMBER 345-817-0004
PROJECT LOCATION Moundsville, West Virginia
DATE STARTED 5/14/25 **COMPLETED** 7/25/25
GROUND ELEVATION 637.7 ft **HOLE SIZE** 10 inches
DRILLING CONTRACTOR RockWater Drilling, Inc.
GROUND WATER LEVELS:
DRILLING METHOD 4.25" I.D. Hollow Stem Augers; Automatic Hammer
▽ **AT TIME OF DRILLING** 16.0 ft / Elev 621.7 ft
LOGGED BY JO **CHECKED BY** JBG
AT END OF DRILLING Refer to Note 2
LOCATION N 491496.2, E 1596848.2
AFTER DRILLING Refer to Note 2

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)
637.7		TOPSOIL (3 inches)	0.0				
637.4		Brown, Poorly Graded Gravel, GP, Moist **(FILL)**		GB 1			
635.7		Brown, Clayey Sand, SC, Moist **(FILL)**		GB 2			
634.7		Brown, Clayey Gravel, GC, Moist **(FILL)**		GB 3			
			5.0	GB 4			
631.7		Brown, WELL GRADED GRAVEL WITH SILT AND SAND, GW-GM, Moist, Loose to Medium Dense **(FILL)**		GB 5	22	5-6-4 (10)	
				SS 1			
			10.0	SS 2	56	5-4-5 (9)	
				SS 3	72	5-6-6 (12)	
624.2		Brown, Sandy Lean Clay, CL, Moist, Stiff **(ALLUVIUM)**	15.0	SS 4	89	5-3-3 (6)	1.0-1.5
621.7		▽ Gray, Sandy Silt, ML, Wet, Soft **(ALLUVIUM)**		SS 5	89	3-1-WH (1)	0.25-0.5
619.2		Brown, Lean Clay, CL, Moist, Very Stiff **(ALLUVIUM)**	20.0	SS 6	100	1-3-4 (7)	2.0-2.5
614.2		Brown, Sandy Silt, ML, Wet, Very Soft **(ALLUVIUM)**	25.0	SS 7	100	1-3-3 (6)	<0.25
609.2		Brown, Poorly-Graded Sand with Silt, SP-SM, Wet, Loose **(ALLUVIUM)**	30.0	SS 8	100	WH-1-4 (5)	
			35.0				

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

CEC CUSTOM LOG 345-817-0004 INITIAL SAFETY FACTOR ASSESSMENT.GPJ GOOD TEMPLATE.GDT 11/5/25

(Continued Next Page)

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10300 Alliance Road, Suite 300
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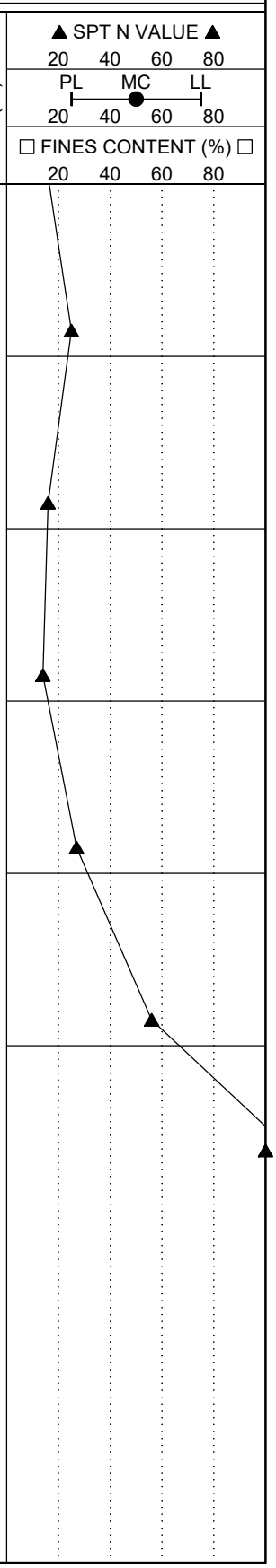
BORING NUMBER MW-1D

CLIENT American Electric Power
PROJECT NAME Kammer-Initial Safety Factor Assessment
CEC PROJECT NUMBER 345-817-0004
PROJECT LOCATION Moundsville, West Virginia

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)
		Brown, Poorly-Graded Sand with Silt, SP-SM, Wet, Loose **(ALLUVIUM)** *(continued)*	35.0				
599.2		Brown, Well-Graded Sand with Gravel, SW, Wet, Medium Dense **(ALLUVIUM)**	40.0	SS 9	28	16-15-10 (25)	
			45.0	SS 10	33	8-8-8 (16)	
			50.0	SS 11	50	7-7-7 (14)	
			55.0	SS 12	22	7-15-12 (27)	
579.2		Brown, Poorly-Graded Sand, SP, Wet, Very Dense **(ALLUVIUM)**	60.0	SS 13	72	8-23-33 (56)	
574.7 574.6		Gray, Shale with Interbedded Limestone, Completely Weathered, Very Broken, Very Soft Bottom of hole at 63.1 feet.		SS 14	50	50/1"	

Notes:
1) About 5 feet of heave was observed in the augers at a depth of 33.5 feet. The heaved material was flushed from the augers using water. SPT sampling was resumed at a depth of 38.5 feet.
2) Deep well installed in borehole and shallow well installed in offset borehole. Refer to well logs.



Civil & Environmental Consultants, Inc.
10300 Alliance Road, Suite 300
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BORING NUMBER BG-2

CLIENT American Electric Power
PROJECT NAME Kammer-Initial Safety Factor Assessment
CEC PROJECT NUMBER 345-817-0004
PROJECT LOCATION Moundsville, West Virginia
DATE STARTED 5/15/25 **COMPLETED** 6/19/25
GROUND ELEVATION 652.4 ft **HOLE SIZE** 8 inches
DRILLING CONTRACTOR RockWater Drilling, Inc.
GROUND WATER LEVELS:
DRILLING METHOD 4.25" I.D. Hollow Stem Augers; Automatic Hammer
▽ **AT TIME OF DRILLING** 28.5 ft / Elev 623.9 ft
LOGGED BY JO **CHECKED BY** JBG
AT END OF DRILLING Refer to Note 5
LOCATION N 491024.4, E 1597731.1
AFTER DRILLING Refer to Note 5

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)
652.4		TOPSOIL (4 inches)	0.0				
652.1		Brown, Clayey Gravel with Sand, GC, Moist **(FILL)**		GB 1			
				GB 2			
649.4		Brown, Sandy Silt, ML, Moist **(FILL)**		GB 3			
648.4		Brown, Clayey Gravel, GC, Moist **(FILL)**	5.0	GB 4			
646.4		Brown, Sandy Silt, ML, Moist, Stiff Becoming Medium Stiff **(FILL)**		GB 5	100	2-3-4 (7)	1.0-1.5
				SS 1			
			10.0	SS 2	94	2-4-6 (10)	1.5
				SS 3	83	1-4-6 (10)	0.5
638.9		Brown, Well-Graded Gravel with Sand, GW, Moist, Medium Dense **(FILL)** *Noted fly ash.*	15.0	SS 4	33	4-8-8 (16)	
				SS 5	6	2-7-4 (11)	
633.9		Brown and Black, Silty Sand, SM, Moist, Stiff **(FILL)** *Noted intermixed bottom ash.*	20.0	SS 6	28	3-5-6 (11)	
628.9		Brown and Gray, Poorly-Graded Sand with Gravel, SP, Moist Becoming Wet, Medium Dense to Dense **(ALLUVIUM)**	25.0	SS 7	72	5-6-5 (11)	
		▽	30.0	SS 8	78	7-18-22 (40)	
618.9		Brown and Gray, Poorly-Graded Sand, SP, Wet, Medium Dense **(ALLUVIUM)**	35.0	SS 9	94	2-7-13 (20)	

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

(Continued Next Page)

Civil & Environmental Consultants, Inc.
10300 Alliance Road, Suite 300
Cincinnati, Ohio 45242

BORING NUMBER BG-2

CLIENT American Electric Power **PROJECT NAME** Kammer-Initial Safety Factor Assessment

CEC PROJECT NUMBER 345-817-0004 **PROJECT LOCATION** Moundsville, West Virginia

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)
		Brown and Gray, Poorly-Graded Sand, SP, Wet, Medium Dense **(ALLUVIUM)** *(continued)*	35.0				
613.9		Brown, Well-Graded Sand with Gravel, SW, Wet, Dense Becoming Medium Dense **(ALLUVIUM)**	40.0	SS 10	22	12-21-19 (40)	
			45.0	SS 11	22	5-10-12 (22)	
			50.0	SS 12	50	3-4-7 (11)	
598.9		Brown, Well-Graded Sand, SW, Wet, Medium Dense **(ALLUVIUM)**	55.0	SS 13	78	6-5-11 (16)	
			60.0	SS 14	50	4-5-8 (13)	
			65.0	SS 15	100	8-7-8 (15)	
583.9		Brown, Poorly-Graded Sand, SP, Wet, Medium Dense Becoming Very Dense **(ALLUVIUM)**	70.0	SS 16	78	6-7-9 (16)	
			75.0	SS 17	100	6-11-27 (38)	

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

(Continued Next Page)

Civil & Environmental Consultants, Inc.
10300 Alliance Road, Suite 300
Cincinnati, Ohio 45242

BORING NUMBER BG-2

CLIENT American Electric Power **PROJECT NAME** Kammer-Initial Safety Factor Assessment

CEC PROJECT NUMBER 345-817-0004 **PROJECT LOCATION** Moundsville, West Virginia

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)
		Brown, Poorly-Graded Sand, SP, Wet, Medium Dense Becoming Very Dense **(ALLUVIUM)** *(continued)*	75.0				
			80.0	SS 18	100	16-36-17 (53)	
568.7		Gray, Shale with Interbedded Limestone, Completely Weathered, Very Broken, Very Soft	85.0	SS 19	103	23-27-50/4"	
564.5		Bottom of hole at 87.9 feet.		SS 20	104	50/5"	

Notes:
1) Vacuum extraction methods were performed to a depth of 6 feet prior to the auger boring, to identify whether shallow underground utilities were present. The auger boring with standard penetration tests began at a depth of 6 feet.
2) About 10 feet of heave on 1st attempt and 14 feet of heave on 2nd attempt was observed in the augers at a depth of 38.5 feet. The heaved material was flushed from the augers using water. SPT sampling was resumed at a depth of 38.5 feet.
3) Auger refusal was encountered at a depth of about 87.5' bgs.
4) Bulk sample collected from 6 to 8 feet bgs.
5) Deep well installed in borehole and shallow well installed in offset borehole. Refer to well logs.

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Civil & Environmental Consultants, Inc.
10300 Alliance Road, Suite 300
Cincinnati, Ohio 45242

BORING NUMBER BG-4

CLIENT American Electric Power
PROJECT NAME Kammer-Initial Safety Factor Assessment
CEC PROJECT NUMBER 345-817-0004
PROJECT LOCATION Moundsville, West Virginia
DATE STARTED 5/15/25 **COMPLETED** 7/10/25
GROUND ELEVATION 667.0 ft **HOLE SIZE** 10 inches
DRILLING CONTRACTOR RockWater Drilling, Inc.
GROUND WATER LEVELS:
DRILLING METHOD 4.25" I.D. Hollow Stem Augers; Automatic Hammer
▽ **AT TIME OF DRILLING** 16.0 ft / Elev 651.0 ft
LOGGED BY JO **CHECKED BY** JBG
AT END OF DRILLING Refer to Note 3
LOCATION N 490913.4, E 1598535.7
AFTER DRILLING Refer to Note 3

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)
667.0		TOPSOIL (5 inches)	0.0				
666.6		Brown, Clayey Gravel with Sand, GC, Moist **(FILL)**		GB 1			
				GB 2			
664.0		Brown and Gray, Gravelly Lean Clay, CL, Moist **(FILL)**		GB 3			
			5.0	GB 4			
661.0		Brown and Gray, Gravelly Lean Clay with Sand, CL, Moist, Very Stiff **(FILL)** *Noted few coal fragments from 8.5 to 12.5 feet below ground surface.*		GB 5	50	3-4-5 (9)	2.5
				SS 1			
			10.0	SS 2	78	2-9-12 (21)	2.0
656.0		Brown, Lean Clay with Sand, CL, Moist, Very Stiff **(FILL)**		SS 3	100	5-8-7 (15)	2.5-3.5
653.5		Brown, Well-Graded Sand with Clay, SW-SC, Moist, Medium Dense **(FILL)**	15.0	SS 4	56	5-6-5 (11)	
651.0		▽ Brown, Well-Graded Sand with Clay, SW-SC, Wet, Loose becoming Very Loose **(ALLUVIUM)**		SS 5	67	1-2-3 (5)	
			20.0	SS 6	56	WH-WH-1 (1)	
			25.0	SS 7	50	WH-WH-1 (1)	
638.5		Brown, Clayey Gravel with Sand, GC, Wet, Loose **(ALLUVIUM)**	30.0	SS 8	67	1-3-6 (9)	
633.5		Brown, Poorly-Graded Sand with Gravel, SP, Wet, Loose **(ALLUVIUM)**	35.0	SS 9	72	5-4-5 (9)	

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

(Continued Next Page)

Civil & Environmental Consultants, Inc.
10300 Alliance Road, Suite 300
Cincinnati, Ohio 45242

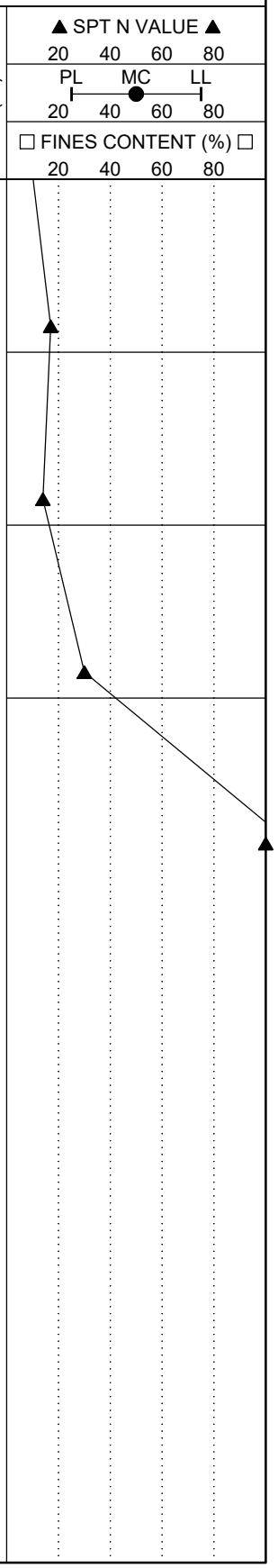
BORING NUMBER BG-4

CLIENT American Electric Power **PROJECT NAME** Kammer-Initial Safety Factor Assessment

CEC PROJECT NUMBER 345-817-0004 **PROJECT LOCATION** Moundsville, West Virginia

ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)
		Brown, Poorly-Graded Sand with Gravel, SP, Wet, Loose **(ALLUVIUM)** *(continued)*	35.0				
628.5		Brown, Poorly-Graded Sand with Clay and Gravel, SP-SC, Wet, Medium Dense **(ALLUVIUM)**	40.0	SS 10	89	6-8-9 (17)	
623.5		Brown, Sandy Silt, ML, Wet, Very Stiff **(ALLUVIUM)**	45.0	SS 11	100	4-7-7 (14)	2.0
618.5		Gray, Shale with Interbedded Limestone, Completely Weathered to Highly Weathered, Very Broken, Very Soft	50.0	SS 12	100	12-14-16 (30)	2.0-3.5
				SS 13	82	18-37-50/5"	
612.1		Bottom of hole at 54.9 feet.					

Notes:
1) Vacuum extraction methods were performed to a depth of 6 feet prior to the auger boring, to identify whether shallow underground utilities were present. The auger boring with standard penetration tests began at a depth of 6 feet.
2) Noted geotextile fabric at 9 inches below ground surface.
3) Deep well installed in offset borehole. Refer to well logs.



APPENDIX III

LABORATORY TEST RESULTS

LABORATORY DETERMINATION OF WATER (MOISTURE) CONTENT OF SOIL AND ROCK

ASTM D2216-19

Client Civil & Environmental Consultants, Inc. (CEC)
Client Project 345-817.0004 AEP Kammer Plant
Project No. 25-04143

Lab Sample No.	Boring	Depth	Sample	Tare Number	Tare Weight + Wet Soil gm	Tare Weight + Dry Soil gm	Tare Weight gm	Water Content		~Maximum Particle Tested	Any + Sizes Omitted?	Weight Omitted grams	Material Types (quantity)	Could Minimum Mass be meet	Method A or B
								Method B %	Method A %						
25-04143-12	AP-2	6.0' - 7.0'	SS-1A	916	298.61	275	97.47	13.3	13	-3/8	Yes	14.75	2	Yes	A
25-04143-13	AP-2	8.5' - 10.0'	SS-2	219	410.34	372.33	178.8	19.6	20	-3/8	No	-	2	Yes	A
25-04143-14	AP-2	11.0'-12.5'	SS-3	817	311.42	276.43	101.45	20.0	20	-3/8	No	-	1	Yes	A
25-04143-16	AP-2	18.5'-20.0'	SS-4	516	592.07	514.49	101.71	18.8	19	-3/8	Yes	17.7	2	Yes	A
25-04143-17	AP-2	23.5'-25.0'	SS-7	736	447.04	406.32	179.9	18.0	18	-3/8	No	-	2	Yes	A
25-04143-18	AP-3	6.0'-7.5'	SS-1	3004	417.12	385.48	182.3	15.6	16	-3/8	No	-	2	Yes	A
25-04143-19	AP-3	8.5'-10.0'	SS-2	829	343.46	306.35	101.51	18.1	18	-3/8	No	-	1	Yes	A
25-04143-20	AP-3	11.0'-12.5'	SS-3	739	397.4	367.77	180.8	15.8	16	-3/8	No	-	2	Yes	A
25-04143-21	AP-3	16.0'-18.5'	SS-5	964	322.74	287.3	102.95	19.2	19	-3/8	No	-	1	Yes	A
25-04143-23	AP-3	28.5'-30.0'	SS-8	507	469.08	410.6	102.56	19.0	19	-3/8	No	-	2	Yes	A
25-04143-24	AP-4	6.0'-7.5'	SS-1	971	231.58	213.9	97.82	15.2	15	-3/8	No	-	1	Yes	A
25-04143-25	AP-4	11.0'-12.5'	SS-3	911	335.82	315.68	187.5	15.7	16	-3/8	No	-	2	Yes	A
25-04143-27	AP-4	16.0'-17.5'	SS-5	320	419.11	381.33	189.7	19.7	20	-3/8	No	-	2	Yes	A
25-04143-28	AP-4	18.5'-20.0'	SS-6	234	416.79	374.68	179.83	21.6	22	-3/8	No	-	2	Yes	A
25-04143-29	AP-4	23.5'-25.0'	SS-7	750	394.9	355.8	183.2	22.7	23	-3/8	No	-	2	Yes	A
25-04143-30	AP-5	6.0'-7.5'	SS-1	500	278.24	249.17	104.94	20.2	20	-3/8	No	-	2	Yes	A
25-04143-32	AP-6	11.0'-12.5'	SS-3	740	377.04	334.83	187	28.6	29	-3/8	No	-	2	Yes	A
25-04143-34	AP-8	3.5'-5.0'	SS-2	907	337.56	318.72	185.68	14.2	14	-3/8	Yes	31.08	3	Yes	A
25-04143-35	AP-8	6.0'-7.5'	SS-3	316	299.93	283.84	187.74	16.7	17	-3/8	Yes	9.25	2	Yes	A
25-04143-37	MW-10	13.5'-15.0'	SS-4	1009	322.1	316.58	194.1	4.5	5	-3/4	Yes	32.49	2	No	A
25-04143-38	MW-10	18.5'-20.0'	SS-6	203	427.85	389.94	176.76	17.8	18	-3/8	No	-	1	Yes	A
25-04143-39	MW-10	23.5'-25.0'	SS-7	2076	447.28	398.97	150.98	19.5	19	-3/8	No	-	2	Yes	A

Performed By: RH Input Validation: MA Reviewed By: BS Date Tested: 9/9/2025

Note: Both Methods A & B are presented for instances where additional significant digits are required for other calculations.

PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	**Boring**	AP-2
Client Project	345-817.0004 AEP Kammer Plant	**Depth**	13.5'-15.0'
Project No.	25-04143	**Sample**	SS-6
		Lab Sample	25-04143 -15

Sample Color: BROWN
USCS Group Name: SANDY SILTY CLAY WITH GRAVEL
Dry Prep: R58-11(2018)[1]
USCS Group Symbol: CL-ML USDA: LOAM AASHTO: A-4 (2)

MECHANICAL SIEVE

Total Sample	
Tare No.	2015
Tare + WS., gm	239.18
Tare + DS., gm	228.19
Tare, gm	151.00
Total sample WC	**14.2%**
Total Sample Dry Wt, gm (-3")	77

Hygroscopic WC (-#10)	
Tare No.	202
Tare + WS., gm	20.29
Tare + DS., gm	20.18
Tare, gm	16.69
Hygroscopic WC	3.15%
-#10 Hydro/Sieve air dry wt.	54.20
Wt. of +#200 Sample, gm	10.73

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	2.99	3.9%	96.1%	
3/8"	9.5	4.07	5.3%	90.9%	
No. 4	4.75	5.17	6.7%	84.2%	
No. 10	2	3.29	4.3%	79.9%	
No. 20	0.85	0.14	0.2%	79.7%	
No. 40	0.425	0.51	0.8%	78.9%	
No. 60	0.25	0.49	0.7%	78.2%	
No. 140	0.106	5.31	7.8%	70.4%	
No. 200	0.075	4.28	6.3%	64.1%	

HYDROMETER (-#10)

Split Air Dry Wt 55.91
Hygroscopic WC 3.15%
Corrected Dry wt 54.2

-#10 Dispersed 1min in Hamilton Beach Mixer

Specific Gravity 2.7 Assumed
a Factor *0.9889*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	24.0	23.5	4.7	19.3	0.0129	35.2	0.0320	28.1%
5	20.0	23.5	4.7	15.3	0.0129	27.9	0.0208	22.3%
15	19.0	23.6	4.7	14.3	0.0129	26.1	0.0121	20.8%
30	17.0	23.7	4.6	12.4	0.0129	22.6	0.0086	18.1%
60	15.0	23.8	4.6	10.4	0.0129	19.0	0.0062	15.2%
250	13.5	23.9	4.6	8.9	0.0129	16.2	0.0030	13.0%
1440	11.0	23.9	4.6	6.4	0.0129	11.7	0.0013	9.3%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4) **15.8** Silt=49.6% Clay=14.5%
Coarse=0; Fine=15.8 D60, mm NA
% Sand (-#4 & +#200) **20.1** D30, mm NA
Coarse=4.3; Medium=1; Fine=14.9 D10, mm NA
% Fines (-#200) **64.1** Cc NA
% Plus #200 (-3") **35.9** Cu NA

USCS Description
SANDY SILTY CLAY WITH GRAVEL

USCS Group Symbol	Atterberg Limits Group Symbol
CL-ML	CL-ML - SILTY CLAY

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)
100	100
2	79.9
0.05	47.0
0.002	11.2

Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
Gravel	20.1	0
Sand	32.9	41.2
Silt	35.8	44.8
Clay	11.2	14.0

USDA Classification
LOAM

Performed By: RH Input Validation: MA Reviewed By: BS Date Tested: 9/8/2025

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-2
Client Project	345-817.0004 AEP Kammer Plant	Depth	13.5'-15.0'
Project No.	25-04143	Sample	SS-6
		Lab Sample	25-04143 -15

Soil Description: BROWN SILTY CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	2015
Wt. Tare & WS, gm	239.18
Wt. Tare & DS, gm	228.19
Wt. Tare, gm	151
Water Content, %	14.2

SAMPLE SUMMARY

Liquid Limit (LL), %	**23**
Plastic Limit (PL), %	**16**
Plasticity Index (PI)	**7**
USCS Group Symbol (*-#40 Fraction*)	**CL-ML**
USCS Group Name (*-#40 Fraction*)	**SILTY CLAY**
Sample Color:	**BROWN**

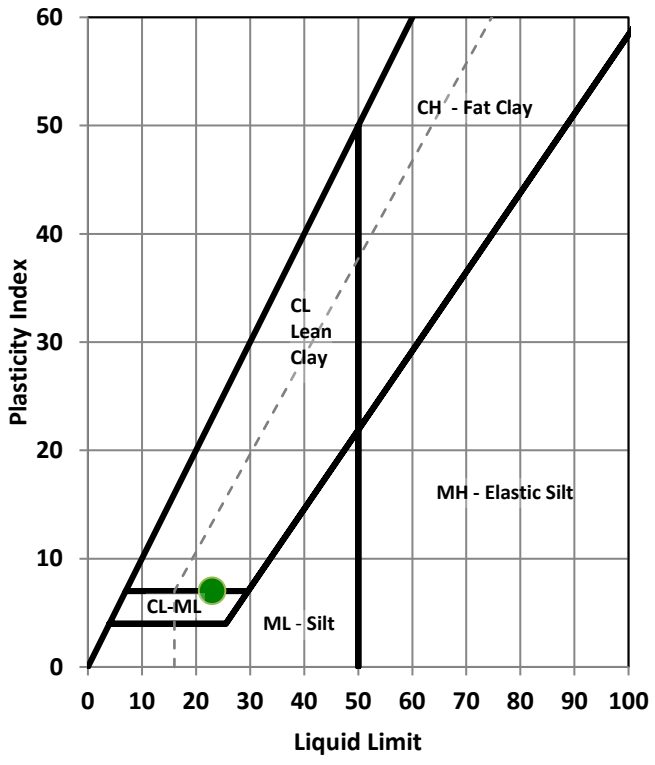
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	1113	460	462
Wt. Tare & WS, gm	19.78	19.83	18.51
Wt. Tare & DS, gm	18.62	18.61	17.45
Wt. Tare, gm	11.61	10.84	10.85
Water Content, %	16.5	15.7	16.1

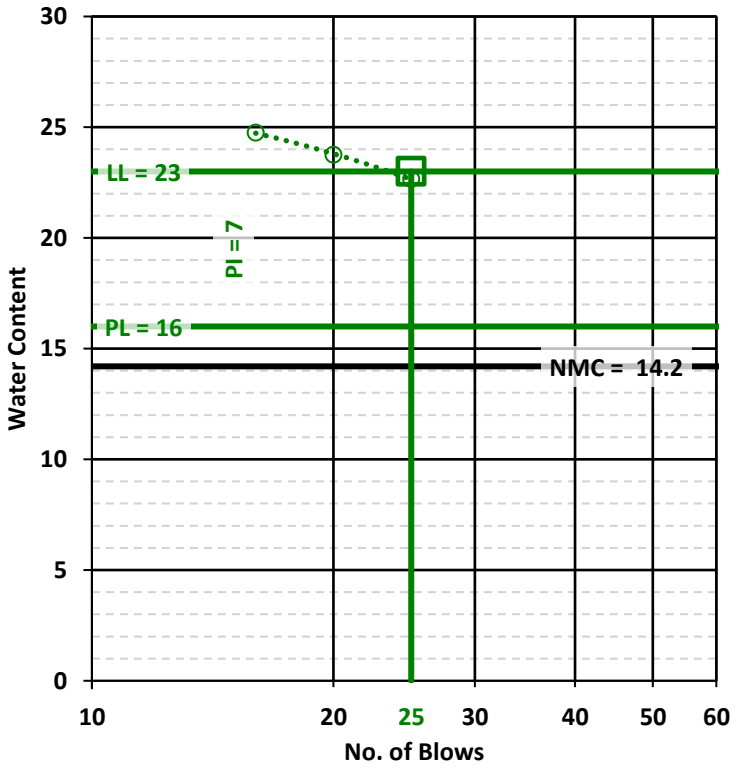
LIQUID LIMIT

	3 Points		
	463	705	320
	16.97	16.31	16.82
	15.73	15.35	15.78
	10.72	11.31	11.19
	24.8	23.8	22.7
# of Blows	16	20	25

PLASTICITY CHART



FLOW CURVE



Performed By: RH | Input Validation:MA | Reviewed By: BS | Date Tested: 9/8/2025

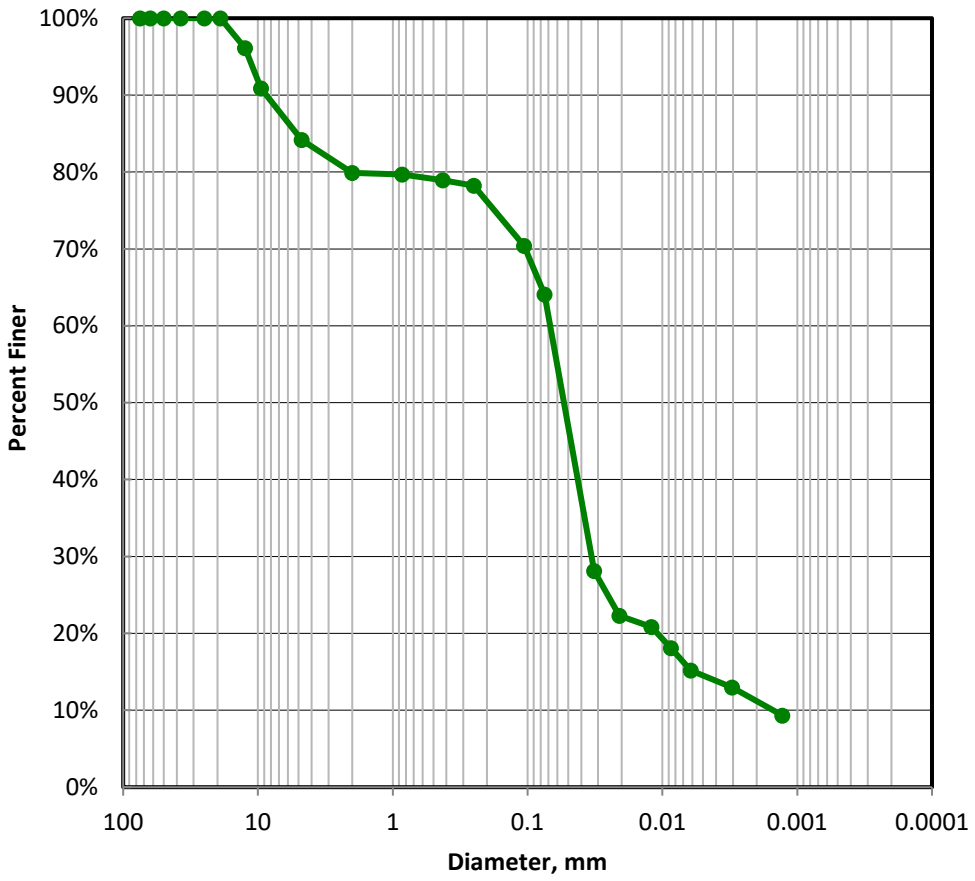
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-2
Client Project	345-817.0004 AEP Kammer Plant	Depth	13.5'-15.0'
Project No.	25-04143	Sample	SS-6
		Lab Sample	25-04143 -15

Sample Color: **BROWN**

USCS Group Name: **SANDY SILTY CLAY WITH GRAVEL**

USCS Group Symbol: **CL-ML** USDA: **LOAM** AASHTO: **A-4 (2)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	96.1%
3/8"	9.5	90.9%
No. 4	4.75	84.2%
No. 10	2	79.9%
No. 20	0.85	79.7%
No. 40	0.425	78.9%
No. 60	0.25	78.2%
No. 140	0.106	70.4%
No. 200	0.075	64.1%
NA	0.0320	28.1%
NA	0.0208	22.3%
NA	0.0121	20.8%
NA	0.0086	18.1%
NA	0.0062	15.2%
NA	0.0030	13.0%
NA	0.0013	9.3%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**15.8**	Silt=49.6% Clay=14.5%	
Coarse=0; Fine=15.8		D60, mm	NA
% Sand (-#4 & +#200)	**20.1**	D30, mm	NA
Coarse=4.3; Medium=1; Fine=14.9		D10, mm	NA
% Fines (-#200)	**64.1**	Cc	NA
% Plus #200 (-3")	**35.9**	Cu	NA

USCS Description

SANDY SILTY CLAY WITH GRAVEL

USCS Group Symbol	Atterberg Limits Group Symbol
CL-ML	**CL-ML - SILTY CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	20.1	0
2	79.9			
		Sand	32.9	41.2
0.05	47.0			
		Silt	35.8	44.8
0.002	11.2			
		Clay	11.2	14.0

USDA Classification

LOAM

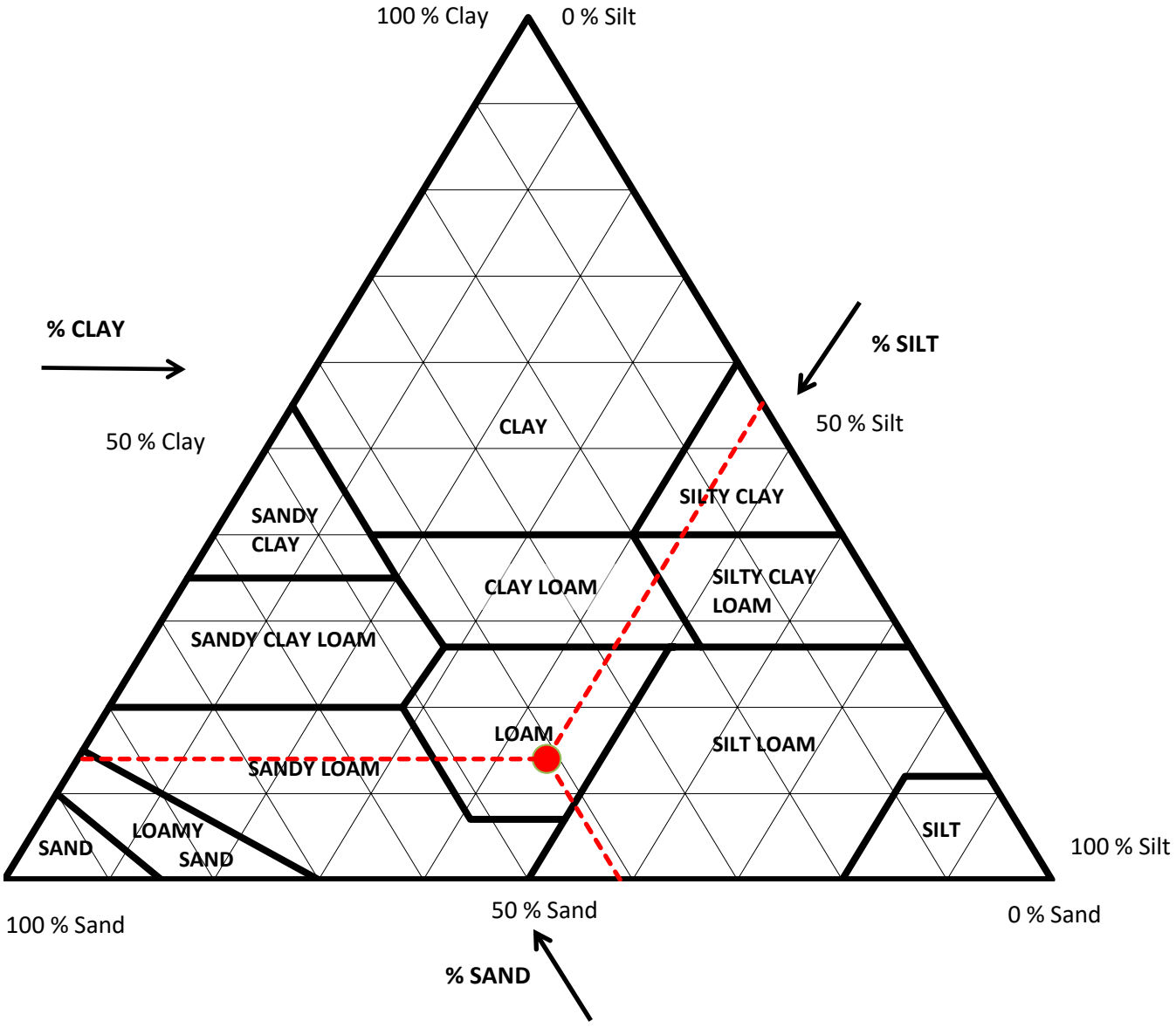
USDA CLASSIFICATION CHART

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-2
Client Project	345-817.0004 AEP Kammer Plant	Depth	13.5'-15.0'
Project No.	25-04143	Sample	SS-6
		Lab Sample	25-04143 -15

Sample Color: **BROWN**
USCS Group Name: **SANDY SILTY CLAY WITH GRAVEL**
USCS Group Symbol: **CL-ML** USDA: **LOAM** AASHTO: **A-4 (2)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	41.2
Percent Silt, %	44.8
Percent Clay, %	14.0

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.2
Coarse Sand; 1-0.5	0.8
Medium Sand; 0.5-0.25	1.1
Fine Sand; 0.25-0.1	11.1
Very Fine Sand; 0.1-0.05	28.0
Total	**41.2**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	**Boring**	AP-3
Client Project	345-817.0004 AEP Kammer Plant	**Depth**	18.5'-20.0'
Project No.	25-04143	**Sample**	SS-6
		Lab Sample	25-04143 -22

Sample Color: BROWN
USCS Group Name: SILTY SAND
USCS Group Symbol: SM USDA: SANDY LOAM AASHTO: A-4 (0)

Dry Prep: R58-11(2018) [1]

MECHANICAL SIEVE

Total Sample	
Tare No.	2062
Tare + WS., gm	461.03
Tare + DS., gm	410.76
Tare, gm	154.20
Total sample WC	**19.6%**
Total Sample Dry Wt, gm (-3")	257

Hygroscopic WC (-#10)	
Tare No.	208
Tare + WS., gm	36.06
Tare + DS., gm	35.92
Tare, gm	16.79
Hygroscopic WC	0.73%
-#10 Hydro/Sieve air dry wt.	70.47
Wt. of +#200 Sample, gm	41.90

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0	0.0%	100.0%	
No. 10	2	0.07	0.0%	100.0%	
No. 20	0.85	0.16	0.2%	99.7%	
No. 40	0.425	1.07	1.5%	98.2%	
No. 60	0.25	3.57	5.1%	93.2%	
No. 140	0.106	31.40	44.5%	48.6%	
No. 200	0.075	5.70	8.1%	40.5%	

HYDROMETER (-#10)

Split Air Dry Wt	70.99	Specific Gravity	2.7
Hygroscopic WC	0.73%		Assumed
Corrected Dry wt	70.5	*a Factor*	*0.9889*

-#10 Dispersed 1min in Hamilton Beach Mixer

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	25.0	23.6	4.7	20.3	0.0129	28.5	0.0318	28.5%
5	21.0	23.6	4.7	16.3	0.0129	22.9	0.0206	22.9%
15	19.5	23.6	4.7	14.8	0.0129	20.8	0.0120	20.8%
30	18.0	23.7	4.6	13.4	0.0129	18.8	0.0086	18.8%
60	17.0	23.8	4.6	12.4	0.0129	17.4	0.0061	17.4%
250	14.0	23.9	4.6	9.4	0.0129	13.2	0.0030	13.2%
1440	12.0	23.9	4.6	7.4	0.0129	10.4	0.0013	10.4%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=24.3% Clay=16.2%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**59.5**	D30, mm	NA
Coarse=0; Medium=1.7; Fine=57.7		D10, mm	NA
% Fines (-#200)	**40.5**	Cc	NA
% Plus #200 (-3")	**59.5**	Cu	NA

USCS Description
SILTY SAND

USCS Group Symbol	Atterberg Limits Group Symbol
SM	**NP - NON PLASTIC**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.0	0
2	100.0			
		Sand	65.1	65.1
0.05	34.8			
		Silt	23.0	23.0
0.002	11.8			
		Clay	11.8	11.8

USDA Classification
SANDY LOAM

Performed By: RH Input Validation: MA Reviewed By: BS Date Tested: 9/8/2025

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-3
Client Project	345-817.0004 AEP Kammer Plant	Depth	18.5'-20.0'
Project No.	25-04143	Sample	SS-6
		Lab Sample	25-04143 -22

Soil Description: BROWN NON PLASTIC MATERIAL
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	2062
Wt. Tare & WS, gm	461.03
Wt. Tare & DS, gm	410.76
Wt. Tare, gm	154.2
Water Content, %	19.6

SAMPLE SUMMARY

Liquid Limit (LL), %	NA
Plastic Limit (PL), %	NA
Plasticity Index (PI)	NA
USCS Group Symbol (*-#40 Fraction*)	NP
USCS Group Name (*-#40 Fraction*)	NON PLASTIC
Sample Color:	BROWN

PLASTIC LIMIT

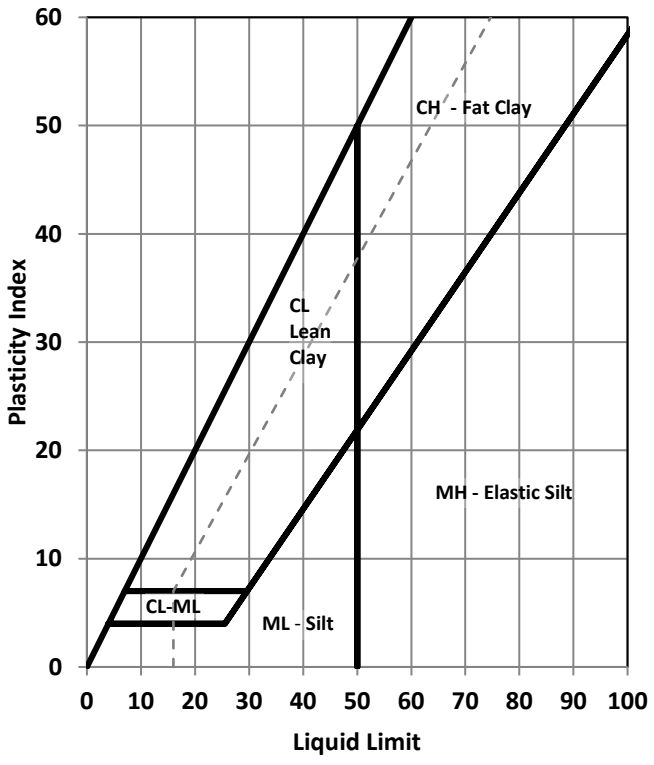
Points Run	0 Non-Plastic
Tare Number	
Wt. Tare & WS, gm	
Wt. Tare & DS, gm	
Wt. Tare, gm	
Water Content, %	

LIQUID LIMIT

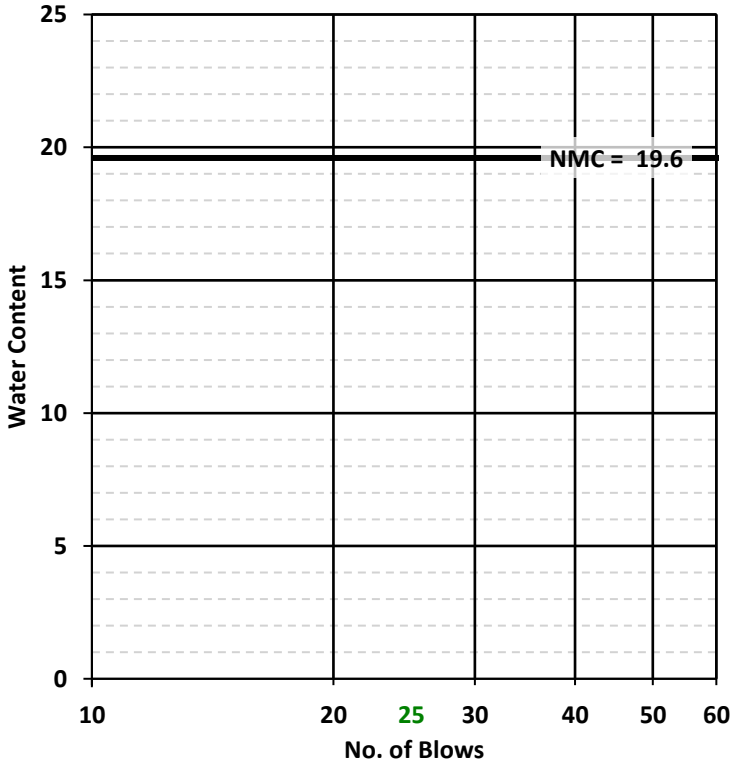
0 Non-Plastic

# of Blows

PLASTICITY CHART



FLOW CURVE



Performed By: RH | Input Validation:MA | Reviewed By: BS | Date Tested: 9/8/2025

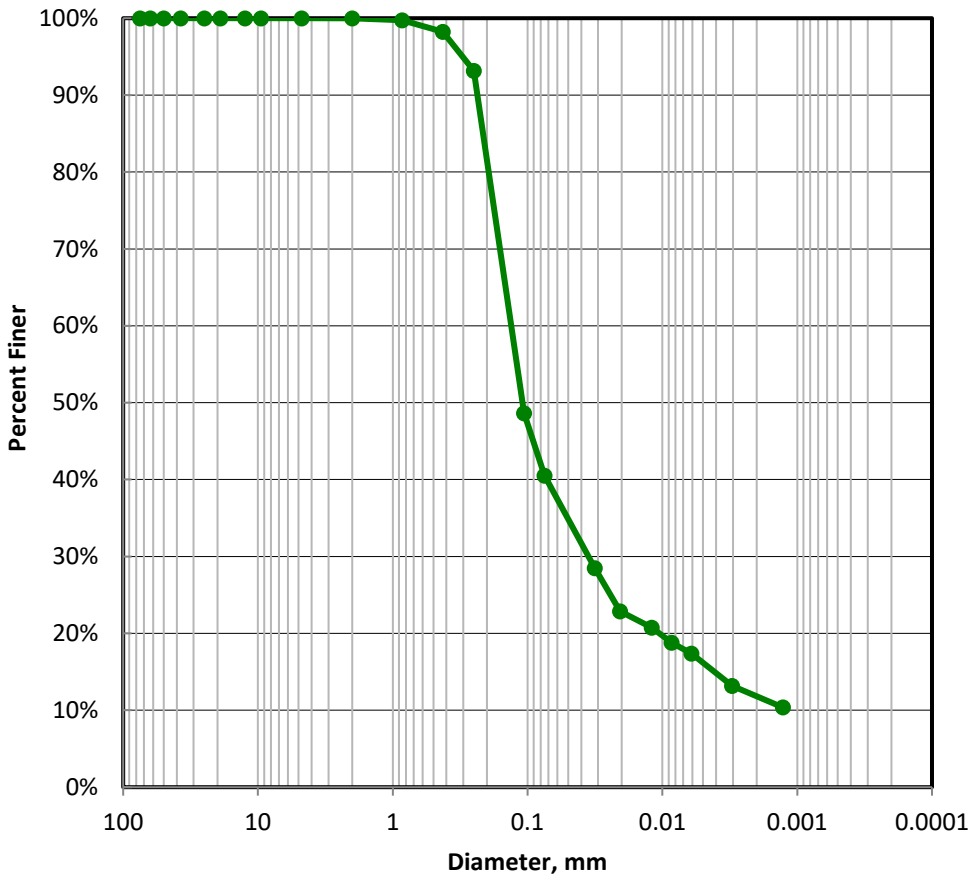
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-3
Client Project	345-817.0004 AEP Kammer Plant	Depth	18.5'-20.0'
Project No.	25-04143	Sample	SS-6
		Lab Sample	25-04143 -22

Sample Color: **BROWN**

USCS Group Name: **SILTY SAND**

USCS Group Symbol: **SM** USDA: **SANDY LOAM** AASHTO: **A-4 (0)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	100.0%
No. 20	0.85	99.7%
No. 40	0.425	98.2%
No. 60	0.25	93.2%
No. 140	0.106	48.6%
No. 200	0.075	40.5%
NA	0.0318	28.5%
NA	0.0206	22.9%
NA	0.0120	20.8%
NA	0.0086	18.8%
NA	0.0061	17.4%
NA	0.0030	13.2%
NA	0.0013	10.4%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=24.3% Clay=16.2%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**59.5**	D30, mm	NA
Coarse=0; Medium=1.7; Fine=57.7		D10, mm	NA
% Fines (-#200)	**40.5**	Cc	NA
% Plus #200 (-3")	**59.5**	Cu	NA

USCS Description

SILTY SAND

USCS Group Symbol	Atterberg Limits Group Symbol
SM	**NP - NON PLASTIC**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)
100	100
2	100.0
0.05	34.8
0.002	11.8

Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
Gravel	0.0	0
Sand	65.1	65.1
Silt	23.0	23.0
Clay	11.8	11.8

USDA Classification

SANDY LOAM

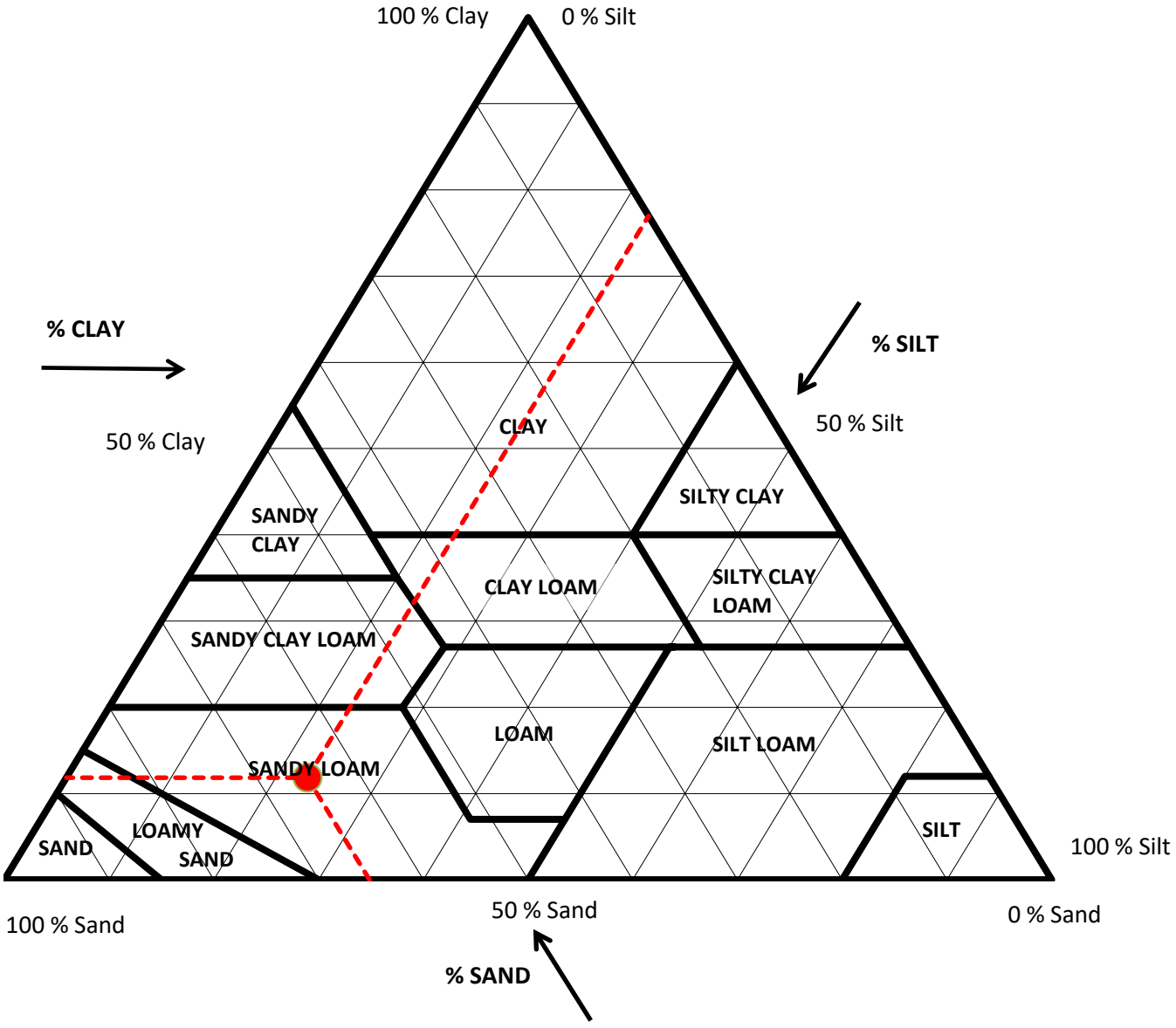
USDA CLASSIFICATION CHART

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-3
Client Project	345-817.0004 AEP Kammer Plant	Depth	18.5'-20.0'
Project No.	25-04143	Sample	SS-6
		Lab Sample	25-04143 -22

Sample Color: **BROWN**
USCS Group Name: **SILTY SAND**
USCS Group Symbol: **SM** USDA: **SANDY LOAM** AASHTO: **A-4 (0)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	65.1
Percent Silt, %	23.0
Percent Clay, %	11.8

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.2
Coarse Sand; 1-0.5	1.2
Medium Sand; 0.5-0.25	5.4
Fine Sand; 0.25-0.1	45.9
Very Fine Sand; 0.1-0.05	12.4
Total	**65.1**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	**Boring**	AP-4
Client Project	345-817.0004 AEP Kammer Plant	**Depth**	13.5'-15.0'
Project No.	25-04143	**Sample**	SS-4
		Lab Sample	25-04143 26

Sample Color: BROWN
USCS Group Name: SANDY LEAN CLAY
USCS Group Symbol: CL USDA: LOAM AASHTO: A-6 (5)

Dry Prep: R58-11(2018) [1]

MECHANICAL SIEVE

Total Sample	
Tare No.	2004
Tare + WS., gm	387.38
Tare + DS., gm	351.81
Tare, gm	150.30
Total sample WC	**17.7%**
Total Sample Dry Wt, gm (-3")	202

Hygroscopic WC (-#10)	
Tare No.	218
Tare + WS., gm	44.42
Tare + DS., gm	44.26
Tare, gm	16.82
Hygroscopic WC	0.58%
-#10 Hydro/Sieve air dry wt.	80.88
Wt. of +#200 Sample, gm	29.83

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0	0.0%	100.0%	
No. 10	2	0.07	0.0%	100.0%	
No. 20	0.85	0.02	0.0%	99.9%	
No. 40	0.425	0.09	0.1%	99.8%	
No. 60	0.25	0.42	0.5%	99.3%	
No. 140	0.106	21.58	26.7%	72.6%	
No. 200	0.075	7.72	9.5%	63.1%	

HYDROMETER (-#10)

Split Air Dry Wt 81.35
Hygroscopic WC 0.58%
Corrected Dry wt 80.9

-#10 Dispersed 1min in Hamilton Beach Mixer

Specific Gravity 2.7 Assumed
a Factor *0.9889*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	36.0	23.6	4.7	31.3	0.0129	38.3	0.0293	38.3%
5	32.0	23.7	4.6	27.4	0.0129	33.5	0.0191	33.5%
15	27.0	23.7	4.6	22.4	0.0129	27.4	0.0114	27.4%
30	26.0	23.7	4.6	21.4	0.0129	26.2	0.0081	26.2%
60	23.0	23.8	4.6	18.4	0.0129	22.5	0.0059	22.5%
250	19.0	23.8	4.6	14.4	0.0129	17.6	0.0029	17.6%
1440	17.0	20.0	5.7	11.3	0.0135	13.8	0.0013	13.8%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4) **0.0** Silt=41.7% Clay=21.4%
Coarse=0; Fine=0 D60, mm NA
% Sand (-#4 & +#200) **36.9** D30, mm NA
Coarse=0; Medium=0.1; Fine=36.7 D10, mm NA
% Fines (-#200) **63.1** Cc NA
% Plus #200 (-3") **36.9** Cu NA

USCS Description
SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	CL - LEAN CLAY

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.0	0
2	100.0			
		Sand	47.6	47.6
0.05	52.4			
		Silt	36.6	36.6
0.002	15.8			
		Clay	15.8	15.8

USDA Classification
LOAM

Performed By: RH Input Validation: MA Reviewed By: BS Date Tested: 9/8/2025

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-4
Client Project	345-817.0004 AEP Kammer Plant	Depth	13.5'-15.0'
Project No.	25-04143	Sample	SS-4
		Lab Sample	25-04143 26

Soil Description: BROWN LEAN CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	2004
Wt. Tare & WS, gm	387.38
Wt. Tare & DS, gm	351.81
Wt. Tare, gm	150.3
Water Content, %	17.7

SAMPLE SUMMARY

Liquid Limit (LL), %	**29**
Plastic Limit (PL), %	**18**
Plasticity Index (PI)	**11**
USCS Group Symbol (*-#40 Fraction*)	**CL**
USCS Group Name (*-#40 Fraction*)	**LEAN CLAY**
Sample Color:	**BROWN**

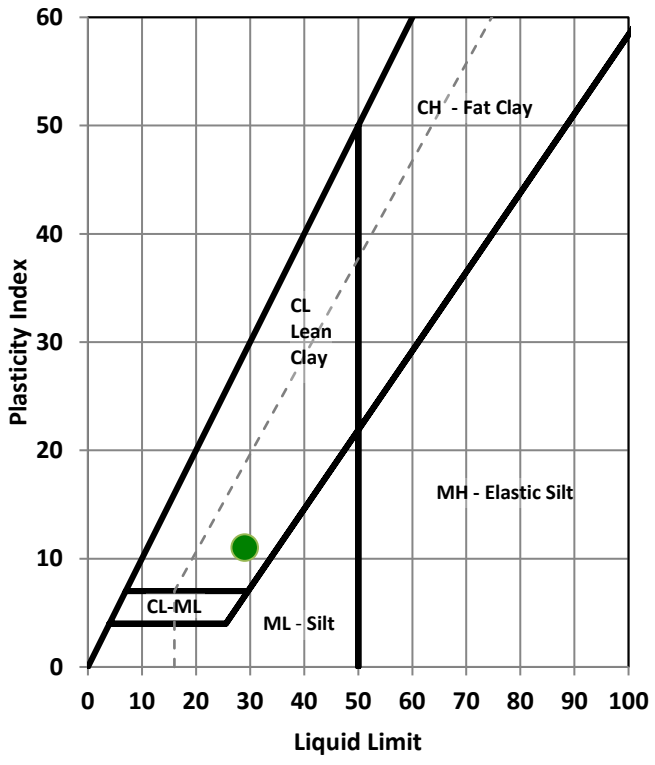
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	443	404	420
Wt. Tare & WS, gm	17.01	17.19	19.56
Wt. Tare & DS, gm	16.09	16.21	18.25
Wt. Tare, gm	10.79	10.84	10.73
Water Content, %	17.4	18.2	17.4

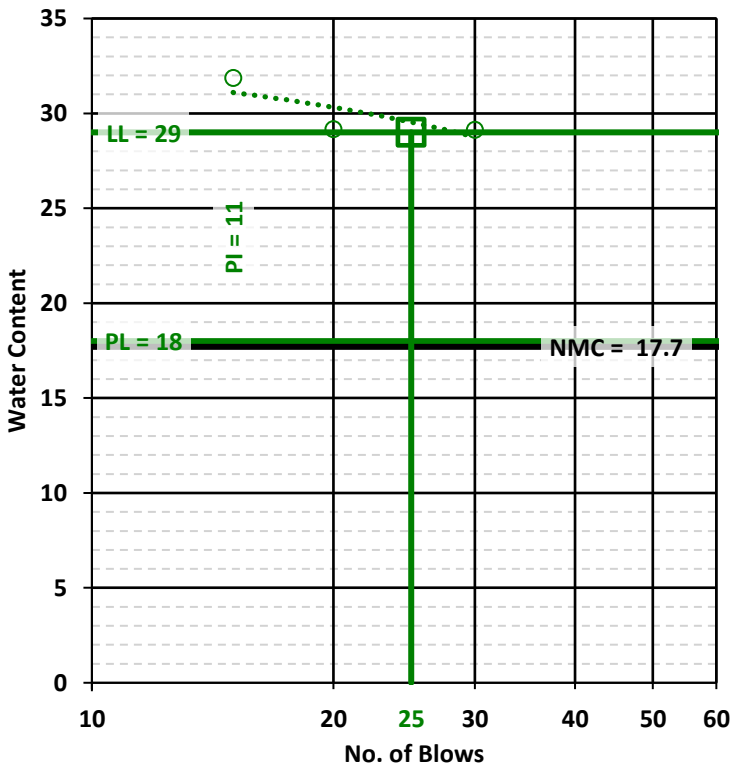
LIQUID LIMIT

	3 Points		
	444	710	708
	16.70	16.72	18.28
	15.25	15.46	16.96
	10.70	11.14	12.43
	31.9	29.2	29.1
# of Blows	15	20	30

PLASTICITY CHART



FLOW CURVE



Performed By: RH | Input Validation:MA | Reviewed By: BS | Date Tested: 9/8/2025

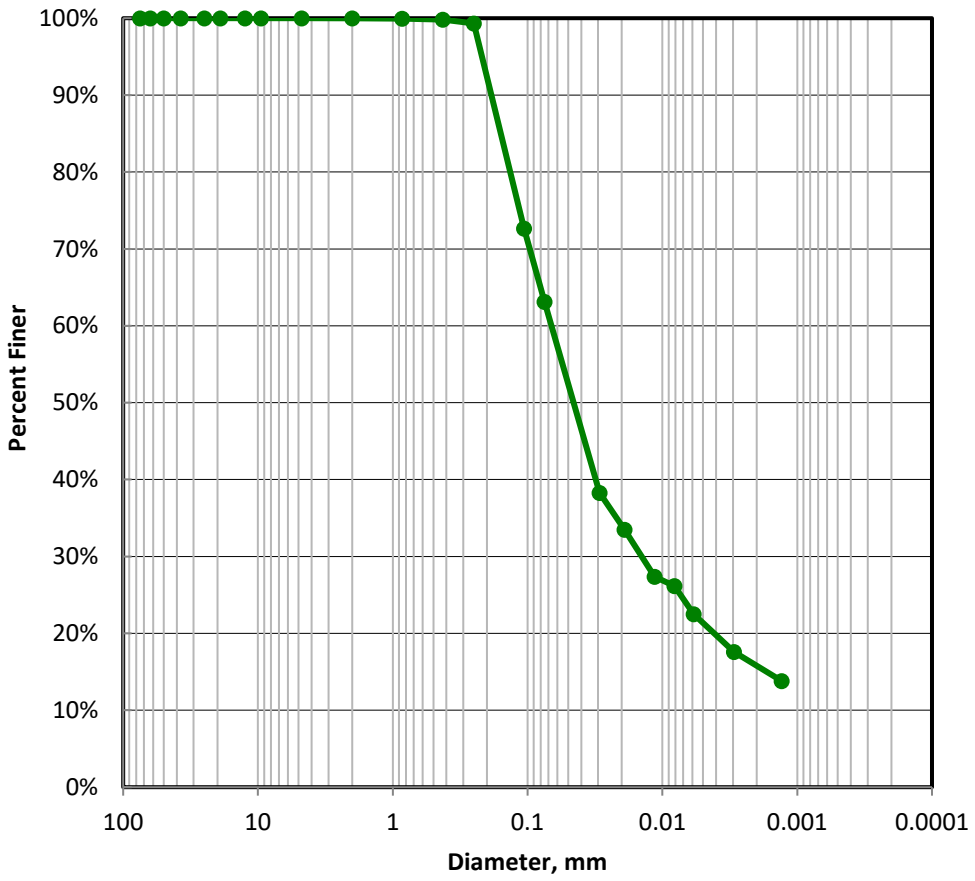
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-4
Client Project	345-817.0004 AEP Kammer Plant	Depth	13.5'-15.0'
Project No.	25-04143	Sample	SS-4
		Lab Sample	25-04143 26

Sample Color: **BROWN**

USCS Group Name: **SANDY LEAN CLAY**

USCS Group Symbol: **CL** USDA: **LOAM** AASHTO: **A-6 (5)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	100.0%
No. 20	0.85	99.9%
No. 40	0.425	99.8%
No. 60	0.25	99.3%
No. 140	0.106	72.6%
No. 200	0.075	63.1%
NA	0.0293	38.3%
NA	0.0191	33.5%
NA	0.0114	27.4%
NA	0.0081	26.2%
NA	0.0059	22.5%
NA	0.0029	17.6%
NA	0.0013	13.8%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=41.7% Clay=21.4%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**36.9**	D30, mm	NA
Coarse=0; Medium=0.1; Fine=36.7		D10, mm	NA
% Fines (-#200)	**63.1**	Cc	NA
% Plus #200 (-3")	**36.9**	Cu	NA

USCS Description

SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)
100	100
2	100.0
0.05	52.4
0.002	15.8

Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
Gravel	0.0	0
Sand	47.6	47.6
Silt	36.6	36.6
Clay	15.8	15.8

USDA Classification

LOAM

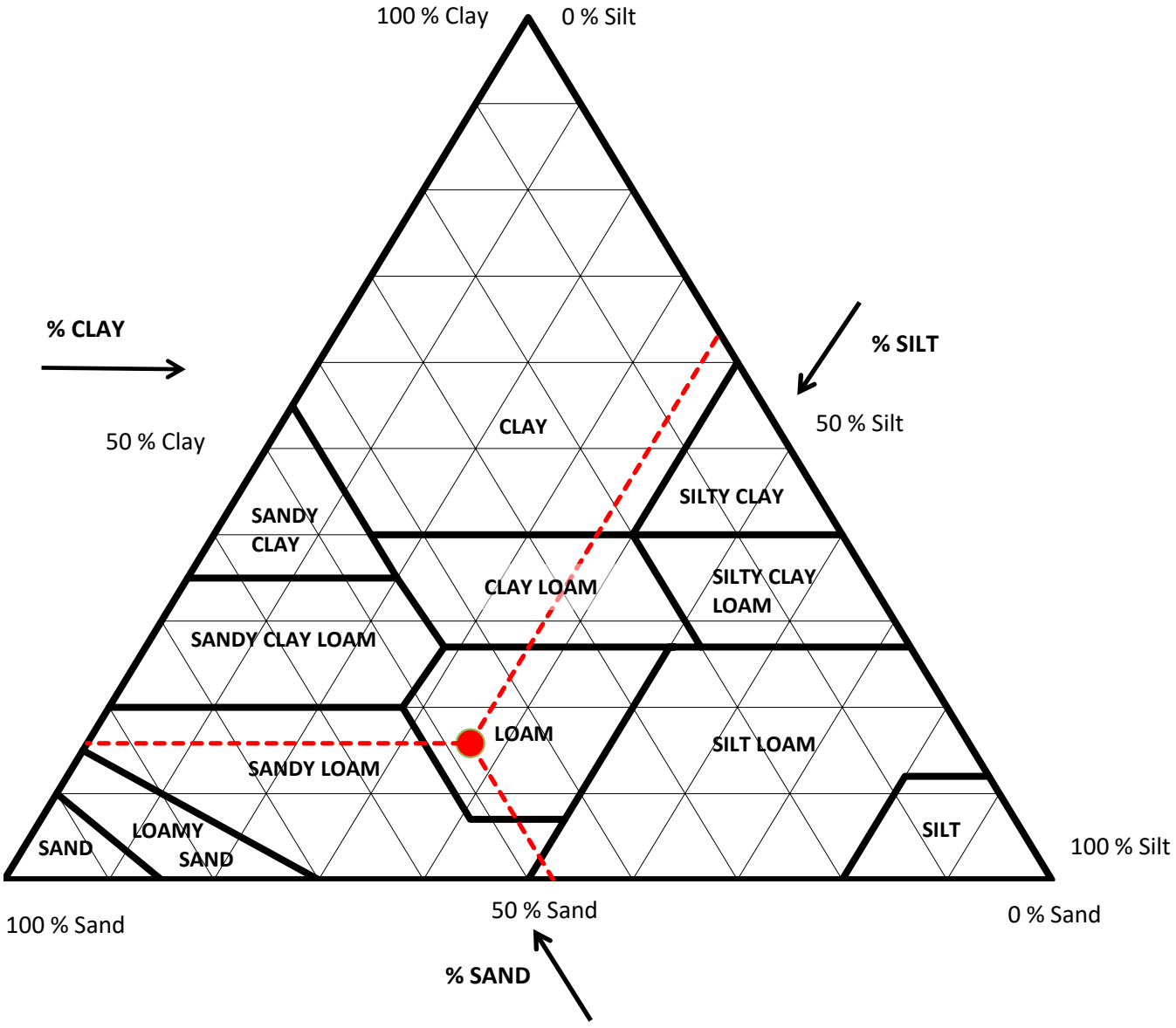
USDA CLASSIFICATION CHART

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-4
Client Project	345-817.0004 AEP Kammer Plant	Depth	13.5'-15.0'
Project No.	25-04143	Sample	SS-4
		Lab Sample	25-04143 26

Sample Color: **BROWN**
USCS Group Name: **SANDY LEAN CLAY**
USCS Group Symbol: **CL** USDA: **LOAM** AASHTO: **A-6 (5)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	47.6
Percent Silt, %	36.6
Percent Clay, %	15.8

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.0
Coarse Sand; 1-0.5	0.1
Medium Sand; 0.5-0.25	0.5
Fine Sand; 0.25-0.1	28.3
Very Fine Sand; 0.1-0.05	18.7
Total	**47.6**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	**Boring**	AP-5
Client Project	345-817.0004 AEP Kammer Plant	**Depth**	3.0'-5.0'
Project No.	25-04143	**Sample**	ST-1
		Lab Sample	25-04143 -01

Sample Color: BROWN
USCS Group Name: LEAN CLAY WITH SAND
USCS Group Symbol: CL USDA: LOAM AASHTO: A-6 (10)

Dry Prep: R58-11(2018) [1]

MECHANICAL SIEVE

Total Sample	
Tare No.	889
Tare + WS., gm	592.80
Tare + DS., gm	521.43
Tare, gm	186.60
Total sample WC	**21.3%**
Total Sample Dry Wt, gm (-3")	335

Hygroscopic WC (-#10)	
Tare No.	336
Tare + WS., gm	41.39
Tare + DS., gm	41.24
Tare, gm	11.15
Hygroscopic WC	0.50%
-#10 Hydro/Sieve air dry wt.	72.45
Wt. of +#200 Sample, gm	11.05

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	4.32	1.3%	98.7%	
No. 4	4.75	3.29	1.0%	97.7%	
No. 10	2	3.52	1.1%	96.7%	
No. 20	0.85	0.95	1.3%	95.4%	
No. 40	0.425	0.29	0.4%	95.0%	
No. 60	0.25	0.03	0.0%	95.0%	
No. 140	0.106	5.49	7.3%	87.7%	
No. 200	0.075	4.29	5.7%	81.9%	

HYDROMETER (-#10)

Split Air Dry Wt 72.81
Hygroscopic WC 0.50%
Corrected Dry wt 72.4

-#10 Dispersed 1min in Hamilton Beach Mixer

Specific Gravity 2.7 Assumed
a Factor *0.9889*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	46.0	23.6	4.7	41.3	0.0129	56.4	0.0269	54.5%
5	40.0	23.6	4.7	35.3	0.0129	48.2	0.0179	46.6%
15	36.5	23.6	4.7	31.8	0.0129	43.4	0.0107	42.0%
30	32.0	23.6	4.7	27.3	0.0129	37.3	0.0078	36.0%
60	30.0	23.6	4.7	25.3	0.0129	34.5	0.0056	33.4%
250	24.5	23.8	4.6	19.9	0.0129	27.2	0.0028	26.3%
1440	20.0	23.8	4.6	15.4	0.0129	21.0	0.0012	20.3%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**2.3**	Silt=49.7% Clay=32.2%	
Coarse=0; Fine=2.3		D60, mm	NA
% Sand (-#4 & +#200)	**15.8**	D30, mm	NA
Coarse=1.1; Medium=1.7; Fine=13.1		D10, mm	NA
% Fines (-#200)	**81.9**	Cc	NA
% Plus #200 (-3")	**18.1**	Cu	NA

USCS Description
LEAN CLAY WITH SAND

USCS Group Symbol	Atterberg Limits Group Symbol
CL	CL - LEAN CLAY

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)
100	100
2	96.7
0.05	71.1
0.002	23.8

Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
Gravel	3.3	0
Sand	25.6	26.5
Silt	47.3	48.9
Clay	23.8	24.6

USDA Classification
LOAM

Performed By: RH Input Validation: MA Reviewed By: BLS Date Tested: 9/8/2025

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-5
Client Project	345-817.0004 AEP Kammer Plant	Depth	3.0'-5.0'
Project No.	25-04143	Sample	ST-1
		Lab Sample	25-04143 -01

Soil Description: BROWN LEAN CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	889
Wt. Tare & WS, gm	592.8
Wt. Tare & DS, gm	521.43
Wt. Tare, gm	186.6
Water Content, %	21.3

SAMPLE SUMMARY

Liquid Limit (LL), %	**33**
Plastic Limit (PL), %	**19**
Plasticity Index (PI)	**14**
USCS Group Symbol (*-#40 Fraction*)	**CL**
USCS Group Name (*-#40 Fraction*)	**LEAN CLAY**
Sample Color:	**BROWN**

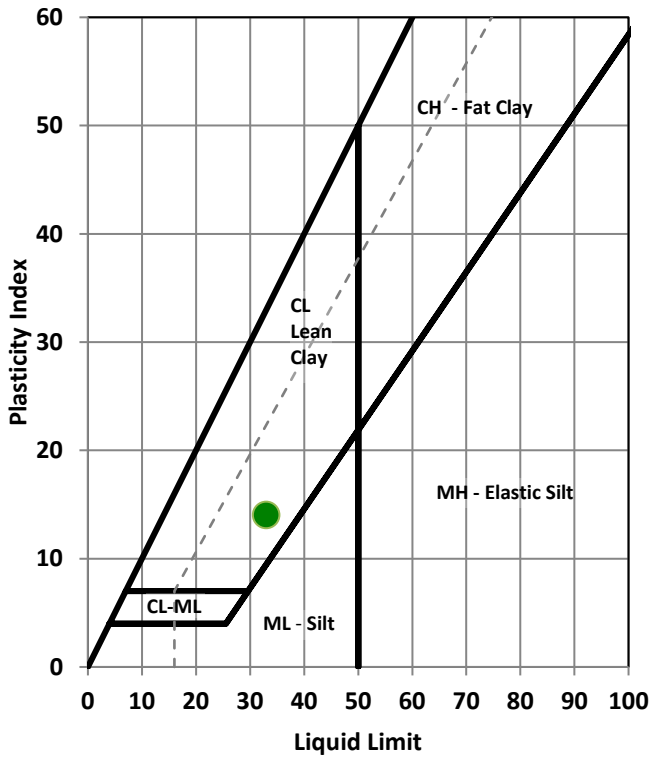
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	490	498	467
Wt. Tare & WS, gm	16.93	16.82	16.84
Wt. Tare & DS, gm	15.97	15.85	15.88
Wt. Tare, gm	10.76	10.71	10.72
Water Content, %	18.4	18.9	18.6

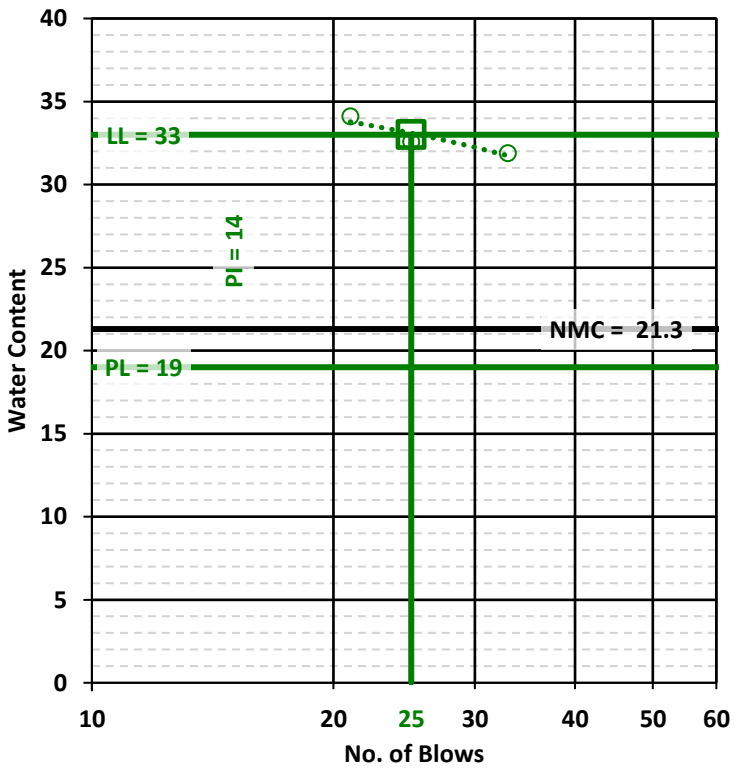
LIQUID LIMIT

	3 Points		
	329	471	710
	17.83	16.60	16.94
	16.22	15.16	15.53
	11.50	10.74	11.11
	34.1	32.6	31.9
# of Blows	21	25	33

PLASTICITY CHART



FLOW CURVE



Performed By: RH | Input Validation:MA | Reviewed By: BS | Date Tested: 9/8/2025

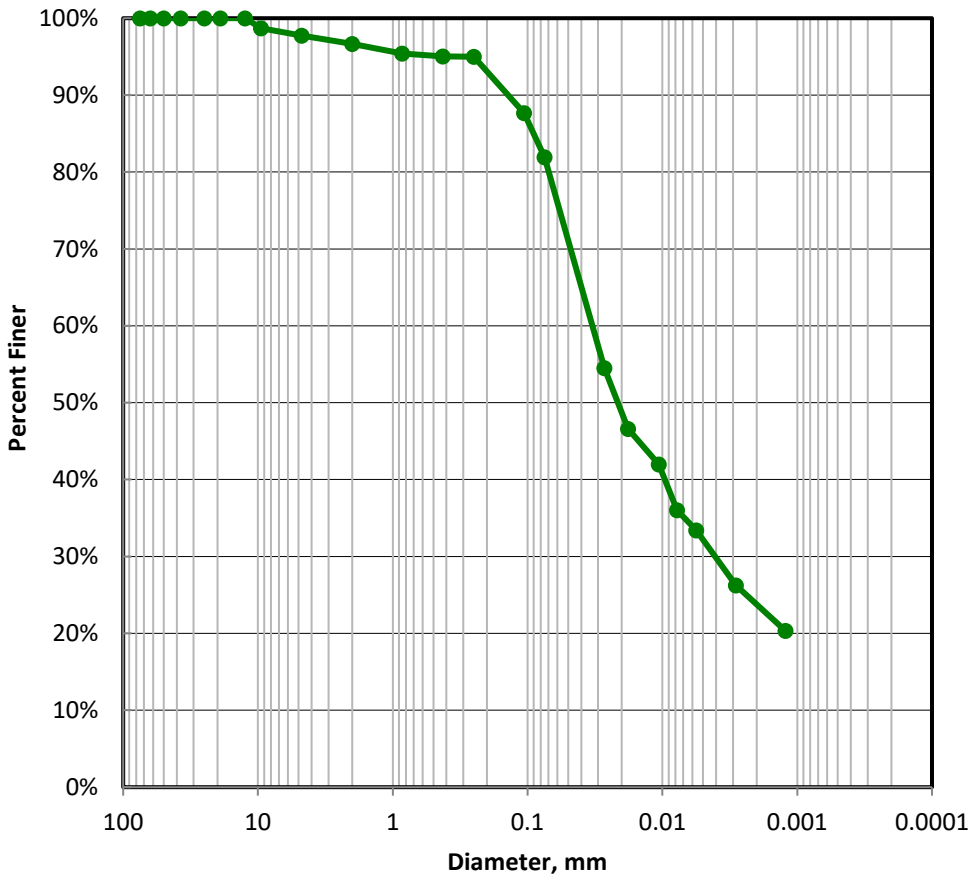
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-5
Client Project	345-817.0004 AEP Kammer Plant	Depth	3.0'-5.0'
Project No.	25-04143	Sample	ST-1
		Lab Sample	25-04143 -01

Sample Color: **BROWN**

USCS Group Name: **LEAN CLAY WITH SAND**

USCS Group Symbol: **CL** USDA: **LOAM** AASHTO: **A-6 (10)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	98.7%
No. 4	4.75	97.7%
No. 10	2	96.7%
No. 20	0.85	95.4%
No. 40	0.425	95.0%
No. 60	0.25	95.0%
No. 140	0.106	87.7%
No. 200	0.075	81.9%
NA	0.0269	54.5%
NA	0.0179	46.6%
NA	0.0107	42.0%
NA	0.0078	36.0%
NA	0.0056	33.4%
NA	0.0028	26.3%
NA	0.0012	20.3%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**2.3**	Silt=49.7% Clay=32.2%	
Coarse=0; Fine=2.3		D60, mm	NA
% Sand (-#4 & +#200)	**15.8**	D30, mm	NA
Coarse=1.1; Medium=1.7; Fine=13.1		D10, mm	NA
% Fines (-#200)	**81.9**	Cc	NA
% Plus #200 (-3")	**18.1**	Cu	NA

USCS Description

LEAN CLAY WITH SAND

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)
100	100
2	96.7
0.05	71.1
0.002	23.8

Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
Gravel	3.3	0
Sand	25.6	26.5
Silt	47.3	48.9
Clay	23.8	24.6

USDA Classification

LOAM

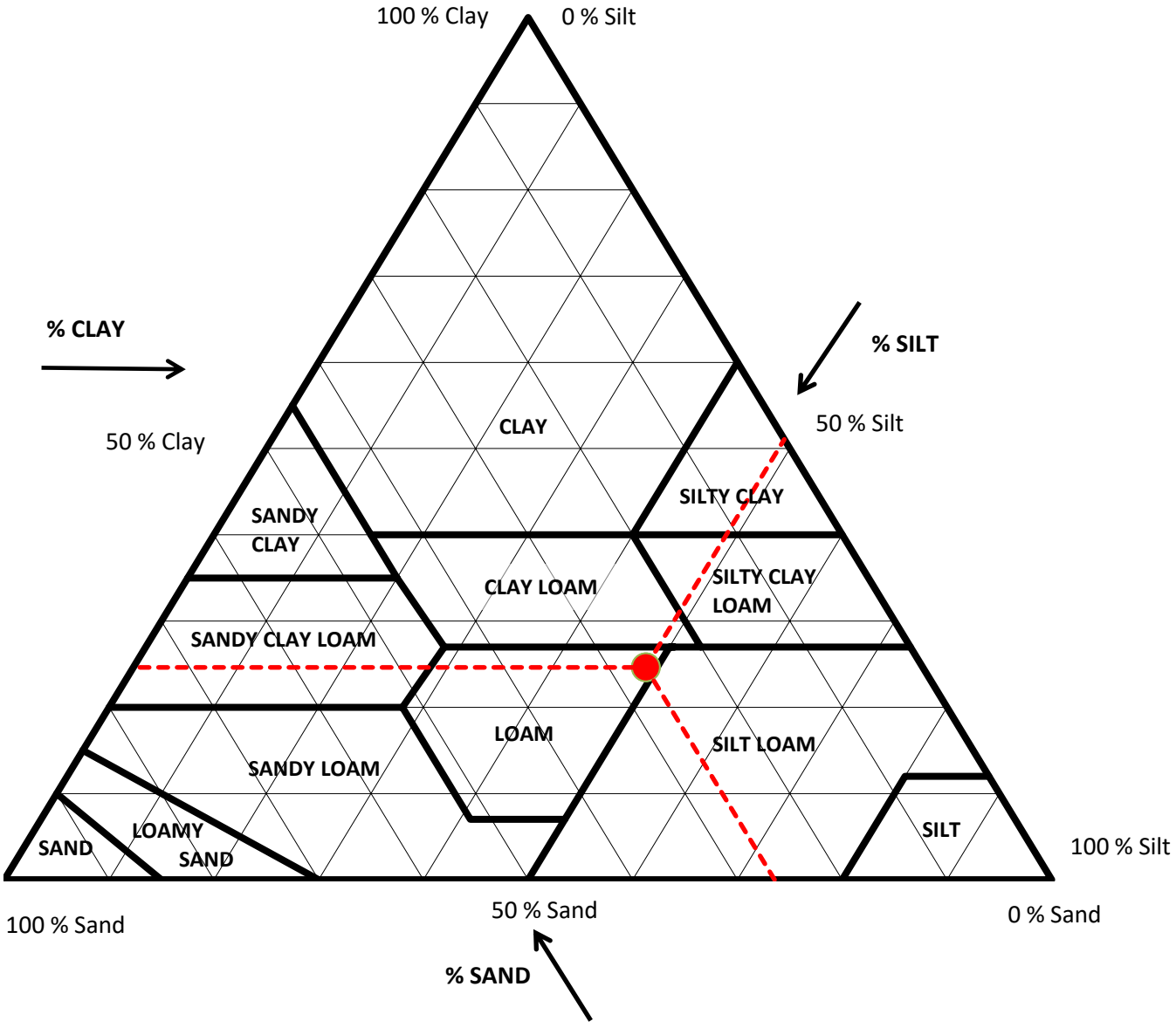
USDA CLASSIFICATION CHART

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-5
Client Project	345-817.0004 AEP Kammer Plant	Depth	3.0'-5.0'
Project No.	25-04143	Sample	ST-1
		Lab Sample	25-04143 -01

Sample Color: **BROWN**
USCS Group Name: **LEAN CLAY WITH SAND**
USCS Group Symbol: **CL** USDA: **LOAM** AASHTO: **A-6 (10)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	26.5
Percent Silt, %	48.9
Percent Clay, %	24.6

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	1.1
Coarse Sand; 1-0.5	0.6
Medium Sand; 0.5-0.25	0.1
Fine Sand; 0.25-0.1	8.6
Very Fine Sand; 0.1-0.05	16.1
Total	**26.5**



GEOTECHNICAL TESTING SERVICES
A TRI ENVIRONMENTAL COMPANY

Consolidated-Undrained Triaxial Compression

Client: Civil & Environmental Consultants, Inc.
Project: 345-817.0004
Sample: AP-5 (3' - 5') ST-1

TRI Log #: 25-04143.1
Test Method: ASTM D4767

Specimens				
Identification	1	2	3	4
Depth/Elev. (ft)	-	-	-	-
Eff. Consol. Stress (psi)	5.0	20.0	40.0	-
Initial Specimen Properties				
Avg. Diameter (in)	2.82	2.83	2.79	-
Avg. Height (in)	5.99	5.88	6.03	-
Avg. Water Content (%)	27.9	29.1	27.4	-
Bulk Density (pcf)	118.9	117.8	129.0	-
Dry Density (pcf)	92.9	91.3	101.2	-
Specific Gravity (Assumed)	2.75			
Saturation (%)	90.7	90.9	108.5	-
Void Ratio, n	0.85	0.88	0.69	-
B-Value, End of Saturation	0.93	0.94	0.93	-

Test Setup	
Specimen Condition	Undisturbed / Intact
Specimen Preparation	Trimmed
Mounting Method	Wet
Consolidation	Isotropic

Post-Consolidation / Pre-Shear				
Void Ratio	0.85	0.84	0.64	-

Shear / Post-Shear				
Rate of Strain (%/hr)	1.00	1.00	1.00	-
Avg. Water Content (%)	27.3	27.7	27.4	-

At Failure								
Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1'-\sigma_3')_{max}$				Ratio, $(\sigma_1'/\sigma_3')_{max}$			
Axial Strain at Failure (%), $\varepsilon_{a,f}$	15.0	15.0	15.0	-	7.0	7.5	8.0	-
Minor Effective Stress (psi), $\sigma_3'_f$	4.2	8.7	22.1	-	3.1	7.7	18.0	-
Principal Stress Difference (psi), $(\sigma_1-\sigma_3)_f$	10.6	24.1	55.1	-	9.0	21.9	47.7	-
Pore Water Pressure, Δu_f (psi)	0.8	11.3	18.0	-	1.9	12.3	22.0	-
Major Effective Stress (psi), $\sigma_1'_f$	14.8	32.8	77.2	-	12.1	29.6	65.6	-
Secant Friction Angle (degrees)	34.0	35.5	33.7	-	36.0	36.0	34.7	-
Effective Friction Angle (degrees)	33.4				34.3			
Effective Cohesion (psi)	0.4				0.4			

Note: The presented M-C parameters are based on a linear regression in modified stress space, across all assigned effective consolidation stresses. This fit does not purported to capture typical curvature of envelopes that may, in particular, be observed across broader range in effective stresses. Please note that the stresses associated with peak principal stress ratio and peak principal stress difference are presented in tabular form on the first page of the report. There are alternate interpretations to theses two failure criterion including but not limited to strain compatibility and post-peak.

Jeffrey A. Kuhn , Ph.D., P.E., 09/02/2025
Analysis & Quality Review/Date

GEOTECHNICAL TESTING SERVICES, INC., A TRI ENVIRONMENTAL COMPANY; 1-800-853-7309
103 Coraopolis Road, Coraopolis, PA, 15108

GEOTECHNICAL TESTING SERVICES
A TRI ENVIRONMENTAL COMPANY

Consolidated-Undrained Triaxial Compression

Client: Civil & Environmental Consultants, Inc.
Project: 345-817.0004
Sample: AP-5 (3' - 5') ST-1

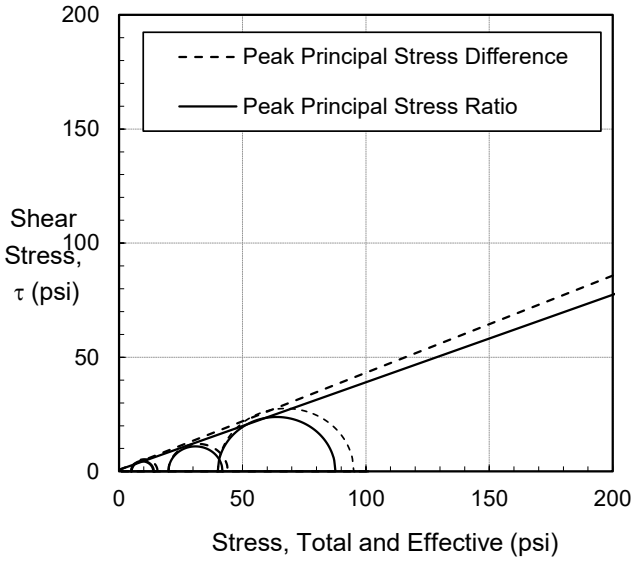
TRI Log #: 25-04143.1
Test Method: ASTM D4767

R / "Total Stress" Envelope			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Friction Angle (deg)	ϕ_R	23.0	21.0
Cohesion (psi)	c_R	0.7	0.7

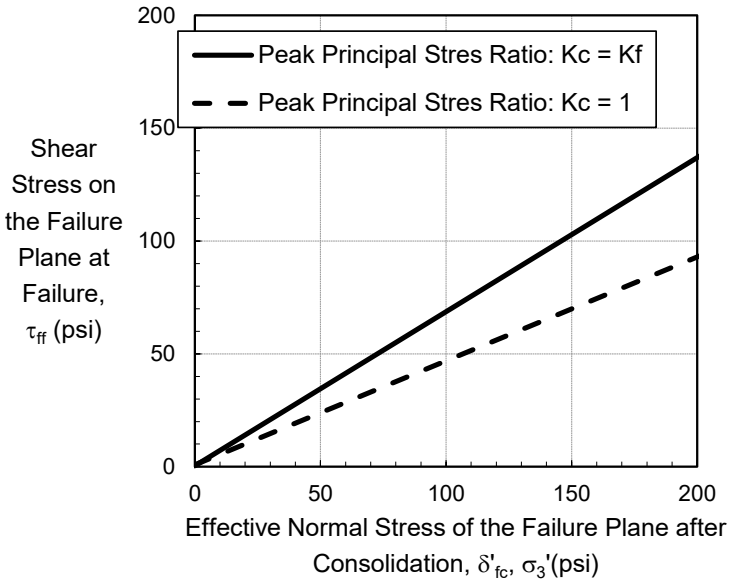
Kc = Kf Envelope, Effective Stress Envelope (Duncan et al. 1990)			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	ϕ'	33.4	34.3
Effective Cohesion (psi)	c'	0.4	0.4

Kc = 1 (τ_{ff} vs σ'_{fc}) Envelope, Total Stress Envelope (Duncan et al. 1990)			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Friction Angle (deg)	$d_{Kc=1}$	28.2	24.7
Cohesion (psi)	$\psi_{Kc=1}$	0.9	0.8

R / "Total Stress" Envelope



Three-Stage Rapid Drawdown



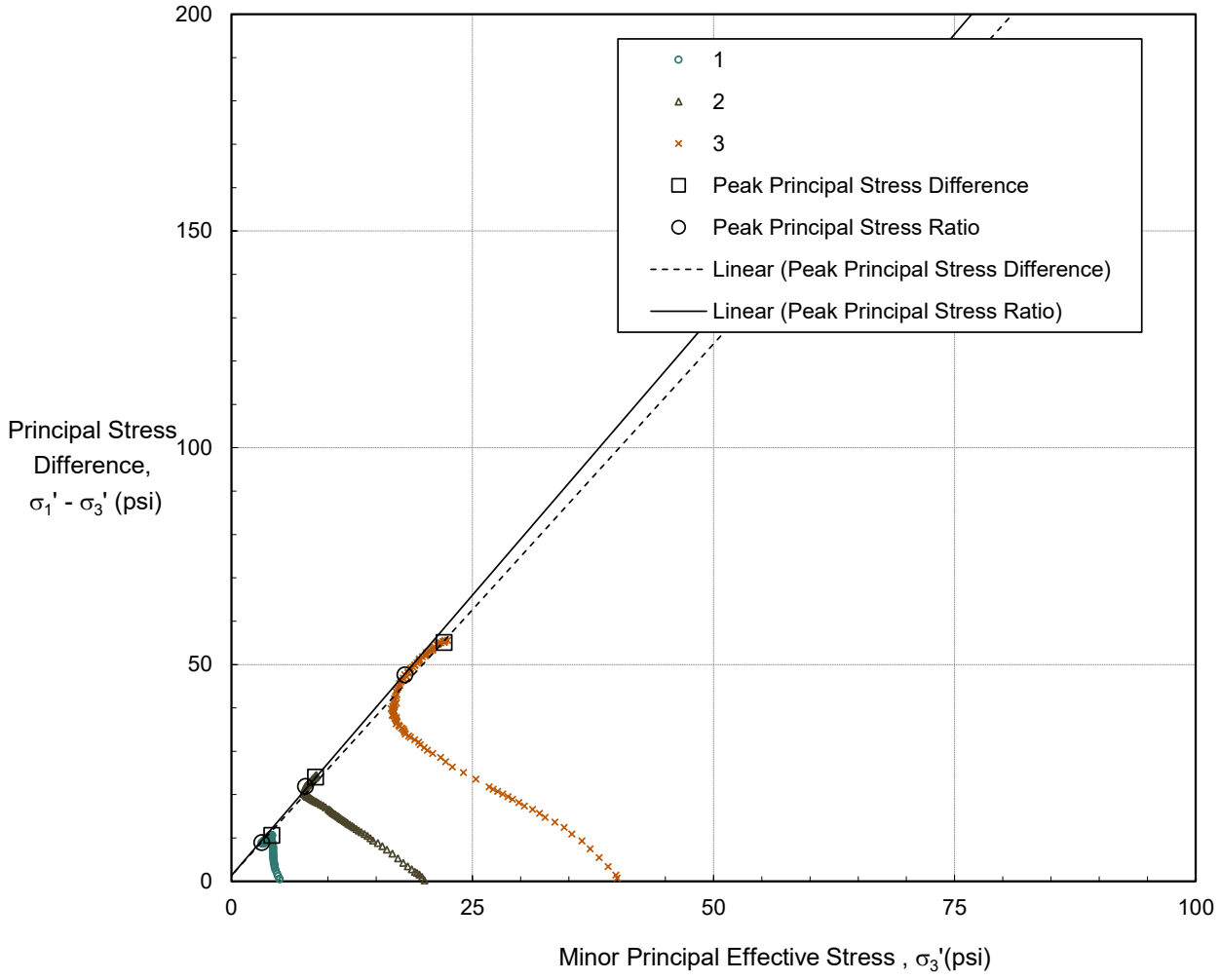
GEOTECHNICAL TESTING SERVICES, INC., A TRI ENVIRONMENTAL COMPANY; 1-800-853-7309
103 Coraopolis Road, Coraopolis, PA, 15108

Consolidated-Undrained Triaxial Compression

Client: Civil & Environmental Consultants, Inc.
Project: 345-817.0004
Sample: AP-5 (3' - 5') ST-1

TRI Log #: 25-04143.1
Test Method: ASTM D4767

Modified Mohr-Coulomb



Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	33.4	34.3
Effective Cohesion (psi)	0.4	0.4

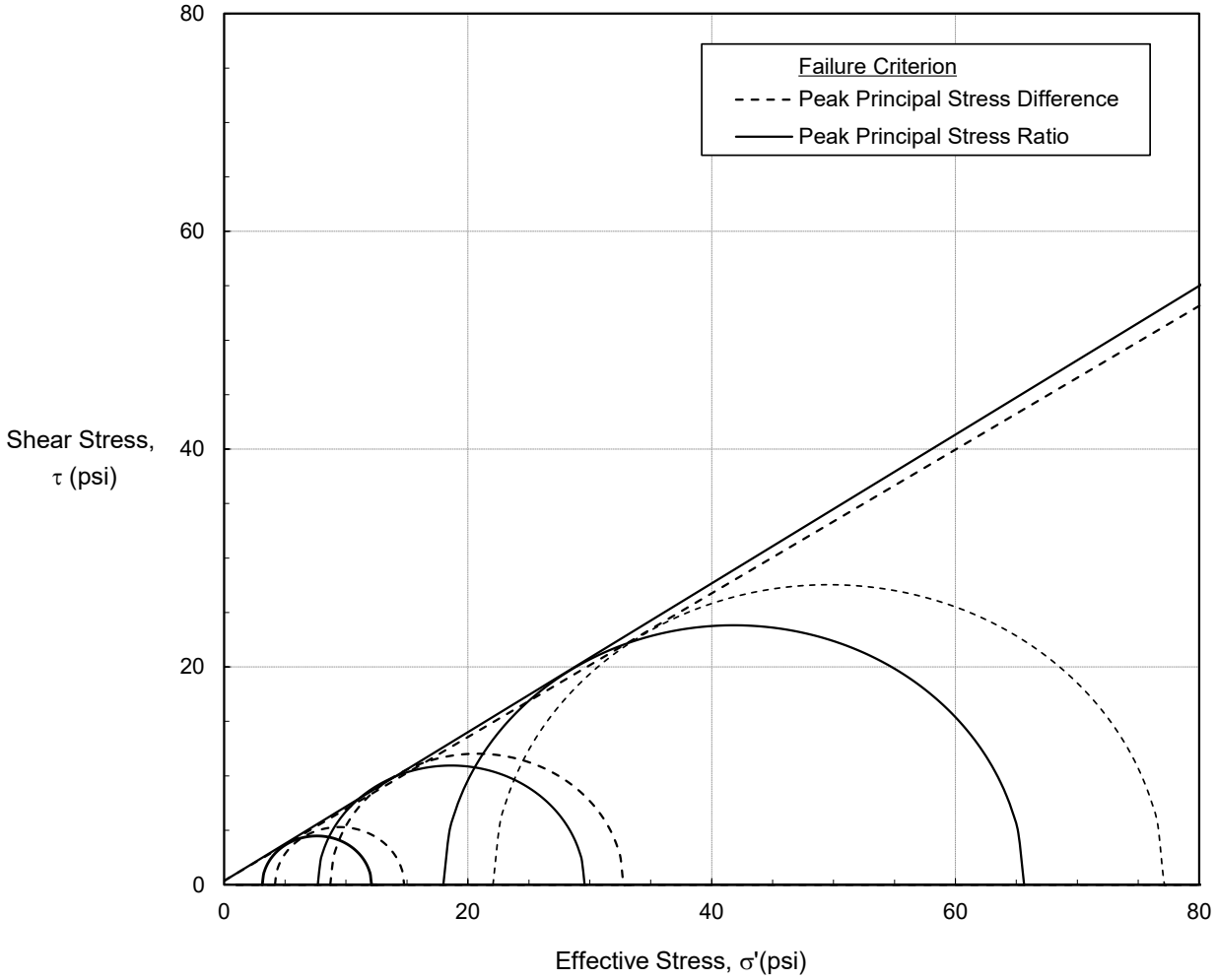
GEOTECHNICAL TESTING SERVICES
A TRI ENVIRONMENTAL COMPANY

Consolidated-Undrained Triaxial Compression

Client: Civil & Environmental Consultants, Inc.
Project: 345-817.0004
Sample: AP-5 (3' - 5') ST-1

TRI Log #: 25-04143.1
Test Method: ASTM D4767

Mohr-Coulomb



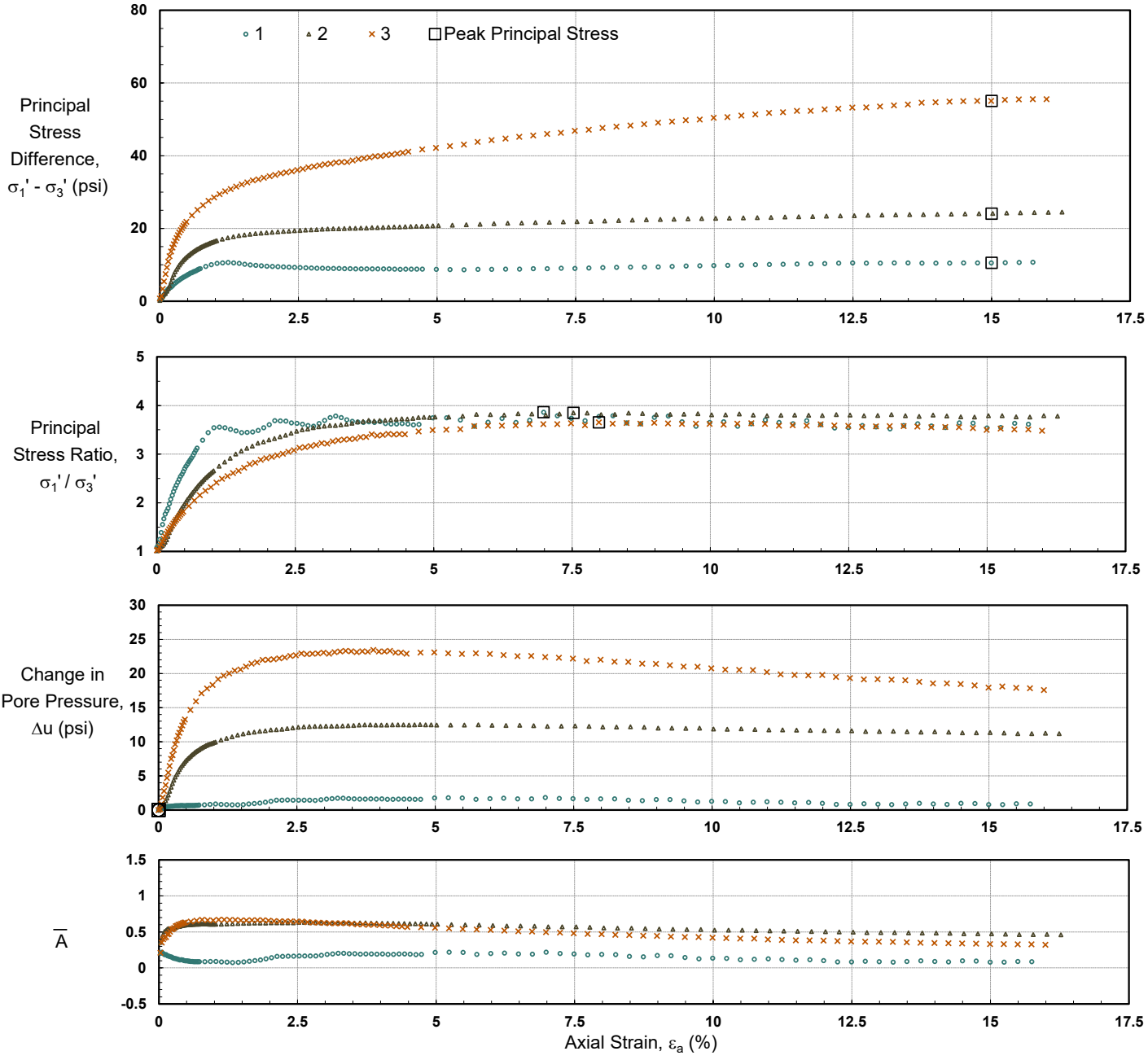
Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	33.4	34.3
Effective Cohesion (psi)	0.4	0.4

GEOTECHNICAL TESTING SERVICES, INC., A TRI ENVIRONMENTAL COMPANY; 1-800-853-7309
103 Coraopolis Road, Coraopolis, PA, 15108

Consolidated-Undrained Triaxial Compression

Client: Civil & Environmental Consultants, Inc.
Project: 345-817.0004
Sample: AP-5 (3' - 5') ST-1

TRI Log #: 25-04143.1
Test Method: ASTM D4767

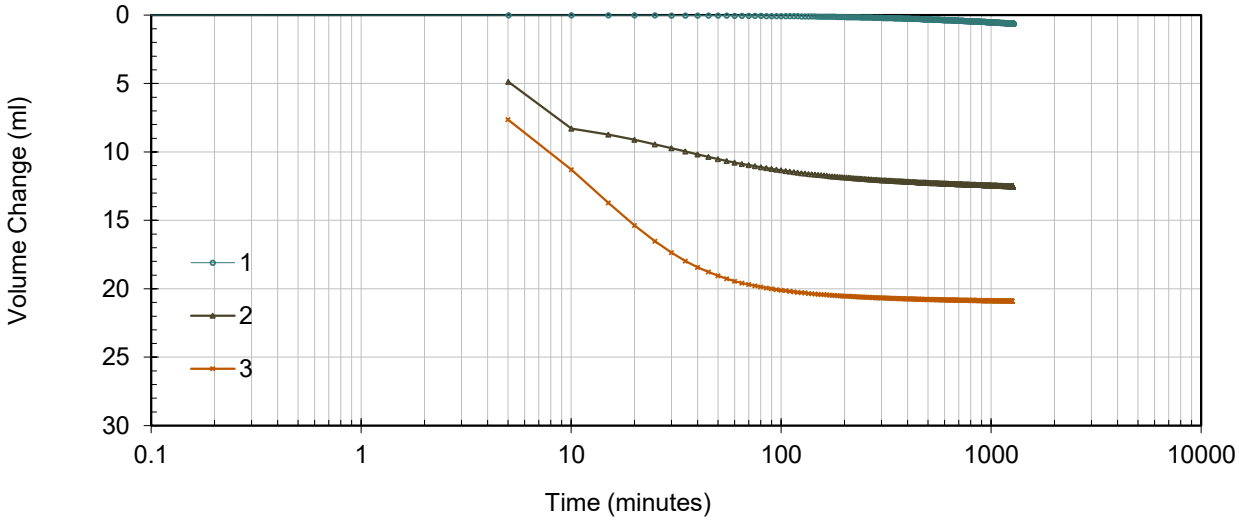


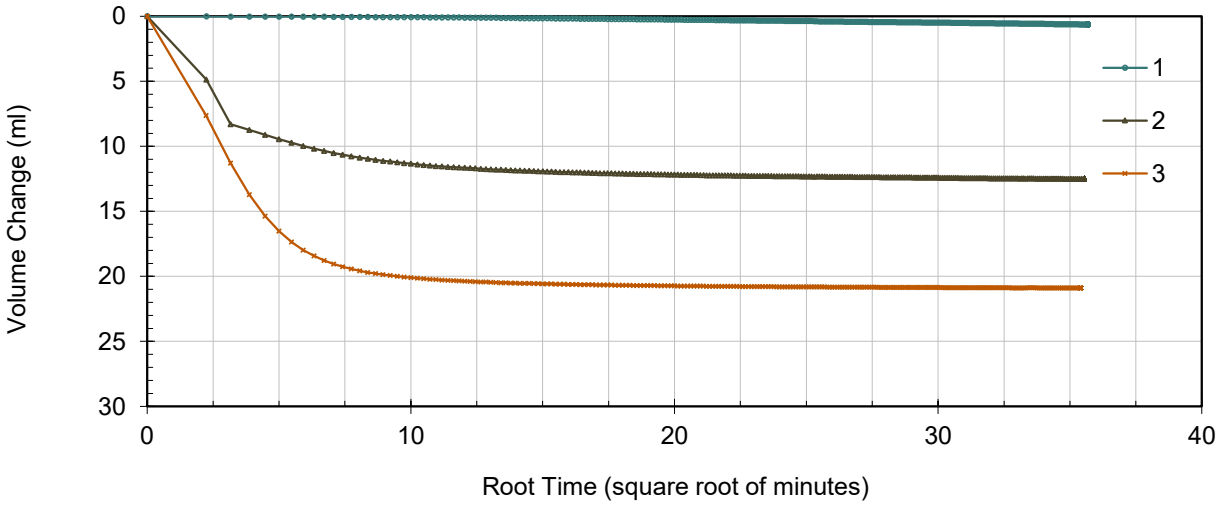
Consolidated-Undrained Triaxial Compression

Client: Civil & Environmental Consultants, Inc.
Project: 345-817.0004
Sample: AP-5 (3' - 5') ST-1

TRI Log #: 25-04143.1
Test Method: ASTM D4767

Consolidation





GEOTECHNICAL TESTING SERVICES, INC., A TRI ENVIRONMENTAL COMPANY; 1-800-853-7309
103 Coraopolis Road, Coraopolis, PA, 15108

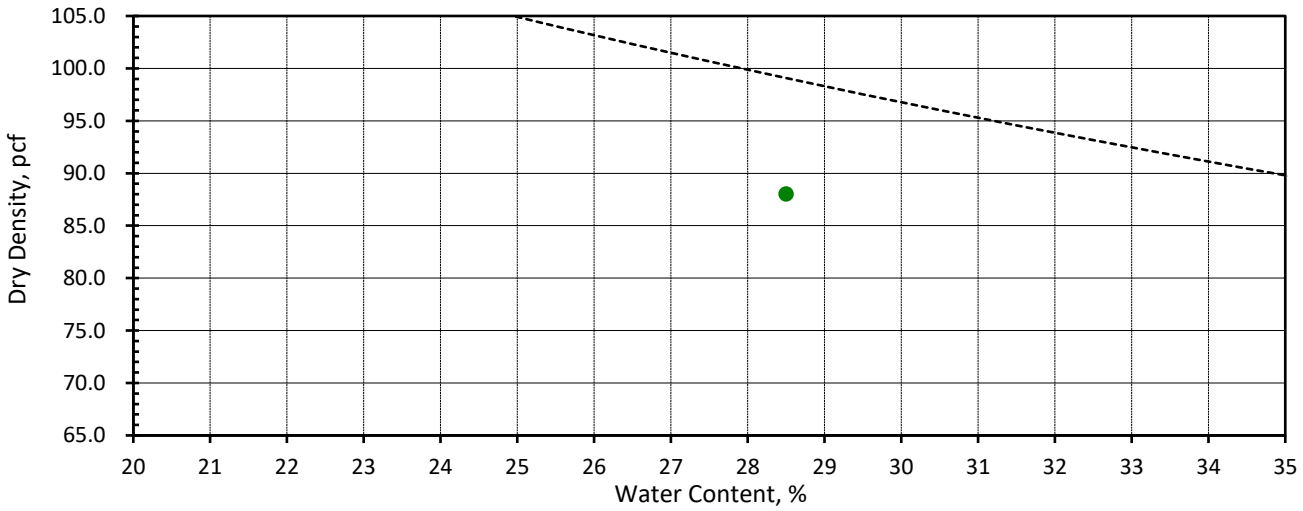
LABORATORY COMPACTION CHARACTERISTICS OF SOIL

Client	Civil & Environmental Consultants, Inc.	Boring	AP-5
Client Project	345-817.0004 AEP Kammer Plant	Depth	3.0' - 5.0'
Project No.	25-04143	Sample	ST-1
		Lab Sample No.	25-04143-01

Visual Description: BROWN LEAN CLAY WITH SAND

WET DENSITY						TEST PARAMETERS	
Mold ID	G					Test Method	ASTM D1557
Compaction Point #	1					Compaction Energy	Modified
Wt. Mold & WS, gm.	6059.2					Test Procedure	B
Wt. Mold, gm.	4357					Mold Diameter, in	4
Wt. WS, gm.	1702					Compacted Layers	5
Mold Volume, cc	939					Blows Per Layer	25
Wet Density, gm./cc	1.81					Rammer Weight / Fall	10 lbs / 18 in.
Wet Density, pcf	113.1					Size of Material Used	-3/8" Sieve
						Use: <5% Retained on 3/8"	
WATER CONTENT						**OVERSIZE PARTICLE CORRECTION**	
						No Corrections Needed	
Tare Number	563						
Wt. Tare & WS, gm.	469						
Wt. Tare & DS, gm.	408.23					Percent of Oversize Rock (+3/8" Sieve) = <5%	
Wt. Tare, gm.	195					(Based on As-received Screening & Soaking)	
Water Content, %	28.5						
						W.C. of Finer Material, % (-3/8" Sieve) = NA	
DRY DENSITY vs. WATER CONTENT						**SAMPLE SUMMARY**	
LABORATORY TEST VALUES							
Water Content, %	28.5					***Lab 1 Pt Water Content, %***	***28.5***
Dry Density, pcf	88.0					***Lab 1 pt Dry Density, pcf***	***88.0***

Note: Maximum Density and Optimum Water Content reported from estimated best fit smooth curve!



Note: Compacted using manual hammer.

Input Validation: JSJ Reviewed By: BLS Date Tested: 09/02/25

PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	**Boring**	AP-5
Client Project	345-817.0004 AEP Kammer Plant	**Depth**	6.0'-8.0'
Project No.	25-04143	**Sample**	BS-1
		Lab Sample	25-04143 -10

Sample Color: BROWN
USCS Group Name: SANDY LEAN CLAY
USCS Group Symbol: CL USDA: LOAM AASHTO: A-7-6 (18)

Dry Prep: R58-11(2018) [1]

MECHANICAL SIEVE

Total Sample	
Tare No.	Q54
Tare + WS., gm	1095.00
Tare + DS., gm	943.67
Tare, gm	192.00
Total sample WC	**20.1%**
Total Sample Dry Wt, gm (-3")	752

Hygroscopic WC (-#10)	
Tare No.	803
Tare + WS., gm	38.37
Tare + DS., gm	38.26
Tare, gm	14.28
Hygroscopic WC	0.46%
-#10 Hydro/Sieve air dry wt.	70.71
Wt. of +#200 Sample, gm	14.02

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	2.33	0.3%	99.7%	
No. 10	2	7.89	1.0%	98.6%	
No. 20	0.85	2.76	3.9%	94.8%	
No. 40	0.425	0.85	1.2%	93.6%	
No. 60	0.25	0.17	0.2%	93.4%	
No. 140	0.106	5.51	7.7%	85.7%	
No. 200	0.075	4.73	6.6%	79.1%	

HYDROMETER (-#10)

Split Air Dry Wt 71.03
Hygroscopic WC 0.46%
Corrected Dry wt 70.7

-#10 Dispersed 1min in Hamilton Beach Mixer

Specific Gravity 2.7 Assumed
a Factor *0.9889*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	44.0	24.0	4.5	39.5	0.0128	55.2	0.0272	54.5%
5	38.0	24.0	4.5	33.5	0.0128	46.9	0.0181	46.2%
15	34.0	24.0	4.5	29.5	0.0128	41.3	0.0108	40.7%
30	31.0	24.1	4.5	26.5	0.0128	37.1	0.0078	36.6%
60	28.0	24.2	4.5	23.5	0.0128	32.9	0.0056	32.4%
250	23.0	24.4	4.4	18.6	0.0128	26.0	0.0029	25.7%
1440	18.0	23.8	4.6	13.4	0.0129	18.7	0.0012	18.5%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.3**	Silt=47.9% Clay=31.2%	
Coarse=0; Fine=0.3		D60, mm	NA
% Sand (-#4 & +#200)	**20.6**	D30, mm	NA
Coarse=1; Medium=5; Fine=14.5		D10, mm	NA
% Fines (-#200)	**79.1**	Cc	NA
% Plus #200 (-3")	**20.9**	Cu	NA

USCS Description
SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	1.4	0
2	98.6			
		Sand	29.4	29.8
0.05	69.2			
		Silt	46.6	47.3
0.002	22.6			
		Clay	22.6	22.9

USDA Classification
LOAM

Performed By: RH Input Validation: MA Reviewed By: BS Date Tested: 9/8/2025

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-5
Client Project	345-817.0004 AEP Kammer Plant	Depth	6.0'-8.0'
Project No.	25-04143	Sample	BS-1
		Lab Sample	25-04143 -10

Soil Description: BROWN LEAN CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	Q54
Wt. Tare & WS, gm	1095
Wt. Tare & DS, gm	943.67
Wt. Tare, gm	192
Water Content, %	20.1

SAMPLE SUMMARY

Liquid Limit (LL), %	44
Plastic Limit (PL), %	21
Plasticity Index (PI)	23
USCS Group Symbol (*-#40 Fraction*)	CL
USCS Group Name (*-#40 Fraction*)	LEAN CLAY
Sample Color:	BROWN

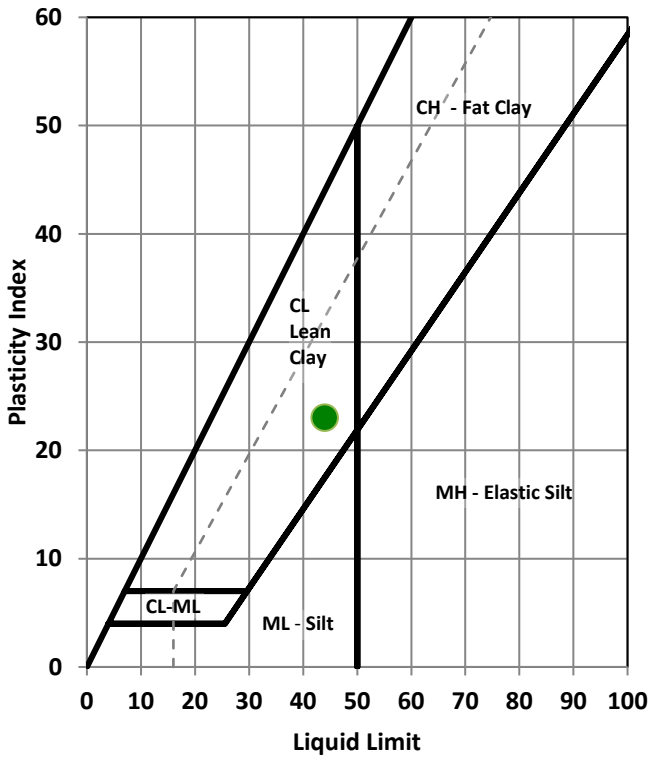
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	472	311	708
Wt. Tare & WS, gm	17.85	17.14	19.39
Wt. Tare & DS, gm	16.72	16.04	18.22
Wt. Tare, gm	10.85	11.18	12.45
Water Content, %	19.3	22.6	20.3

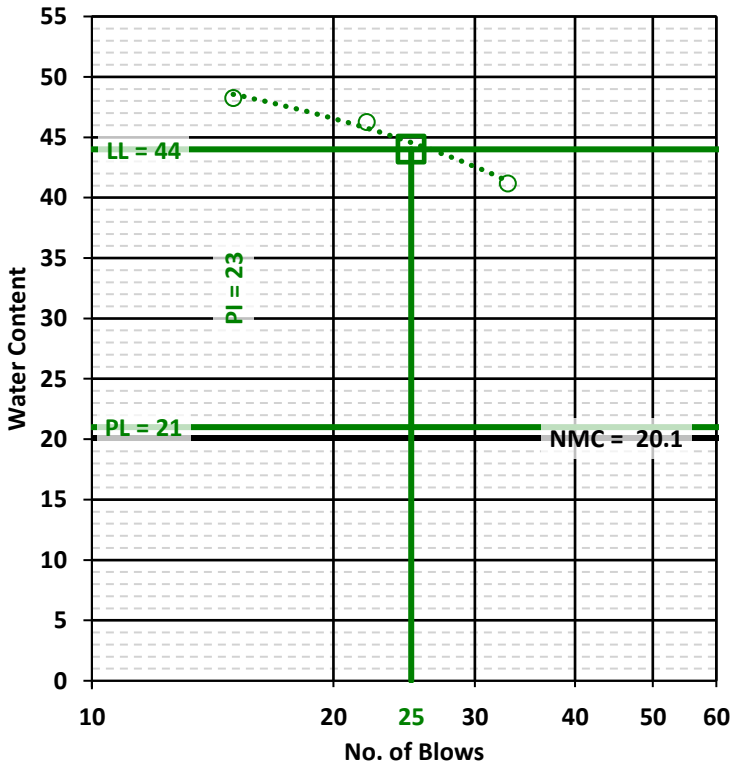
LIQUID LIMIT

	3 Points		
	709	421	400
	19.26	19.12	17.92
	17.06	16.46	15.82
	12.50	10.71	10.72
	48.2	46.3	41.2
# of Blows	15	22	33

PLASTICITY CHART



FLOW CURVE



Performed By: RH | Input Validation:MA | Reviewed By: BS | Date Tested: 9/8/2025

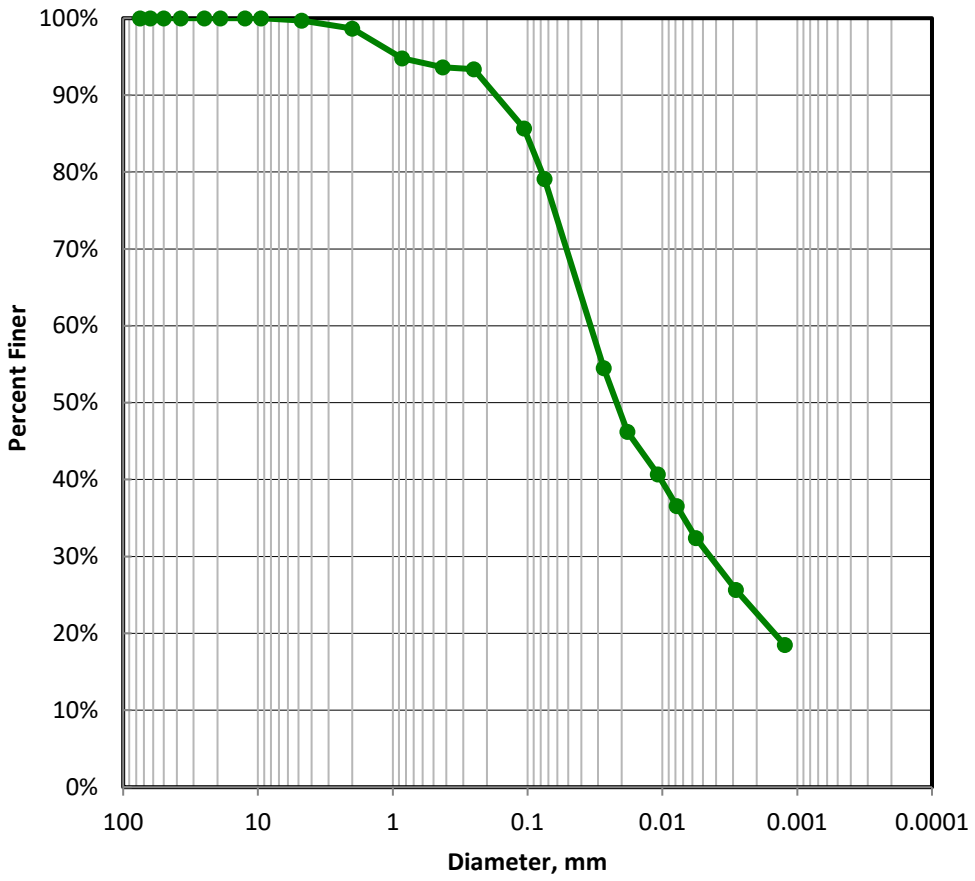
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-5
Client Project	345-817.0004 AEP Kammer Plant	Depth	6.0'-8.0'
Project No.	25-04143	Sample	BS-1
		Lab Sample	25-04143 -10

Sample Color: **BROWN**

USCS Group Name: **SANDY LEAN CLAY**

USCS Group Symbol: **CL** USDA: **LOAM** AASHTO: **A-7-6 (18)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	99.7%
No. 10	2	98.6%
No. 20	0.85	94.8%
No. 40	0.425	93.6%
No. 60	0.25	93.4%
No. 140	0.106	85.7%
No. 200	0.075	79.1%
NA	0.0272	54.5%
NA	0.0181	46.2%
NA	0.0108	40.7%
NA	0.0078	36.6%
NA	0.0056	32.4%
NA	0.0029	25.7%
NA	0.0012	18.5%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.3**	Silt=47.9% Clay=31.2%	
Coarse=0; Fine=0.3		D60, mm	NA
% Sand (-#4 & +#200)	**20.6**	D30, mm	NA
Coarse=1; Medium=5; Fine=14.5		D10, mm	NA
% Fines (-#200)	**79.1**	Cc	NA
% Plus #200 (-3")	**20.9**	Cu	NA

USCS Description

SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)
100	100
2	98.6
0.05	69.2
0.002	22.6

Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
Gravel	1.4	0
Sand	29.4	29.8
Silt	46.6	47.3
Clay	22.6	22.9

USDA Classification

LOAM

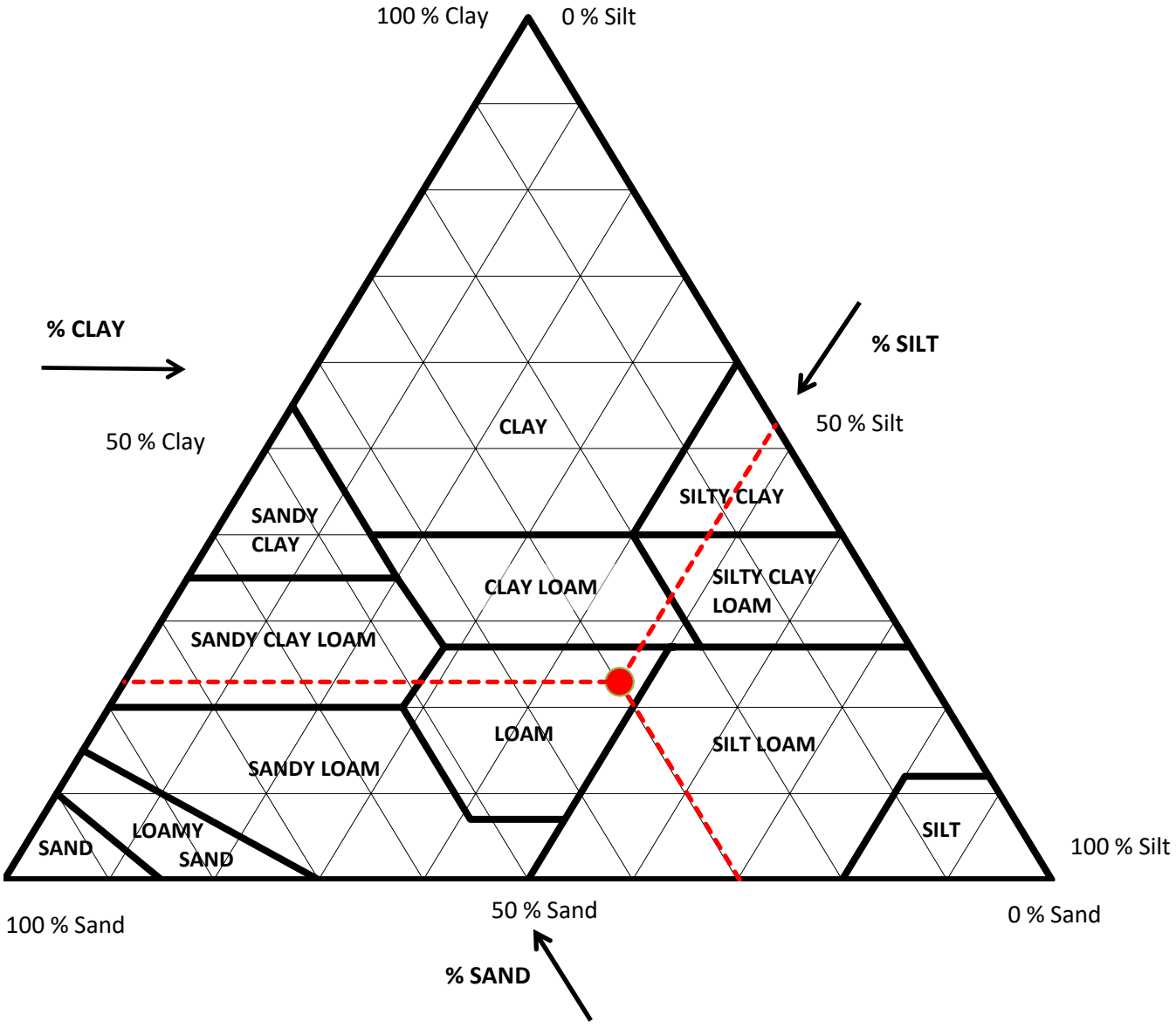
USDA CLASSIFICATION CHART

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-5
Client Project	345-817.0004 AEP Kammer Plant	Depth	6.0'-8.0'
Project No.	25-04143	Sample	BS-1
		Lab Sample	25-04143 -10

Sample Color: **BROWN**
USCS Group Name: **SANDY LEAN CLAY**
USCS Group Symbol: **CL** USDA: **LOAM** AASHTO: **A-7-6 (18)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	29.8
Percent Silt, %	47.3
Percent Clay, %	22.9

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	3.2
Coarse Sand; 1-0.5	1.7
Medium Sand; 0.5-0.25	0.5
Fine Sand; 0.25-0.1	8.9
Very Fine Sand; 0.1-0.05	15.5
Total	**29.8**



LABORATORY COMPACTION CHARACTERISTICS OF SOIL

Client	Civil & Environmental Consultants, Inc.	Boring	AP-5
Client Project	345-817.0004 AEP Kammer Plant	Depth	6.0' - 8.0'
Project No.	25-04143	Sample	BS-1
		Lab Sample No.	25-04143-10
Visual Description:	BROWN SANDY LEAN CLAY		

WET DENSITY					
Mold ID	J	J	J	J	
Compaction Point #	1	2	3	4	
Wt. Mold & WS, gm.	10259	10591	10739	10696	
Wt. Mold, gm.	6450	6450	6450	6450	
Wt. WS, gm.	3809	4141	4289	4246	
Mold Volume, cc	2127	2127	2127	2127	
Wet Density, gm./cc	1.79	1.95	2.02	2.00	
Wet Density, pcf	111.7	121.5	125.8	124.6	

TEST PARAMETERS	
Test Method	ASTM D698
Compaction Energy	Standard
Test Procedure	C
Mold Diameter, in	6
Compacted Layers	3
Blows Per Layer	56
Rammer Weight / Fall	5.5 lbs / 12 in.
Size of Material Used	-3/4" Sieve
Use: <5% Retained on 3/4"	

WATER CONTENT					
Tare Number	216	538	118	32	
Wt. Tare & WS, gm.	423.7	481.3	486.8	451.6	
Wt. Tare & DS, gm.	397.3	445.9	427.5	392.2	
Wt. Tare, gm.	179.8	190.8	83.8	83.2	
Water Content, %	12.1	13.9	17.3	19.2	

OVERSIZE PARTICLE CORRECTION
No Corrections Needed
Percent of Oversize Rock (+3/4" Sieve) = <5%
(Based on As-received Screening & Soaking)
W.C. of Finer Material, % (-3/4" Sieve) = NA

DRY DENSITY vs. WATER CONTENT

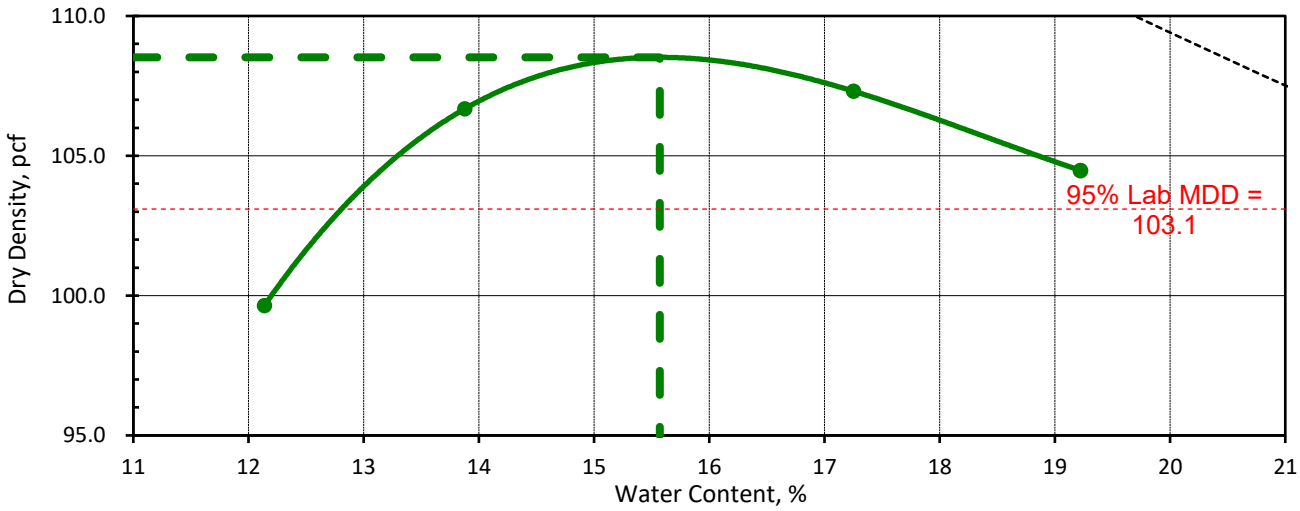
SAMPLE SUMMARY

LABORATORY TEST VALUES

Water Content, %	12.1	13.9	17.3	19.2	
Dry Density, pcf	99.6	106.7	107.3	104.5	

SAMPLE SUMMARY	
Lab Optimum Water Content, %	***15.6***
Lab Maximum Dry Density, pcf	***108.5***

Note: Maximum Density and Optimum Water Content reported from estimated best fit smooth curve!



Note: Compacted with automatic compaction machine

Input Validation: MA Reviewed By: BLS Date Tested: 09/02/25

PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	**Boring**	AP-5
Client Project	345-817.0004 AEP Kammer Plant	**Depth**	13.0'-15.0'
Project No.	25-04143	**Sample**	ST-3
		Lab Sample	25-04143 -02

Sample Color: BROWN
USCS Group Name: CLAYEY SAND
USCS Group Symbol: SC USDA: SANDY LOAM AASHTO: A-4 (0)

Dry Prep: R58-11(2018) [1]

MECHANICAL SIEVE

Total Sample	
Tare No.	560
Tare + WS., gm	772.81
Tare + DS., gm	683.48
Tare, gm	198.24
Total sample WC	**18.4%**
Total Sample Dry Wt, gm (-3")	485

Hygroscopic WC (-#10)	
Tare No.	406
Tare + WS., gm	30.77
Tare + DS., gm	30.62
Tare, gm	10.74
Hygroscopic WC	0.75%
-#10 Hydro/Sieve air dry wt.	69.91
Wt. of +#200 Sample, gm	40.35

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0	0.0%	100.0%	
No. 10	2	0	0.0%	100.0%	
No. 20	0.85	0.13	0.2%	99.8%	
No. 40	0.425	0.49	0.7%	99.1%	
No. 60	0.25	1.35	1.9%	97.2%	
No. 140	0.106	31.89	45.6%	51.6%	
No. 200	0.075	6.49	9.3%	42.3%	

HYDROMETER (-#10)

Split Air Dry Wt 70.44
Hygroscopic WC 0.75%
Corrected Dry wt 69.9

-#10 Dispersed 1min in Hamilton Beach Mixer

Specific Gravity 2.7 Assumed
a Factor *0.9889*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	25.0	23.6	4.7	20.3	0.0129	28.7	0.0318	28.7%
5	23.5	23.6	4.7	18.8	0.0129	26.6	0.0203	26.6%
15	21.0	23.6	4.7	16.3	0.0129	23.1	0.0119	23.1%
30	19.0	23.6	4.7	14.3	0.0129	20.2	0.0085	20.2%
60	18.5	23.7	4.6	13.9	0.0129	19.7	0.0060	19.7%
250	17.0	23.9	4.6	12.4	0.0129	17.5	0.0030	17.5%
1440	15.0	23.9	4.6	10.4	0.0129	14.7	0.0013	14.7%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4) **0.0** Silt=23.2% Clay=19.1%
Coarse=0; Fine=0 D60, mm NA
% Sand (-#4 & +#200) **57.7** D30, mm NA
Coarse=0; Medium=0.9; Fine=56.8 D10, mm NA
% Fines (-#200) **42.3** Cc NA
% Plus #200 (-3") **57.7** Cu NA

USCS Description
CLAYEY SAND

USCS Group Symbol	Atterberg Limits Group Symbol
SC	CL - LEAN CLAY

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.0	0
2	100.0			
		Sand	64.1	64.1
0.05	35.9			
		Silt	19.6	19.6
0.002	16.2			
		Clay	16.2	16.2

USDA Classification
SANDY LOAM

Performed By: RH Input Validation: MA Reviewed By: BLS Date Tested: 9/8/2025

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-5
Client Project	345-817.0004 AEP Kammer Plant	Depth	13.0'-15.0'
Project No.	25-04143	Sample	ST-3
		Lab Sample	25-04143 -02

Soil Description: BROWN LEAN CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	560
Wt. Tare & WS, gm	772.81
Wt. Tare & DS, gm	683.48
Wt. Tare, gm	198.24
Water Content, %	18.4

SAMPLE SUMMARY

Liquid Limit (LL), %	**22**
Plastic Limit (PL), %	**14**
Plasticity Index (PI)	**8**
USCS Group Symbol (*-#40 Fraction*)	**CL**
USCS Group Name (*-#40 Fraction*)	**LEAN CLAY**
Sample Color:	**BROWN**

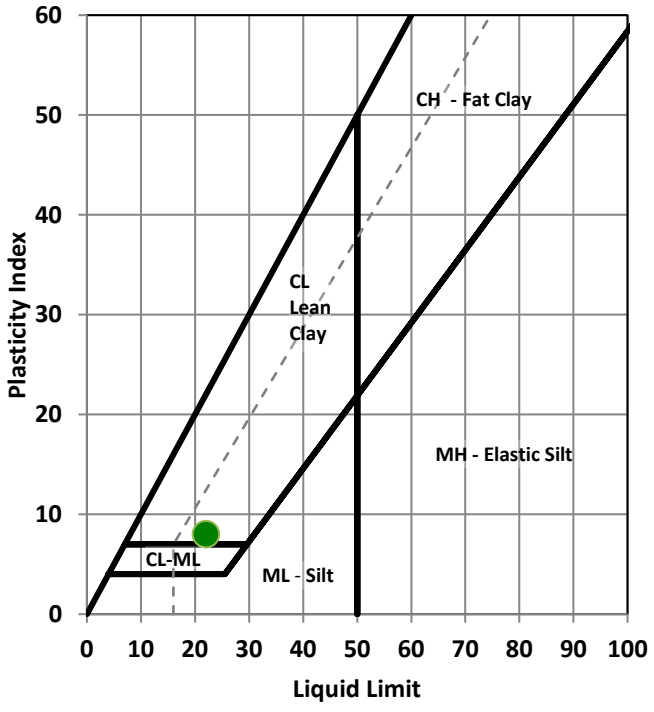
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	348	456	423
Wt. Tare & WS, gm	17.27	17.25	16.97
Wt. Tare & DS, gm	16.50	16.55	16.17
Wt. Tare, gm	10.94	10.94	10.82
Water Content, %	13.8	12.5	15.0

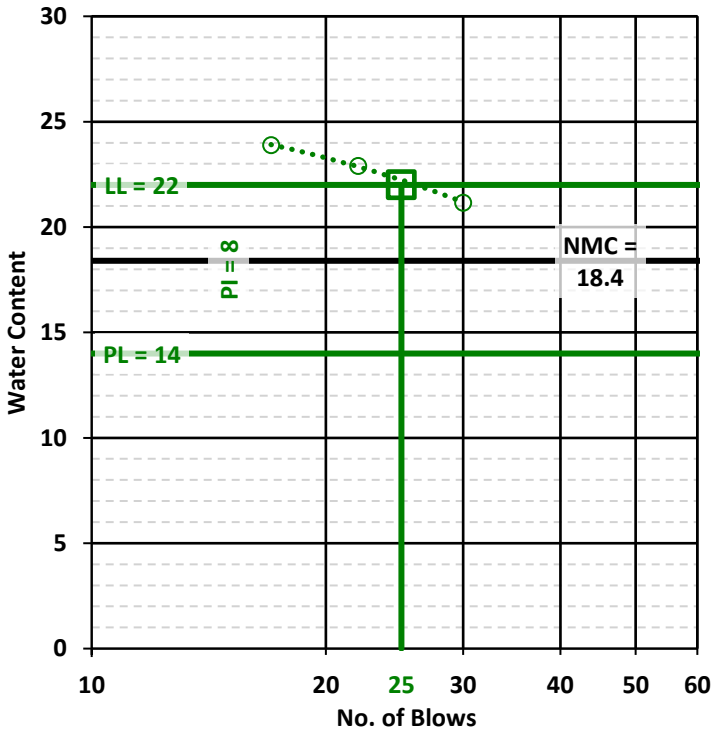
LIQUID LIMIT

	3 Points		
	312	482	404
	20.57	15.15	17.29
	18.80	14.33	16.16
	11.39	10.75	10.82
	23.9	22.9	21.2
# of Blows	17	22	30

PLASTICITY CHART



FLOW CURVE



Performed By: ES Input Validation: MA Reviewed By: BLS Date Tested:9-8-25

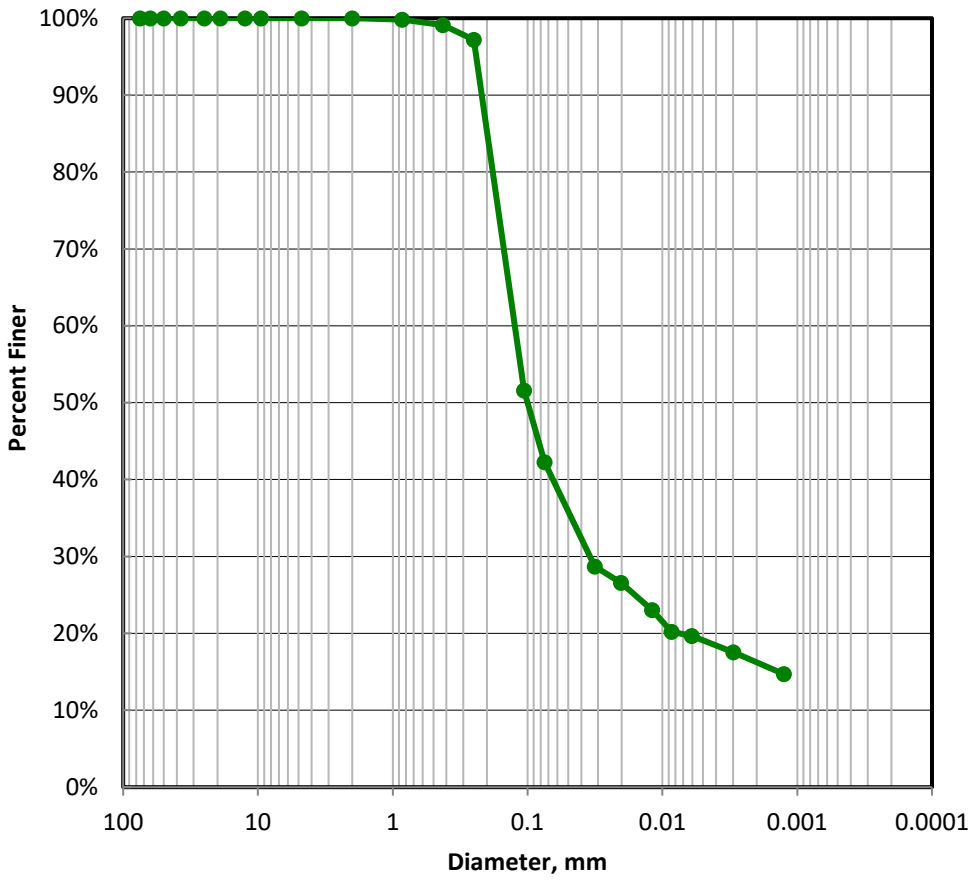
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-5
Client Project	345-817.0004 AEP Kammer Plant	Depth	13.0'-15.0'
Project No.	25-04143	Sample	ST-3
		Lab Sample	25-04143 -02

Sample Color: **BROWN**

USCS Group Name: **CLAYEY SAND**

USCS Group Symbol: **SC** USDA: **SANDY LOAM** AASHTO: **A-4 (0)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	100.0%
No. 20	0.85	99.8%
No. 40	0.425	99.1%
No. 60	0.25	97.2%
No. 140	0.106	51.6%
No. 200	0.075	42.3%
NA	0.0318	28.7%
NA	0.0203	26.6%
NA	0.0119	23.1%
NA	0.0085	20.2%
NA	0.0060	19.7%
NA	0.0030	17.5%
NA	0.0013	14.7%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=23.2% Clay=19.1%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**57.7**	D30, mm	NA
Coarse=0; Medium=0.9; Fine=56.8		D10, mm	NA
% Fines (-#200)	**42.3**	Cc	NA
% Plus #200 (-3")	**57.7**	Cu	NA

USCS Description

CLAYEY SAND

USCS Group Symbol	Atterberg Limits Group Symbol
SC	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.0	0
2	100.0			
		Sand	64.1	64.1
0.05	35.9			
		Silt	19.6	19.6
0.002	16.2			
		Clay	16.2	16.2

USDA Classification

SANDY LOAM

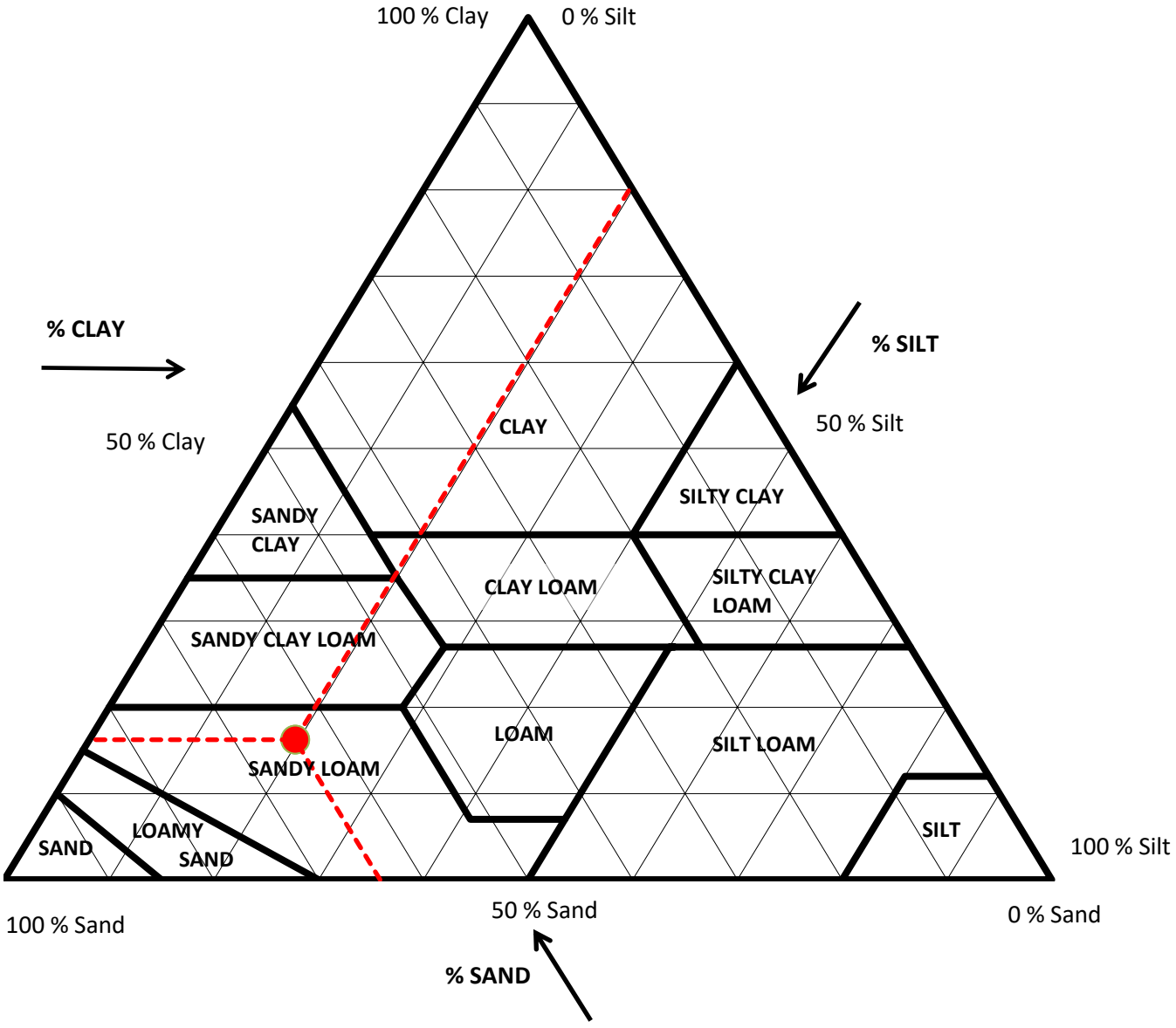
USDA CLASSIFICATION CHART

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-5
Client Project	345-817.0004 AEP Kammer Plant	Depth	13.0'-15.0'
Project No.	25-04143	Sample	ST-3
		Lab Sample	25-04143 -02

Sample Color: **BROWN**
USCS Group Name: **CLAYEY SAND**
USCS Group Symbol: **SC** USDA: **SANDY LOAM** AASHTO: **A-4 (0)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	64.1
Percent Silt, %	19.6
Percent Clay, %	16.2

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.2
Coarse Sand; 1-0.5	0.6
Medium Sand; 0.5-0.25	2.1
Fine Sand; 0.25-0.1	47.2
Very Fine Sand; 0.1-0.05	14.1
Total	**64.1**



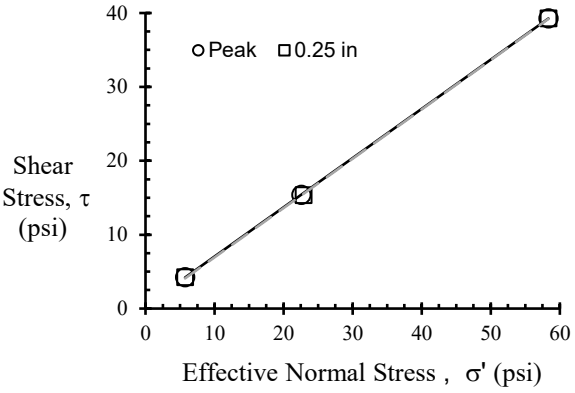
GEOTECHNICAL TESTING SERVICES
A TRI ENVIRONMENTAL COMPANY

Direct Shear Test Under Consolidated Drained Conditions (ASTM D3080)

Client: Civil & Environmental Consultants, Inc.
Client Project: 345-817.0004 AEP Kammer Plant
Project No. 25-04143

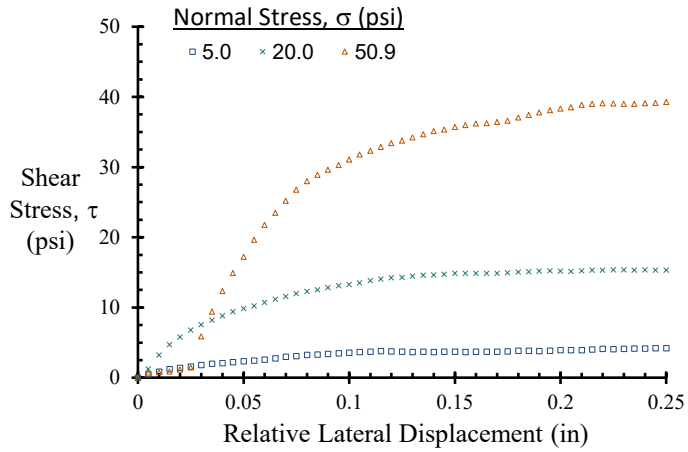
Boring AP-5
Depth 13.0' - 15.0'
Sample ST-3
Lab No. 25-04143-02

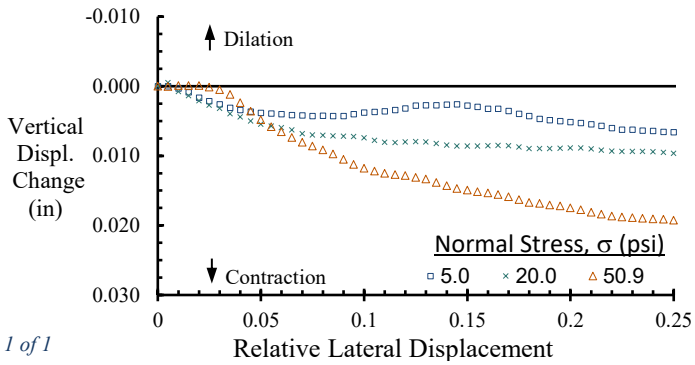
Strength Envelope Linear Regression		
Criterion	C' (psi)	ϕ' (deg)
Peak	0.4	33.7
0.25 in	0.3	33.7



Note: Area Correction Has Been Applied

Specimen Number		1	2	3
Initial Condition	Diameter (in)	2.50	2.50	2.50
	Height (in)	1.00	1.00	1.00
	Water Content (%)	18.4	18.4	18.4
	Dry Density (pcf)	105.8	103.9	104.7
Consol	Normal Stress (psi)	5.0	20.0	50.9
	Duration (min)	708	708	708
	Height (in)	1.0	1.0	1.0
Displacement rate (in/min)		6E-04		
Peak	Displacement, in	0.25	0.23	0.25
	Normal Stress (psi)	5.7	22.6	58.3
	Shear Stress (psi)	4.2	15.4	39.3
0.25 in	Normal Stress (psi)	5.7	22.9	58.3
	Shear Stress (psi)	4.2	15.3	39.3





Jeffrey A. Kuhn, Ph.D, P.E. 9/9/2025
Analysis & Quality Review/Date

GEOTECHNICAL TESTING SERVICES, INC., A TRI ENVIRONMENTAL COMPANY; 1-800-853-7309
103 Coraopolis Road, Coraopolis, PA, 15108

PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	**Boring**	AP-5
Client Project	345-817.0004 AEP Kammer Plant	**Depth**	20.0'-22.0'
Project No.	25-04143	**Sample**	ST-4
		Lab Sample	25-04143 -03

Sample Color: BROWN
USCS Group Name: SANDY LEAN CLAY
USCS Group Symbol: CL USDA: LOAM AASHTO: A-6 (10)

Dry Prep: R58-11(2018) [1]

MECHANICAL SIEVE

Total Sample	
Tare No.	909
Tare + WS., gm	623.85
Tare + DS., gm	557.27
Tare, gm	188.82
Total sample WC	**18.1%**
Total Sample Dry Wt, gm (-3")	368

Hygroscopic WC (-#10)	
Tare No.	820
Tare + WS., gm	44.27
Tare + DS., gm	43.86
Tare, gm	13.79
Hygroscopic WC	1.36%
-#10 Hydro/Sieve air dry wt.	65.85
Wt. of +#200 Sample, gm	26.53

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0.18	0.0%	100.0%	
No. 10	2	0.12	0.0%	99.9%	
No. 20	0.85	1.42	2.2%	97.8%	
No. 40	0.425	4.25	6.4%	91.3%	
No. 60	0.25	3.11	4.7%	86.6%	
No. 140	0.106	16.14	24.5%	62.1%	
No. 200	0.075	1.61	2.4%	59.7%	

HYDROMETER (-#10)

Split Air Dry Wt 66.75
Hygroscopic WC 1.36%
Corrected Dry wt 65.9

-#10 Dispersed 1min in Hamilton Beach Mixer

Specific Gravity 2.7 Assumed
a Factor *0.9889*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	40.0	23.6	4.7	35.3	0.0129	53.0	0.0283	53.0%
5	36.0	23.6	4.7	31.3	0.0129	47.0	0.0185	47.0%
15	31.0	23.6	4.7	26.3	0.0129	39.5	0.0111	39.5%
30	29.0	23.6	4.7	24.3	0.0129	36.5	0.0080	36.5%
60	27.0	23.7	4.6	22.4	0.0129	33.6	0.0057	33.6%
250	23.0	23.9	4.6	18.4	0.0129	27.6	0.0029	27.6%
1440	17.0	23.9	4.6	12.4	0.0129	18.6	0.0012	18.6%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4) 0.0 Silt=27.2% Clay=32.5%
Coarse=0; Fine=0 D60, mm NA
% Sand (-#4 & +#200) 40.3 D30, mm NA
Coarse=0; Medium=8.6; Fine=31.7 D10, mm NA
% Fines (-#200) 59.7 Cc NA
% Plus #200 (-3") 40.3 Cu NA

USCS Description
SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	CL - LEAN CLAY

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.1	0
2	99.9			
		Sand	43.0	43.1
0.05	56.9			
		Silt	33.1	33.2
0.002	23.7			
		Clay	23.7	23.8

USDA Classification
LOAM

Performed By: RH Input Validation: MA Reviewed By: BS Date Tested: 9/8/2025

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-5
Client Project	345-817.0004 AEP Kammer Plant	Depth	20.0'-22.0'
Project No.	25-04143	Sample	ST-4
		Lab Sample	25-04143 -03

Soil Description: BROWN LEAN CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	909
Wt. Tare & WS, gm	623.85
Wt. Tare & DS, gm	557.27
Wt. Tare, gm	188.82
Water Content, %	18.1

SAMPLE SUMMARY

Liquid Limit (LL), %	**39**
Plastic Limit (PL), %	**18**
Plasticity Index (PI)	**21**
USCS Group Symbol (*-#40 Fraction*)	**CL**
USCS Group Name (*-#40 Fraction*)	**LEAN CLAY**
Sample Color:	**BROWN**

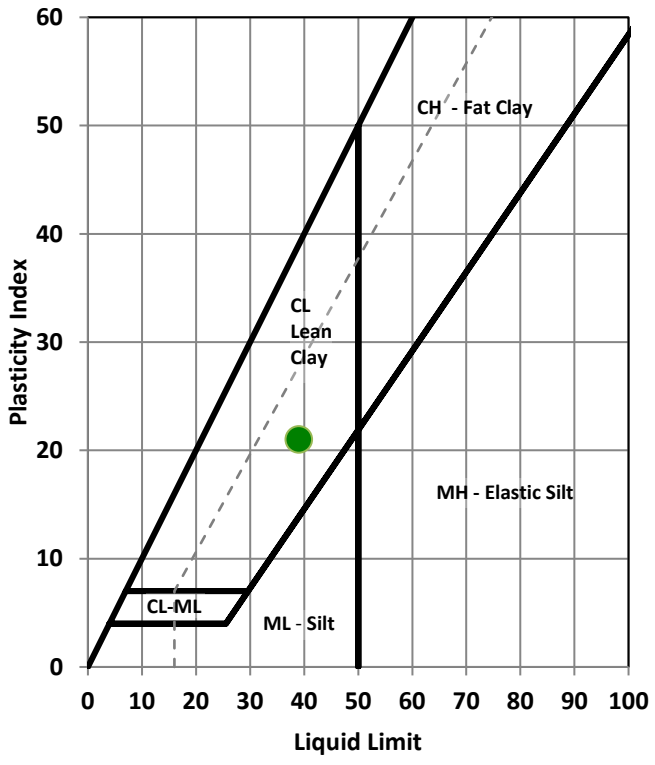
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	486	461	318
Wt. Tare & WS, gm	17.00	17.50	17.52
Wt. Tare & DS, gm	16.10	16.54	16.56
Wt. Tare, gm	10.91	10.71	11.48
Water Content, %	17.3	16.5	18.9

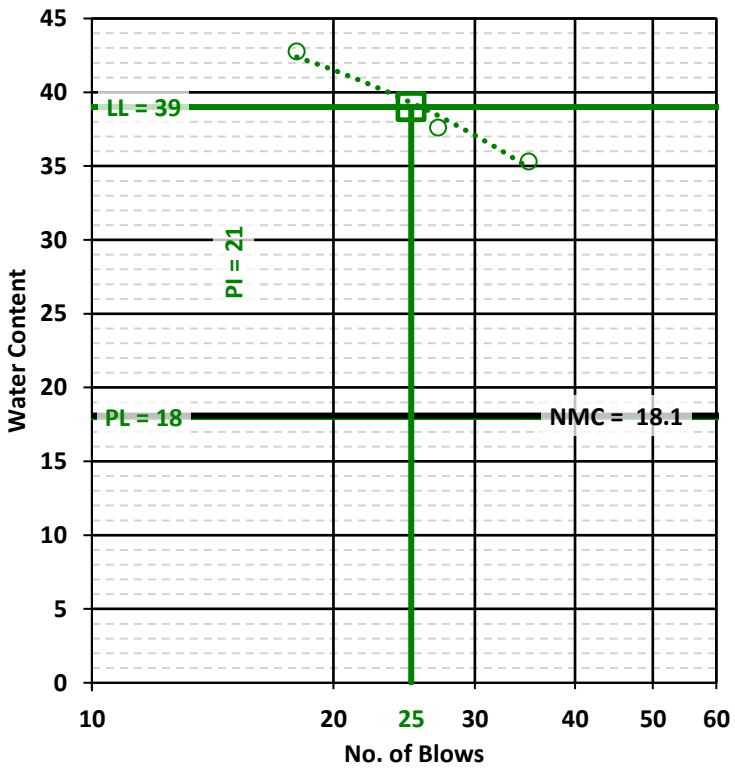
LIQUID LIMIT

	3 Points		
	480	325	706
	17.49	18.02	19.85
	15.42	16.23	17.89
	10.58	11.47	12.34
	42.8	37.6	35.3
# of Blows	18	27	35

PLASTICITY CHART



FLOW CURVE



Performed By: RH | Input Validation:MA | Reviewed By: BS | Date Tested: 9/4/2025

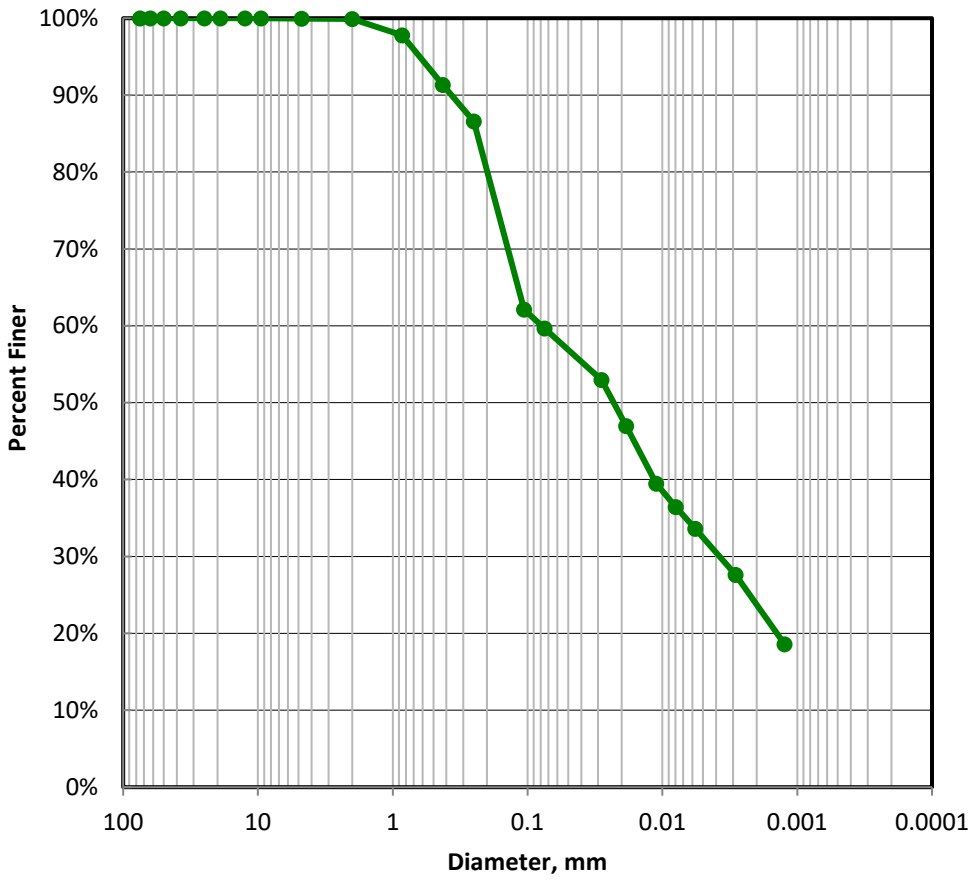
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-5
Client Project	345-817.0004 AEP Kammer Plant	Depth	20.0'-22.0'
Project No.	25-04143	Sample	ST-4
		Lab Sample	25-04143 -03

Sample Color: **BROWN**

USCS Group Name: **SANDY LEAN CLAY**

USCS Group Symbol: **CL** USDA: **LOAM** AASHTO: **A-6 (10)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	99.9%
No. 20	0.85	97.8%
No. 40	0.425	91.3%
No. 60	0.25	86.6%
No. 140	0.106	62.1%
No. 200	0.075	59.7%
NA	0.0283	53.0%
NA	0.0185	47.0%
NA	0.0111	39.5%
NA	0.0080	36.5%
NA	0.0057	33.6%
NA	0.0029	27.6%
NA	0.0012	18.6%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=27.2% Clay=32.5%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**40.3**	D30, mm	NA
Coarse=0; Medium=8.6; Fine=31.7		D10, mm	NA
% Fines (-#200)	**59.7**	Cc	NA
% Plus #200 (-3")	**40.3**	Cu	NA

USCS Description

SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.1	0
2	99.9			
		Sand	43.0	43.1
0.05	56.9			
		Silt	33.1	33.2
0.002	23.7			
		Clay	23.7	23.8

USDA Classification

LOAM

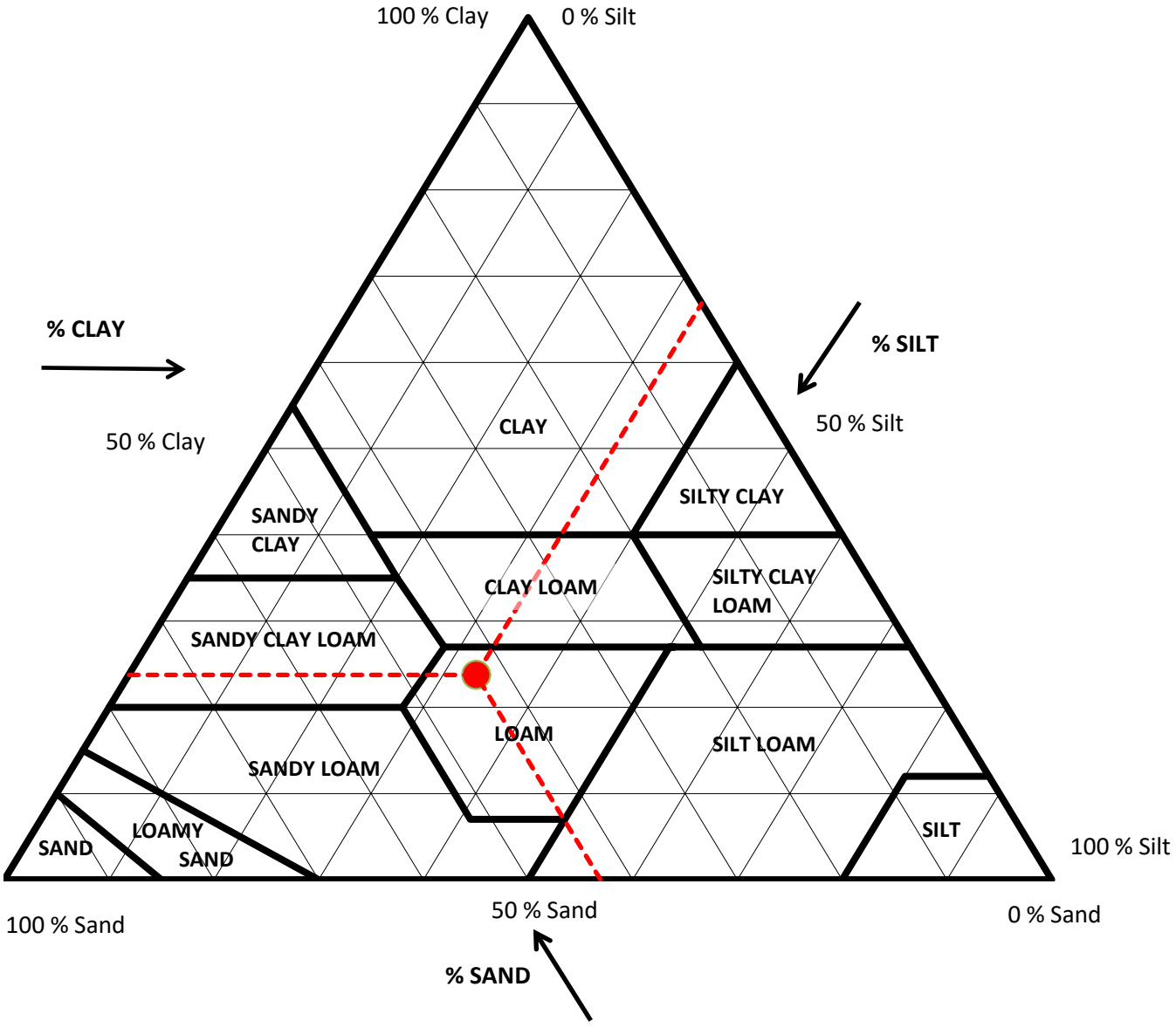
USDA CLASSIFICATION CHART

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-5
Client Project	345-817.0004 AEP Kammer Plant	Depth	20.0'-22.0'
Project No.	25-04143	Sample	ST-4
		Lab Sample	25-04143 -03

Sample Color: **BROWN**
USCS Group Name: **SANDY LEAN CLAY**
USCS Group Symbol: **CL** USDA: **LOAM** AASHTO: **A-6 (10)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	43.1
Percent Silt, %	33.2
Percent Clay, %	23.8

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	1.7
Coarse Sand; 1-0.5	5.4
Medium Sand; 0.5-0.25	6.2
Fine Sand; 0.25-0.1	24.9
Very Fine Sand; 0.1-0.05	4.8
Total	**43.1**

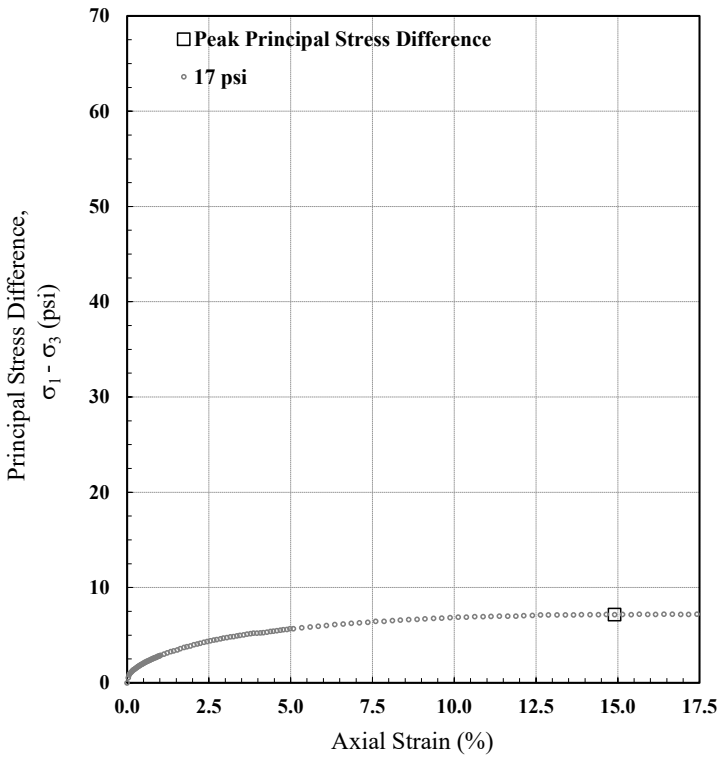


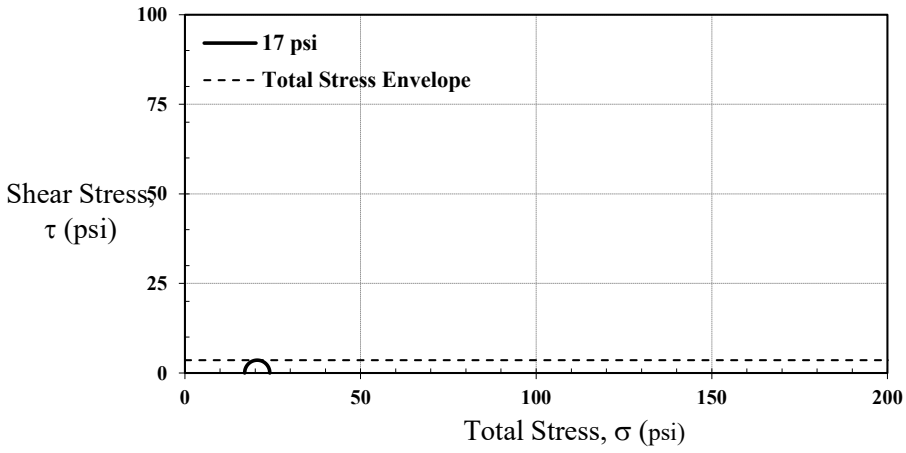
GEOTECHNICAL TESTING SERVICES
A TRI ENVIRONMENTAL COMPANY

Unconsolidated-Undrained (Q) Triaxial Compression

Client: Civil & Environmental Consultants, Inc.
Project: 345-817.0004 AEP Kammer
Sample: AP-5 (20.0' - 22.0'); ST-4

TRI Log #: 25-04143.3
Test Method: ASTM D2850





Test Parameters	
Minor Principal Stress (psi)	17.0
Rate of Strain (%/hr)	60

Initial Properties	
Avg. Diameter (in)	2.83
Avg. Height (in)	5.91
Avg. Water Content (%)	18.2
Bulk Density (pcf)	135.4
Dry Density (pcf)	114.5
Saturation (%)	100.0
Void Ratio	0.50
Specific Gravity (Assumed)	2.75

At Failure - Maximum Deviator Stress	
Axial Strain at Failure (%)	14.9
Minor Total Stress (psi)	17.0
Major Total Stress (psi)	24.2
Principal Stress Diff. (psi)	7.2

Total Stress Envelope	
Friction Angle (deg)	0
Undrained Shear Strength, S_u (psi)	3.6
S_u / σ_3	0.2

Note: The calculated value of specimen saturation was approximately 95% or greater. The Mohr failure envelope was taken as a horizontal straight line.

Jeffrey A. Kuhn , Ph.D., P.E., 9/9/2025
Analysis & Quality Review/Date

GEOTECHNICAL TESTING SERVICES, INC., A TRI ENVIRONMENTAL COMPANY; 1-800-853-7309
103 Coraopolis Road, Coraopolis, PA, 15108

PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	**Boring**	AP-5
Client Project	345-817.0004 AEP Kammer Plant	**Depth**	23.0'-25.0'
Project No.	25-04143	**Sample**	ST-5
		Lab Sample	25-04143 -04

Sample Color: BROWN
USCS Group Name: SANDY LEAN CLAY
USCS Group Symbol: CL USDA: SANDY LOAM AASHTO: A-6 (6)

Dry Prep: R58-11(2018)[1]

MECHANICAL SIEVE

Total Sample	
Tare No.	238
Tare + WS., gm	538.15
Tare + DS., gm	475.93
Tare, gm	179.78
Total sample WC	**21.0%**
Total Sample Dry Wt, gm (-3")	296

Hygroscopic WC (-#10)	
Tare No.	211
Tare + WS., gm	53.29
Tare + DS., gm	52.89
Tare, gm	16.55
Hygroscopic WC	1.10%
-#10 Hydro/Sieve air dry wt.	61.09
Wt. of +#200 Sample, gm	28.51

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0	0.0%	100.0%	
No. 10	2	0.55	0.2%	99.8%	
No. 20	0.85	0.08	0.1%	99.7%	
No. 40	0.425	0.98	1.6%	98.1%	
No. 60	0.25	3.86	6.3%	91.8%	
No. 140	0.106	20.14	32.9%	58.9%	
No. 200	0.075	3.45	5.6%	53.2%	

HYDROMETER (-#10)

Split Air Dry Wt 61.76
Hygroscopic WC 1.10%
Corrected Dry wt 61.1

-#10 Dispersed 1min in Hamilton Beach Mixer

Specific Gravity 2.7 Assumed
a Factor *0.9889*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	25.0	23.5	4.7	20.3	0.0129	32.9	0.0318	32.8%
5	22.0	23.5	4.7	17.3	0.0129	28.0	0.0205	28.0%
15	20.0	23.5	4.7	15.3	0.0129	24.8	0.0120	24.7%
30	18.0	23.5	4.7	13.3	0.0129	21.5	0.0086	21.5%
60	17.0	23.6	4.7	12.3	0.0129	19.9	0.0061	19.9%
250	14.0	23.8	4.6	9.4	0.0129	15.2	0.0030	15.2%
1440	12.0	23.8	4.6	7.4	0.0129	12.0	0.0013	12.0%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=34.7% Clay=18.5%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**46.8**	D30, mm	NA
Coarse=0.2; Medium=1.7; Fine=44.9		D10, mm	NA
% Fines (-#200)	**53.2**	Cc	NA
% Plus #200 (-3")	**46.8**	Cu	NA

USCS Description
SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.2	0
2	99.8			
		Sand	56.2	56.3
0.05	43.6			
		Silt	30.0	30.0
0.002	13.6			
		Clay	13.6	13.7

USDA Classification
SANDY LOAM

Performed By: RH Input Validation: MA Reviewed By: BLS Date Tested: 9/8/2025

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-5
Client Project	345-817.0004 AEP Kammer Plant	Depth	23.0'-25.0'
Project No.	25-04143	Sample	ST-5
		Lab Sample	25-04143 -04

Soil Description: BROWN LEAN CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	238
Wt. Tare & WS, gm	538.15
Wt. Tare & DS, gm	475.93
Wt. Tare, gm	179.78
Water Content, %	21.0

SAMPLE SUMMARY

Liquid Limit (LL), %	**35**
Plastic Limit (PL), %	**18**
Plasticity Index (PI)	**17**
USCS Group Symbol (*-#40 Fraction*)	**CL**
USCS Group Name (*-#40 Fraction*)	**LEAN CLAY**
Sample Color:	**BROWN**

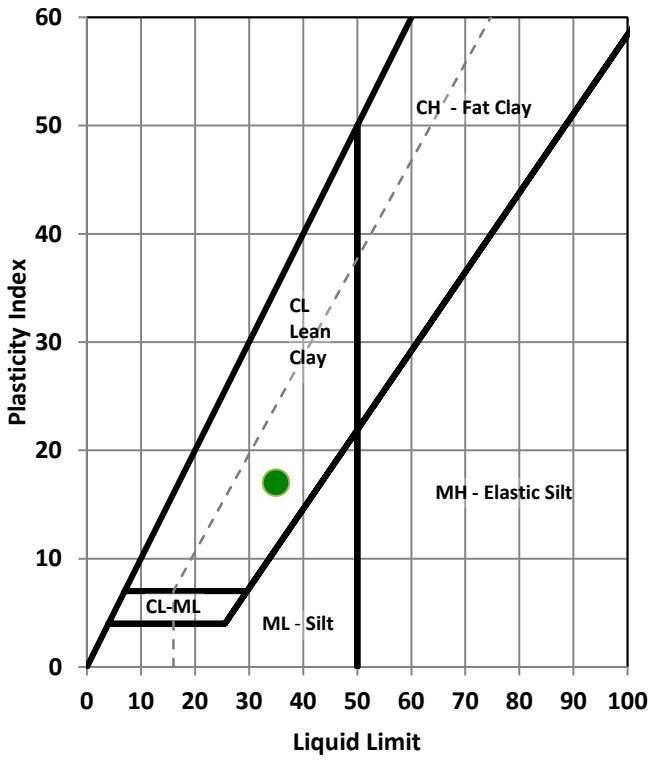
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	711	305	303
Wt. Tare & WS, gm	20.31	17.00	23.71
Wt. Tare & DS, gm	18.97	16.15	21.88
Wt. Tare, gm	11.34	11.42	11.57
Water Content, %	17.6	18.0	17.7

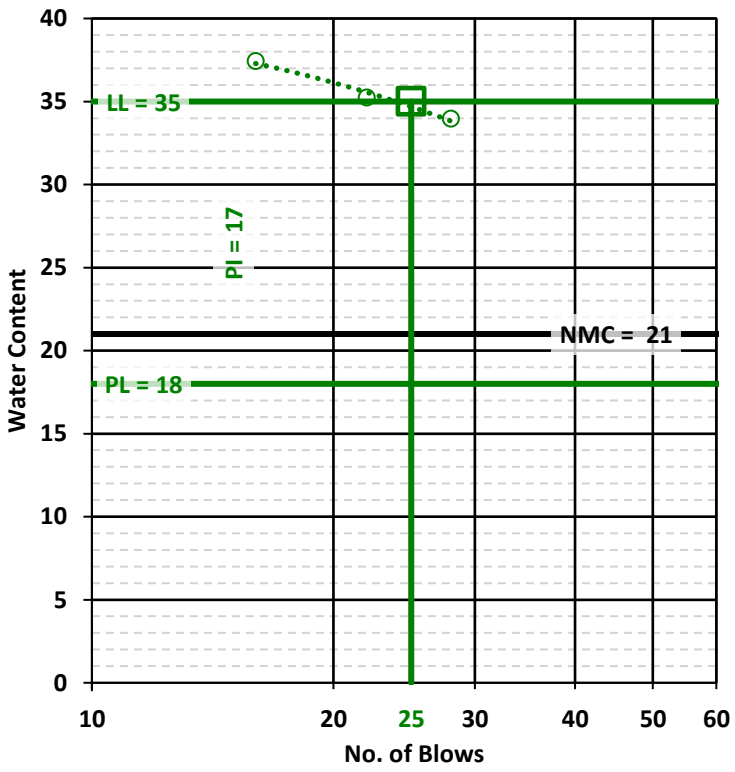
LIQUID LIMIT

	3 Points		
	329	472	328
	21.09	17.16	18.93
	18.48	15.50	17.00
	11.51	10.79	11.32
	37.4	35.2	34.0
# of Blows	16	22	28

PLASTICITY CHART



FLOW CURVE



Performed By: RH | Input Validation:MA | Reviewed By: BS | Date Tested: 9/8/2025

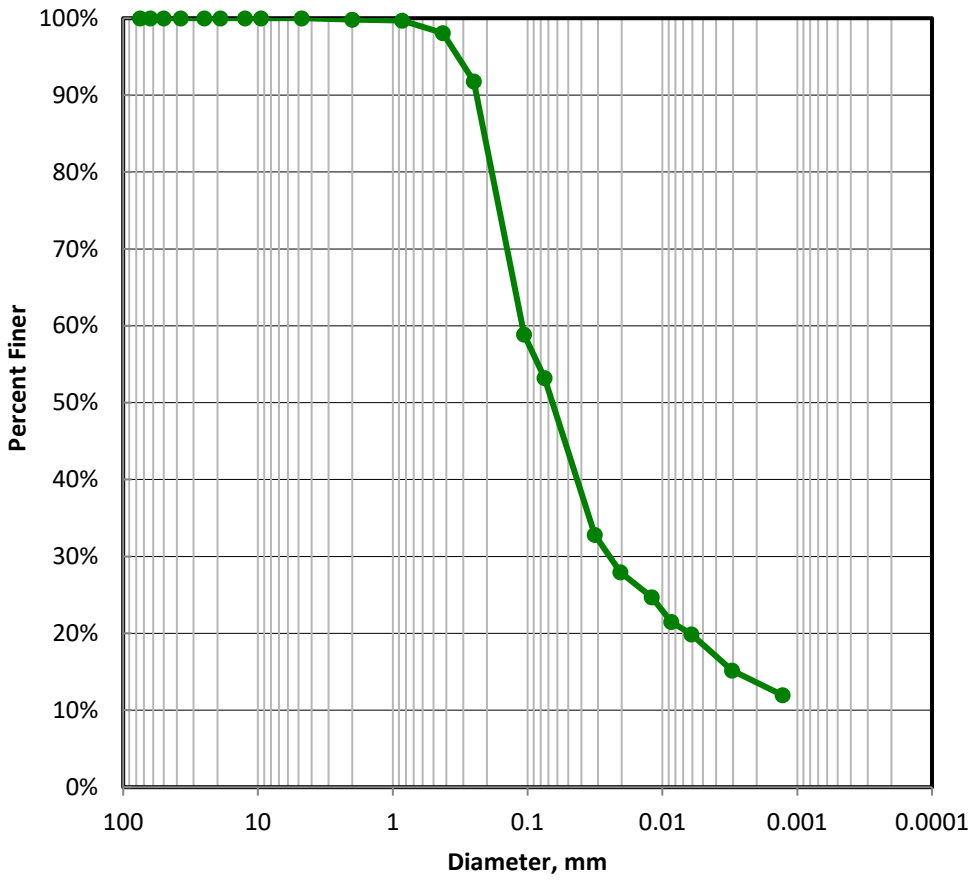
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-5
Client Project	345-817.0004 AEP Kammer Plant	Depth	23.0'-25.0'
Project No.	25-04143	Sample	ST-5
		Lab Sample	25-04143 -04

Sample Color: **BROWN**

USCS Group Name: **SANDY LEAN CLAY**

USCS Group Symbol: **CL** USDA: **SANDY LOAM** AASHTO: **A-6 (6)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	99.8%
No. 20	0.85	99.7%
No. 40	0.425	98.1%
No. 60	0.25	91.8%
No. 140	0.106	58.9%
No. 200	0.075	53.2%
NA	0.0318	32.8%
NA	0.0205	28.0%
NA	0.0120	24.7%
NA	0.0086	21.5%
NA	0.0061	19.9%
NA	0.0030	15.2%
NA	0.0013	12.0%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=34.7% Clay=18.5%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**46.8**	D30, mm	NA
Coarse=0.2; Medium=1.7; Fine=44.9		D10, mm	NA
% Fines (-#200)	**53.2**	Cc	NA
% Plus #200 (-3")	**46.8**	Cu	NA

USCS Description

SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.2	0
2	99.8			
		Sand	56.2	56.3
0.05	43.6			
		Silt	30.0	30.0
0.002	13.6			
		Clay	13.6	13.7

USDA Classification

SANDY LOAM

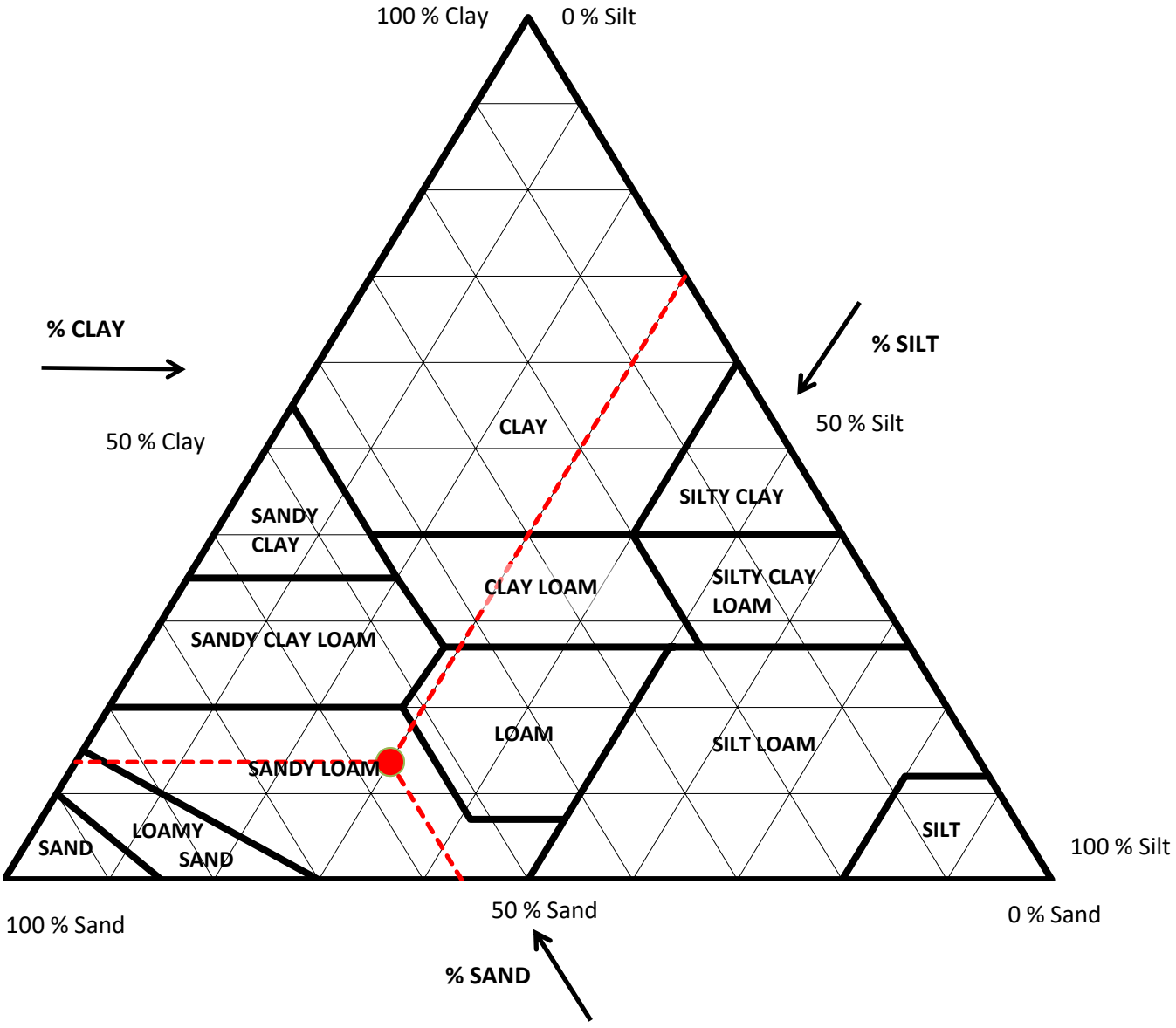
USDA CLASSIFICATION CHART

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-5
Client Project	345-817.0004 AEP Kammer Plant	Depth	23.0'-25.0'
Project No.	25-04143	Sample	ST-5
		Lab Sample	25-04143 -04

Sample Color: **BROWN**
USCS Group Name: **SANDY LEAN CLAY**
USCS Group Symbol: **CL** USDA: **SANDY LOAM** AASHTO: **A-6 (6)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	56.3
Percent Silt, %	30.0
Percent Clay, %	13.7

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.1
Coarse Sand; 1-0.5	1.3
Medium Sand; 0.5-0.25	6.7
Fine Sand; 0.25-0.1	33.9
Very Fine Sand; 0.1-0.05	14.4
Total	**56.3**

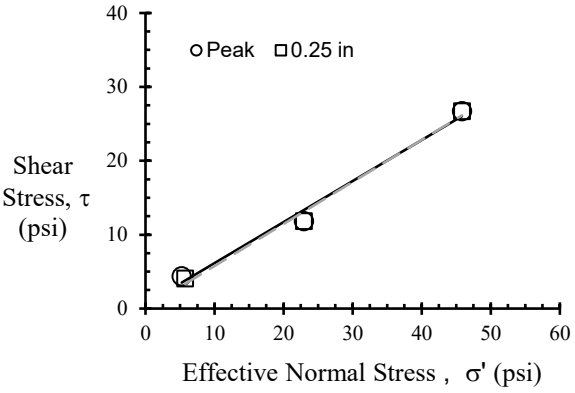


Direct Shear Test Under Consolidated Drained Conditions (ASTM D3080)

Client: Civil & Environmental Consultants, Inc.
Client Project: 345-817.0004 AEP Kammer Plant
Project No. 25-04143

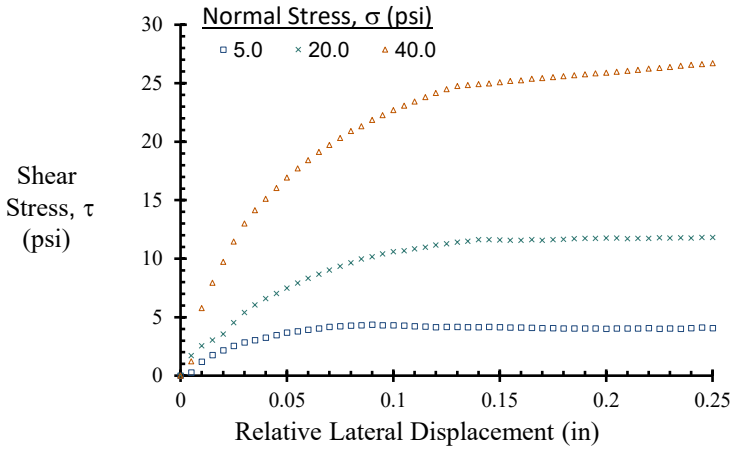
Boring AP-5
Depth 23.0' - 25.0'
Sample ST-5
Lab No. 25-04143-04

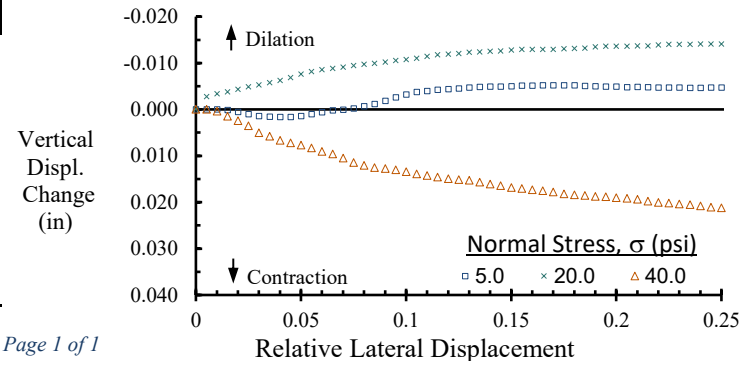
Strength Envelope Linear Regression		
Criterion	C' (psi)	ϕ' (deg)
Peak	0.6	29.0
0.25 in	0.1	29.6



Specimen Number		1	2	3
Initial Condition	Diameter (in)	2.50	2.50	2.50
	Height (in)	1.00	1.00	1.00
	Water Content (%)	21.0	21.0	21.0
	Dry Density (pcf)	102.5	100.5	102.3
Consol	Normal Stress (psi)	5.0	20.0	40.0
	Duration (min)	708	708	708
	Height (in)	1.0	1.1	1.0
Displacement rate (in/min)		6E-04		
Peak	Displacement, in	0.09	0.25	0.25
	Normal Stress (psi)	5.2	22.9	45.8
	Shear Stress (psi)	4.4	11.8	26.7
0.25 in	Normal Stress (psi)	5.7	22.9	45.8
	Shear Stress (psi)	4.1	11.8	26.7

Note: Area Correction Has Been Applied





Jeffrey A. Kuhn, Ph.D, P.E. 9/9/2025
Analysis & Quality Review/Date

PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	**Boring**	AP-5
Client Project	345-817.0004 AEP Kammer Plant	**Depth**	33.5'-34.5'
Project No.	25-04143	**Sample**	SS-9A
		Lab Sample	25-04143 31

Sample Color: BROWN
USCS Group Name: SILTY SAND
USCS Group Symbol: SM USDA: LOAMY SAND AASHTO: A-2-4 (0)

Dry Prep: R58-11(2018) [1]

MECHANICAL SIEVE

Total Sample	
Tare No.	2002
Tare + WS., gm	243.26
Tare + DS., gm	226.45
Tare, gm	151.20
Total sample WC	**22.3%**
Total Sample Dry Wt, gm (-3")	75

Hygroscopic WC (-#10)	
Tare No.	261
Tare + WS., gm	21.04
Tare + DS., gm	20.86
Tare, gm	16.61
Hygroscopic WC	4.24%
-#10 Hydro/Sieve air dry wt.	72.13
Wt. of +#200 Sample, gm	54.87

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	1.53	2.0%	98.0%	
No. 4	4.75	0.00	0.0%	98.0%	
No. 10	2	0.31	0.4%	97.6%	
No. 20	0.85	1.64	2.2%	95.3%	
No. 40	0.425	4.94	6.7%	88.7%	
No. 60	0.25	13.83	18.7%	69.9%	
No. 140	0.106	32.67	44.2%	25.8%	
No. 200	0.075	1.79	2.4%	23.3%	

HYDROMETER (-#10)

Split Air Dry Wt	75.18	Specific Gravity	2.7
Hygroscopic WC	4.24%		Assumed
Corrected Dry wt	72.1	*a Factor*	*0.9889*

-#10 Dispersed 1min in Hamilton Beach Mixer

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	19.0	23.5	4.7	14.3	0.0129	19.6	0.0331	19.1%
5	17.5	23.5	4.7	12.8	0.0129	17.5	0.0211	17.1%
15	13.0	23.6	4.7	8.3	0.0129	11.4	0.0125	11.1%
30	9.0	23.7	4.6	4.4	0.0129	6.0	0.0090	5.9%
60	8.0	23.8	4.6	3.4	0.0129	4.7	0.0064	4.5%
250	6.5	23.8	4.6	1.9	0.0129	2.6	0.0032	2.5%
1440	5.5	23.8	4.6	0.9	0.0129	1.2	0.0013	1.2%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**2.0**	Silt=19.5% Clay=3.8%	
Coarse=0; Fine=2		D60, mm	NA
% Sand (-#4 & +#200)	**74.6**	D30, mm	NA
Coarse=0.4; Medium=8.9; Fine=65.3		D10, mm	NA
% Fines (-#200)	**23.3**	Cc	NA
% Plus #200 (-3")	**76.7**	Cu	NA

USCS Description
SILTY SAND

USCS Group Symbol	Atterberg Limits Group Symbol
SM	**NP - NON PLASTIC**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	2.4	0
2	97.6			
		Sand	76.3	78.2
0.05	21.3			
		Silt	19.4	19.9
0.002	1.8			
		Clay	1.8	1.9

USDA Classification
LOAMY SAND

Performed By: RH Input Validation: MA Reviewed By: BS Date Tested: 9/8/2025

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-5
Client Project	345-817.0004 AEP Kammer Plant	Depth	33.5'-34.5'
Project No.	25-04143	Sample	SS-9A
		Lab Sample	25-04143 31

Soil Description: BROWN NON PLASTIC MATERIAL
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	2002
Wt. Tare & WS, gm	243.26
Wt. Tare & DS, gm	226.45
Wt. Tare, gm	151.2
Water Content, %	22.3

SAMPLE SUMMARY

Liquid Limit (LL), %	NA
Plastic Limit (PL), %	NA
Plasticity Index (PI)	NA
USCS Group Symbol (*-#40 Fraction*)	NP
USCS Group Name (*-#40 Fraction*)	NON PLASTIC
Sample Color:	BROWN

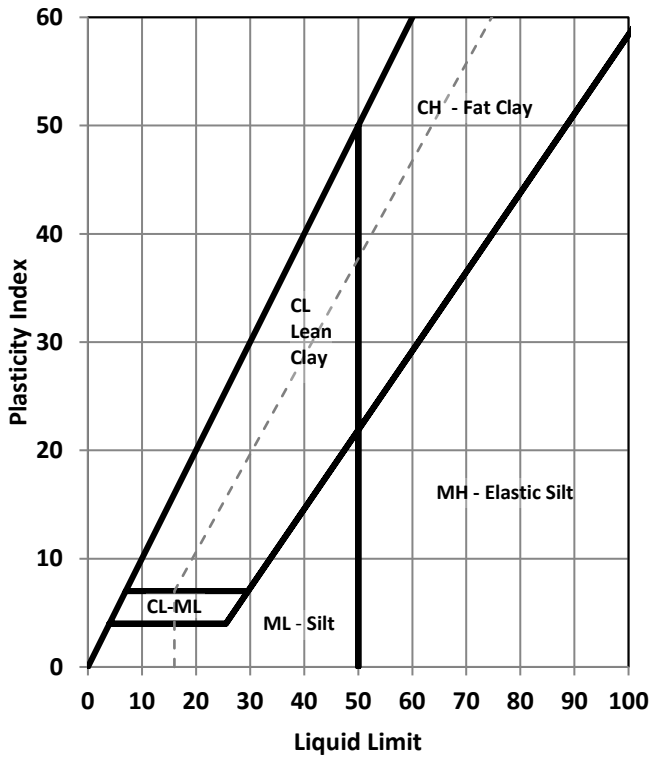
PLASTIC LIMIT

Points Run	0 Non-Plastic
Tare Number	
Wt. Tare & WS, gm	
Wt. Tare & DS, gm	
Wt. Tare, gm	
Water Content, %	

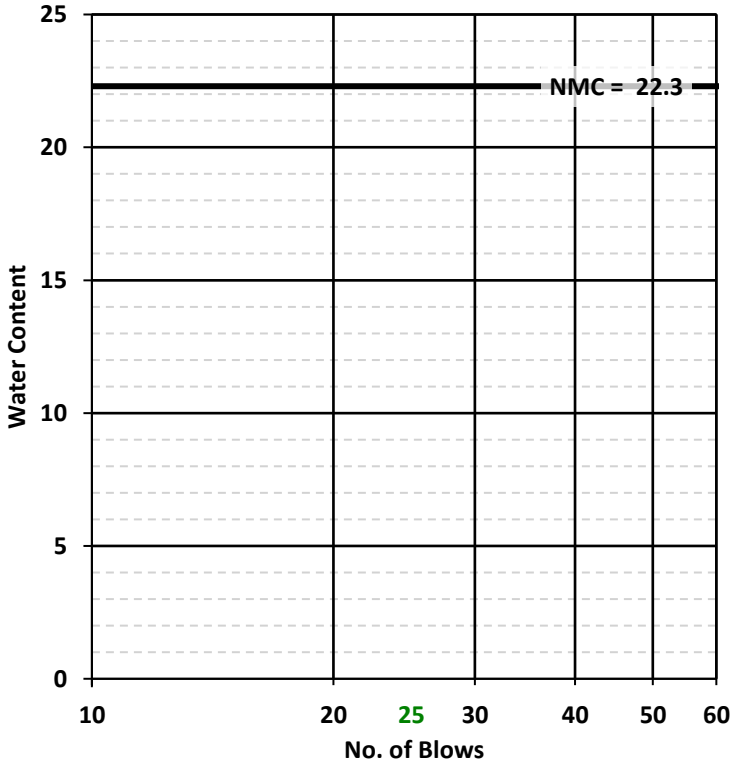
LIQUID LIMIT

0 Non-Plastic
# of Blows

PLASTICITY CHART



FLOW CURVE



Performed By: RH | Input Validation:MA | Reviewed By: BS | Date Tested: 9/8/2025

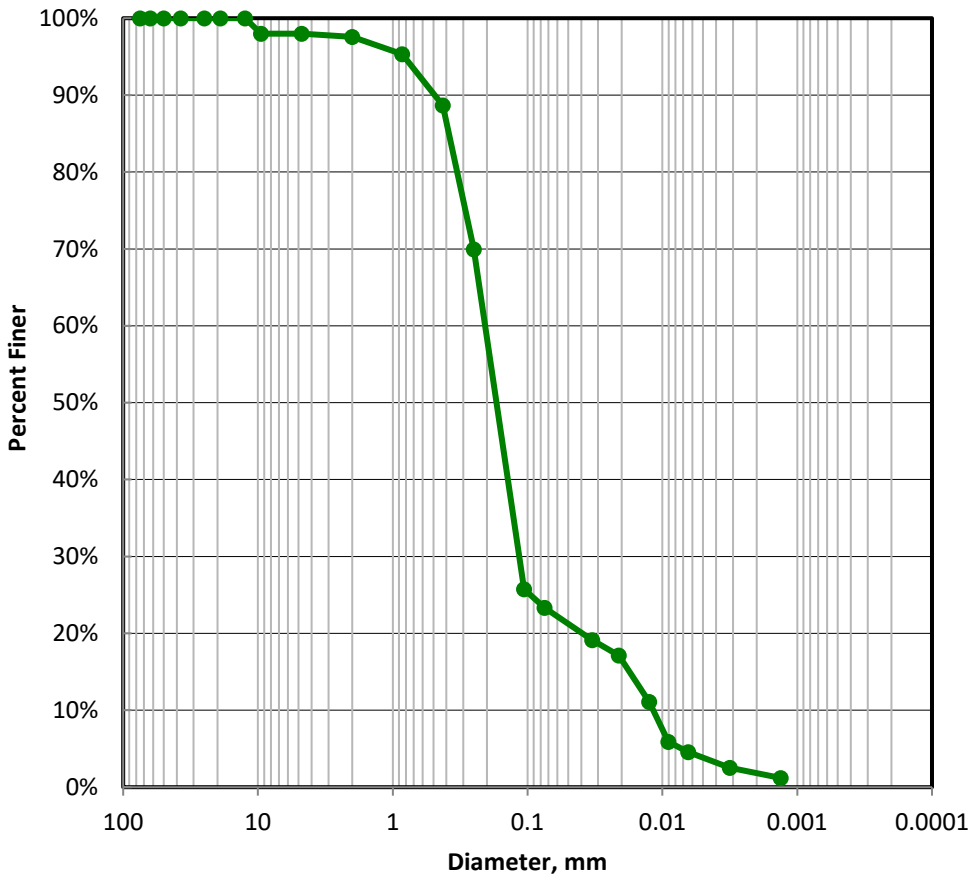
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-5
Client Project	345-817.0004 AEP Kammer Plant	Depth	33.5'-34.5'
Project No.	25-04143	Sample	SS-9A
		Lab Sample	25-04143 31

Sample Color: **BROWN**

USCS Group Name: **SILTY SAND**

USCS Group Symbol: **SM** USDA: **LOAMY SAND** AASHTO: **A-2-4 (0)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	98.0%
No. 4	4.75	98.0%
No. 10	2	97.6%
No. 20	0.85	95.3%
No. 40	0.425	88.7%
No. 60	0.25	69.9%
No. 140	0.106	25.8%
No. 200	0.075	23.3%
NA	0.0331	19.1%
NA	0.0211	17.1%
NA	0.0125	11.1%
NA	0.0090	5.9%
NA	0.0064	4.5%
NA	0.0032	2.5%
NA	0.0013	1.2%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**2.0**	Silt=19.5% Clay=3.8%	
Coarse=0; Fine=2		D60, mm	NA
% Sand (-#4 & +#200)	**74.6**	D30, mm	NA
Coarse=0.4; Medium=8.9; Fine=65.3		D10, mm	NA
% Fines (-#200)	**23.3**	Cc	NA
% Plus #200 (-3")	**76.7**	Cu	NA

USCS Description

SILTY SAND

USCS Group Symbol	Atterberg Limits Group Symbol
SM	**NP - NON PLASTIC**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)
100	100
2	97.6
0.05	21.3
0.002	1.8

Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
Gravel	2.4	0
Sand	76.3	78.2
Silt	19.4	19.9
Clay	1.8	1.9

USDA Classification

LOAMY SAND

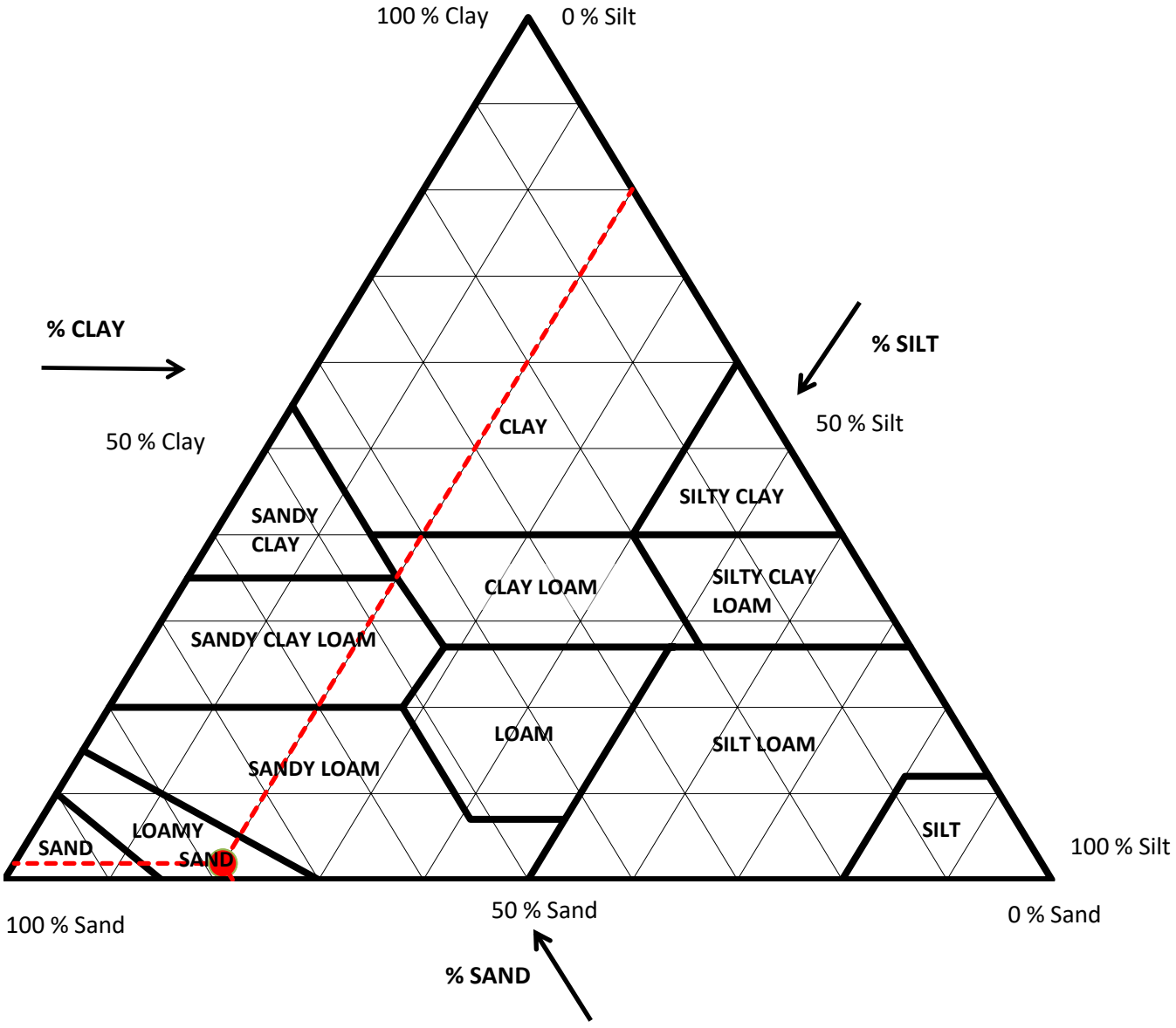
USDA CLASSIFICATION CHART

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-5
Client Project	345-817.0004 AEP Kammer Plant	Depth	33.5'-34.5'
Project No.	25-04143	Sample	SS-9A
		Lab Sample	25-04143 31

Sample Color: **BROWN**
USCS Group Name: **SILTY SAND**
USCS Group Symbol: **SM** USDA: **LOAMY SAND** AASHTO: **A-2-4 (0)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	78.2
Percent Silt, %	19.9
Percent Clay, %	1.9

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	1.8
Coarse Sand; 1-0.5	5.7
Medium Sand; 0.5-0.25	20.8
Fine Sand; 0.25-0.1	45.7
Very Fine Sand; 0.1-0.05	4.2
Total	**78.2**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	**Boring**	AP-6
Client Project	345-817.0004 AEP Kammer Plant	**Depth**	33.5'-35.0'
Project No.	25-04143	**Sample**	SS-9
		Lab Sample	25-04143 -33

Sample Color: DARK GRAY
USCS Group Name: FAT CLAY
USCS Group Symbol: CH USDA: CLAY LOAM AASHTO: A-7-6 (34)

Dry Prep: R58-11(2018)[1]

MECHANICAL SIEVE

Total Sample	
Tare No.	139
Tare + WS., gm	388.31
Tare + DS., gm	310.88
Tare, gm	146.70
Total sample WC	**47.2%**
Total Sample Dry Wt, gm (-3")	164

Hygroscopic WC (-#10)	
Tare No.	223
Tare + WS., gm	27.46
Tare + DS., gm	27.29
Tare, gm	16.71
Hygroscopic WC	1.61%
-#10 Hydro/Sieve air dry wt.	69.58
Wt. of +#200 Sample, gm	7.67

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0	0.0%	100.0%	
No. 10	2	0.08	0.0%	100.0%	
No. 20	0.85	0.42	0.6%	99.3%	
No. 40	0.425	0.22	0.3%	99.0%	
No. 60	0.25	0.12	0.2%	98.9%	
No. 140	0.106	3.39	4.9%	94.0%	
No. 200	0.075	3.52	5.1%	88.9%	

HYDROMETER (-#10)

Split Air Dry Wt 70.70
Hygroscopic WC 1.61%
Corrected Dry wt 69.6

-#10 Dispersed 1min in Hamilton Beach Mixer

Specific Gravity 2.7 Assumed
a Factor *0.9889*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	50.0	23.6	4.7	45.3	0.0129	64.4	0.0258	64.3%
5	44.0	23.6	4.7	39.3	0.0129	55.9	0.0173	55.8%
15	37.5	23.6	4.7	32.8	0.0129	46.6	0.0106	46.6%
30	34.0	23.7	4.6	29.4	0.0129	41.8	0.0077	41.8%
60	30.0	23.8	4.6	25.4	0.0129	36.1	0.0056	36.1%
250	25.0	23.9	4.6	20.4	0.0129	29.0	0.0028	29.0%
1440	22.0	23.9	4.6	17.4	0.0129	24.7	0.0012	24.7%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4) 0.0 Silt=54% Clay=34.9%
Coarse=0; Fine=0 D60, mm NA
% Sand (-#4 & +#200) 11.1 D30, mm NA
Coarse=0; Medium=0.9; Fine=10.1 D10, mm NA
% Fines (-#200) 88.9 Cc NA
% Plus #200 (-3") 11.1 Cu NA

USCS Description
FAT CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CH	CH - FAT CLAY

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.0	0
2	100.0			
		Sand	20.4	20.4
0.05	79.6			
		Silt	52.3	52.4
0.002	27.2			
		Clay	27.2	27.3

USDA Classification
CLAY LOAM

Performed By: RH Input Validation: MA Reviewed By: BS Date Tested: 9/8/2025

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-6
Client Project	345-817.0004 AEP Kammer Plant	Depth	33.5'-35.0'
Project No.	25-04143	Sample	SS-9
		Lab Sample	25-04143 -33

Soil Description: DARK GRAY FAT CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	139
Wt. Tare & WS, gm	388.31
Wt. Tare & DS, gm	310.88
Wt. Tare, gm	146.7
Water Content, %	47.2

SAMPLE SUMMARY

Liquid Limit (LL), %	60
Plastic Limit (PL), %	26
Plasticity Index (PI)	34
USCS Group Symbol (*-#40 Fraction*)	CH
USCS Group Name (*-#40 Fraction*)	FAT CLAY
Sample Color:	DARK GRAY

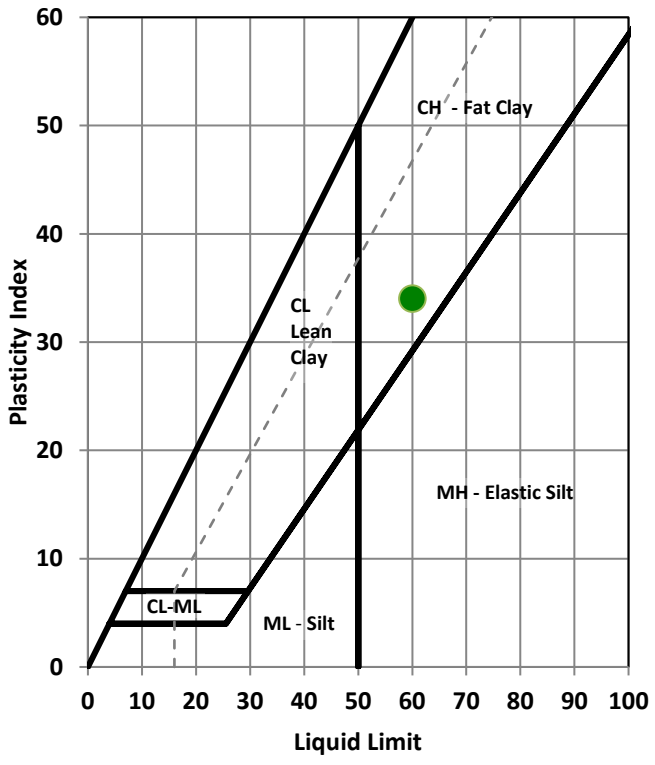
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	317	497	463
Wt. Tare & WS, gm	18.30	19.45	19.24
Wt. Tare & DS, gm	16.90	17.70	17.49
Wt. Tare, gm	11.46	10.85	10.73
Water Content, %	25.7	25.5	25.9

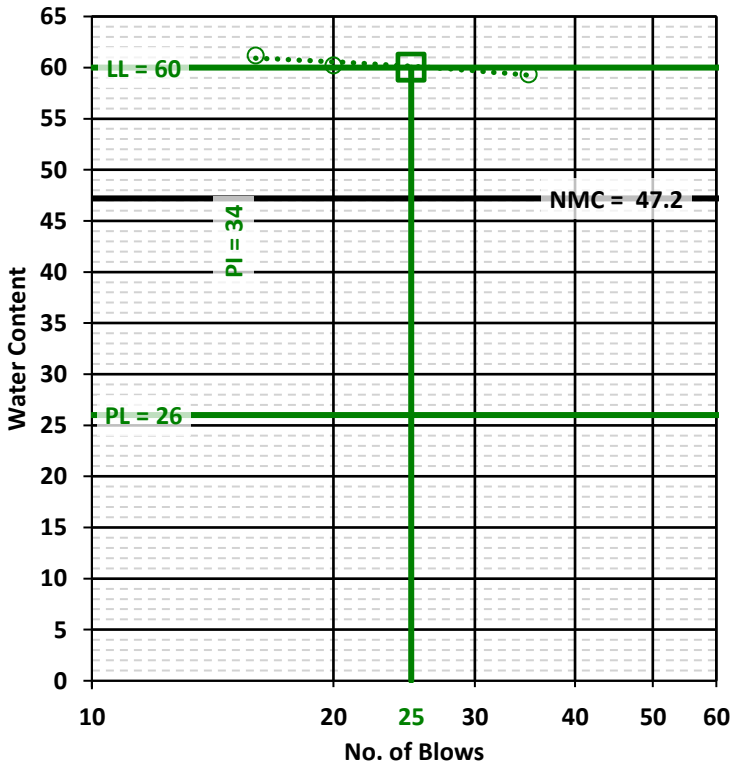
LIQUID LIMIT

	3 Points		
	447	702	469
	14.76	17.10	15.42
	13.23	15.36	13.67
	10.73	12.47	10.72
	61.2	60.2	59.3
# of Blows	16	20	35

PLASTICITY CHART



FLOW CURVE



Performed By: RH | Input Validation:MA | Reviewed By: BS | Date Tested: 9/8/2025

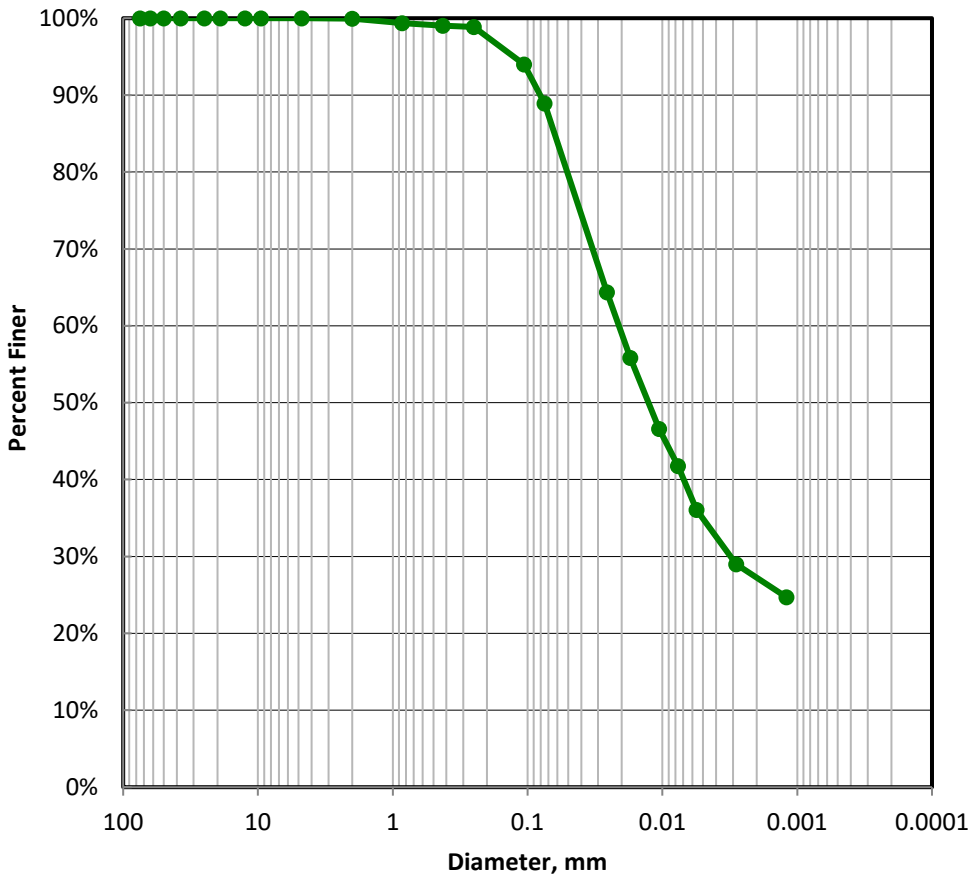
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-6
Client Project	345-817.0004 AEP Kammer Plant	Depth	33.5'-35.0'
Project No.	25-04143	Sample	SS-9
		Lab Sample	25-04143 -33

Sample Color: **DARK GRAY**

USCS Group Name: **FAT CLAY**

USCS Group Symbol: **CH** USDA: **CLAY LOAM** AASHTO: **A-7-6 (34)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	100.0%
No. 20	0.85	99.3%
No. 40	0.425	99.0%
No. 60	0.25	98.9%
No. 140	0.106	94.0%
No. 200	0.075	88.9%
NA	0.0258	64.3%
NA	0.0173	55.8%
NA	0.0106	46.6%
NA	0.0077	41.8%
NA	0.0056	36.1%
NA	0.0028	29.0%
NA	0.0012	24.7%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=54% Clay=34.9%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**11.1**	D30, mm	NA
Coarse=0; Medium=0.9; Fine=10.1		D10, mm	NA
% Fines (-#200)	**88.9**	Cc	NA
% Plus #200 (-3")	**11.1**	Cu	NA

USCS Description

FAT CLAY

USCS Group Symbol	Atterberg Limits Group Symbol		
CH	**CH - FAT CLAY**		
Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.0	0
2	100.0			
		Sand	20.4	20.4
0.05	79.6			
		Silt	52.3	52.4
0.002	27.2			
		Clay	27.2	27.3

USDA Classification

CLAY LOAM

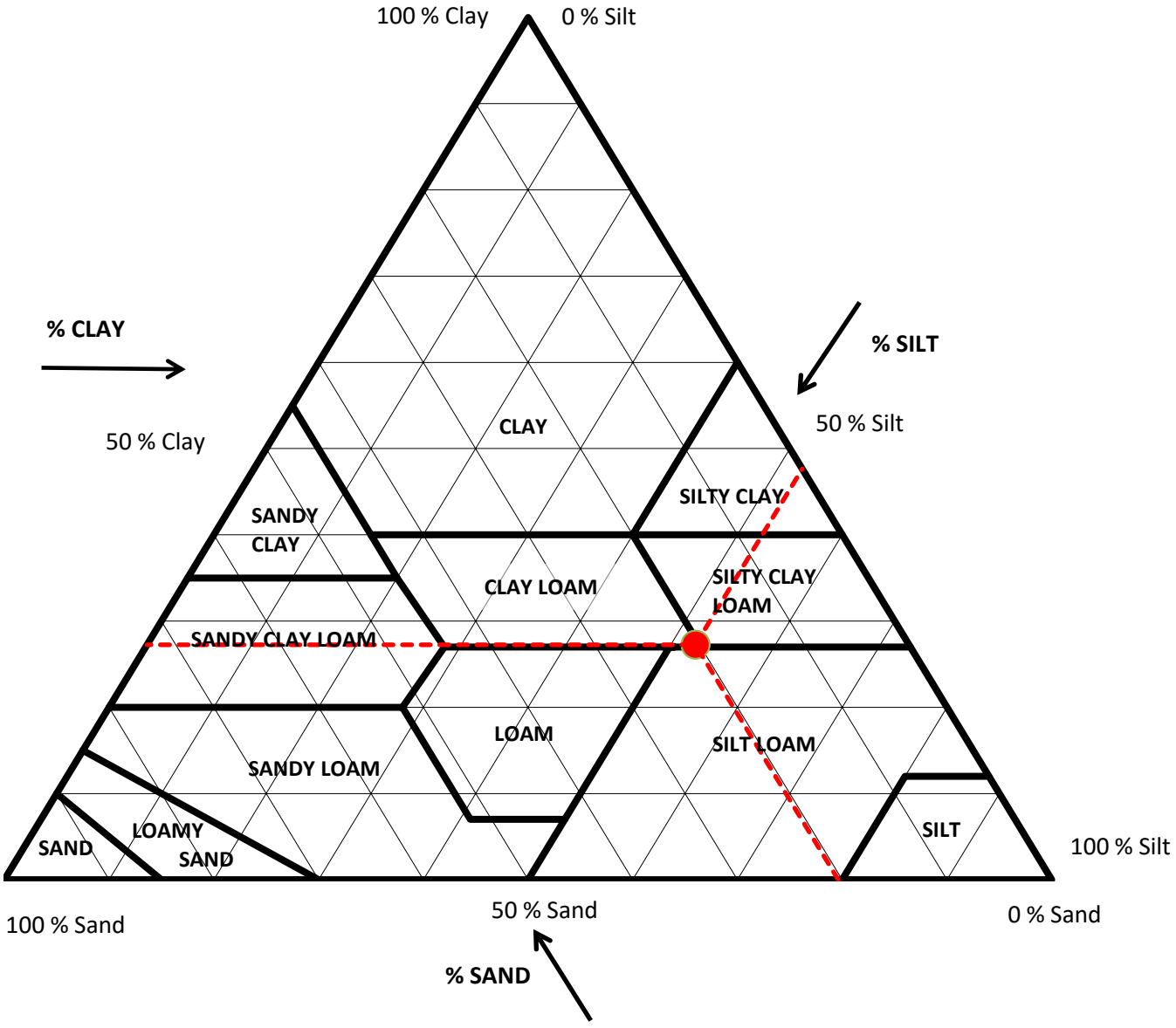
USDA CLASSIFICATION CHART

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-6
Client Project	345-817.0004 AEP Kammer Plant	Depth	33.5'-35.0'
Project No.	25-04143	Sample	SS-9
		Lab Sample	25-04143 -33

Sample Color: **DARK GRAY**
USCS Group Name: **FAT CLAY**
USCS Group Symbol: **CH** USDA: **CLAY LOAM** AASHTO: **A-7-6 (34)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	20.4
Percent Silt, %	52.4
Percent Clay, %	27.3

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.5
Coarse Sand; 1-0.5	0.4
Medium Sand; 0.5-0.25	0.2
Fine Sand; 0.25-0.1	5.7
Very Fine Sand; 0.1-0.05	13.6
Total	**20.4**



PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	**Boring**	AP-7
Client Project	345-817.0004 AEP Kammer Plant	**Depth**	3.0'-5.0'
Project No.	25-04143	**Sample**	ST-1
		Lab Sample	25-04143 -05

Sample Color: STRONG BROWN
USCS Group Name: SANDY LEAN CLAY
USCS Group Symbol: CL USDA: LOAM AASHTO: A-6 (6)

Dry Prep: R58-11(2018) [1]

MECHANICAL SIEVE

Total Sample	
Tare No.	P500
Tare + WS., gm	1849.26
Tare + DS., gm	1777.38
Tare, gm	1376.36
Total sample WC	**17.9%**
Total Sample Dry Wt, gm (-3")	401

Hygroscopic WC (-#10)	
Tare No.	476
Tare + WS., gm	28.98
Tare + DS., gm	28.94
Tare, gm	10.82
Hygroscopic WC	0.22%
-#10 Hydro/Sieve air dry wt.	67.19
Wt. of +#200 Sample, gm	22.50

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0	0.0%	100.0%	
No. 10	2	0.17	0.0%	100.0%	
No. 20	0.85	0.12	0.2%	99.8%	
No. 40	0.425	0.14	0.2%	99.6%	
No. 60	0.25	0.15	0.2%	99.3%	
No. 140	0.106	13.99	20.8%	78.5%	
No. 200	0.075	8.10	12.0%	66.5%	

HYDROMETER (-#10)

Split Air Dry Wt 67.34
Hygroscopic WC 0.22%
Corrected Dry wt 67.2

-#10 Dispersed 1min in Hamilton Beach Mixer

Specific Gravity 2.7 Assumed
a Factor *0.9889*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	33.0	23.8	4.6	28.4	0.0129	41.8	0.0299	41.8%
5	29.0	23.8	4.6	24.4	0.0129	35.9	0.0195	35.9%
15	25.0	23.7	4.6	20.4	0.0129	30.0	0.0116	30.0%
30	23.0	23.6	4.7	18.3	0.0129	26.9	0.0083	26.9%
60	21.0	23.6	4.7	16.3	0.0129	24.0	0.0060	24.0%
250	19.0	23.9	4.6	14.4	0.0129	21.2	0.0029	21.2%
1440	17.0	23.9	4.6	12.4	0.0129	18.2	0.0012	18.2%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4) **0.0** Silt=43.2% Clay=23.3%
Coarse=0; Fine=0 D60, mm NA
% Sand (-#4 & +#200) **33.5** D30, mm NA
Coarse=0; Medium=0.4; Fine=33.1 D10, mm NA
% Fines (-#200) **66.5** Cc NA
% Plus #200 (-3") **33.5** Cu NA

USCS Description
SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	CL - LEAN CLAY

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)
100	100
2	100.0
0.05	55.6
0.002	19.9

Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
Gravel	0.0	0
Sand	44.4	44.4
Silt	35.7	35.7
Clay	19.9	19.9

USDA Classification
LOAM

Performed By: RH Input Validation: MA Reviewed By: BS Date Tested: 9/8/2025

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-7
Client Project	345-817.0004 AEP Kammer Plant	Depth	3.0'-5.0'
Project No.	25-04143	Sample	ST-1
		Lab Sample	25-04143 -05

Soil Description: STRONG BROWN LEAN CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	P500
Wt. Tare & WS, gm	1849.26
Wt. Tare & DS, gm	1777.38
Wt. Tare, gm	1376.36
Water Content, %	17.9

SAMPLE SUMMARY

Liquid Limit (LL), %	**29**
Plastic Limit (PL), %	**17**
Plasticity Index (PI)	**12**
USCS Group Symbol (*-#40 Fraction*)	**CL**
USCS Group Name (*-#40 Fraction*)	**LEAN CLAY**
Sample Color:	**STRONG BROWN**

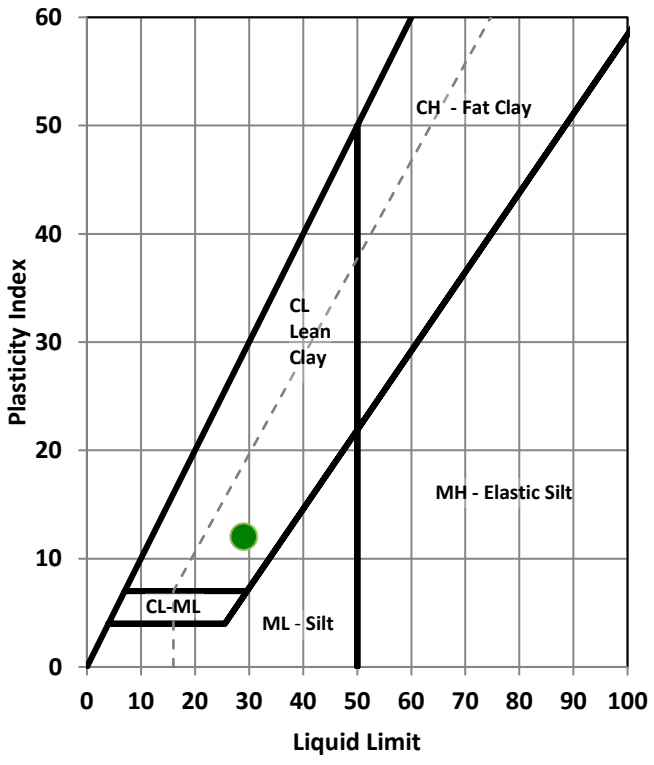
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	346	469	430
Wt. Tare & WS, gm	17.54	16.80	16.79
Wt. Tare & DS, gm	16.65	15.91	15.91
Wt. Tare, gm	11.45	10.72	10.74
Water Content, %	17.1	17.1	17.0

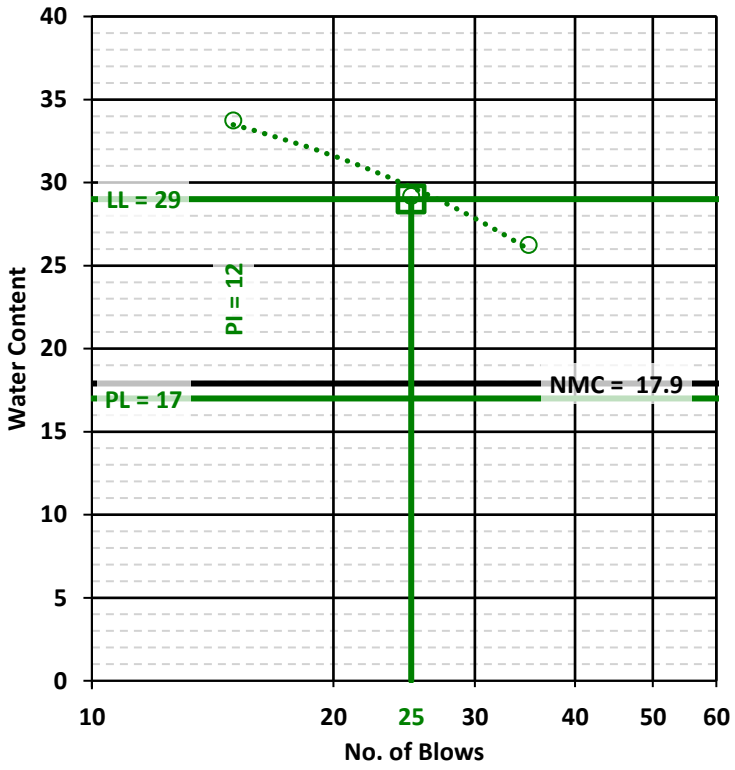
LIQUID LIMIT

	3 Points		
	455	330	707
	16.33	16.64	19.08
	14.97	15.37	17.70
	10.94	11.02	12.44
	33.7	29.2	26.2
# of Blows	15	25	35

PLASTICITY CHART



FLOW CURVE



Performed By: RH | Input Validation:MA | Reviewed By: BS | Date Tested:9/9/25

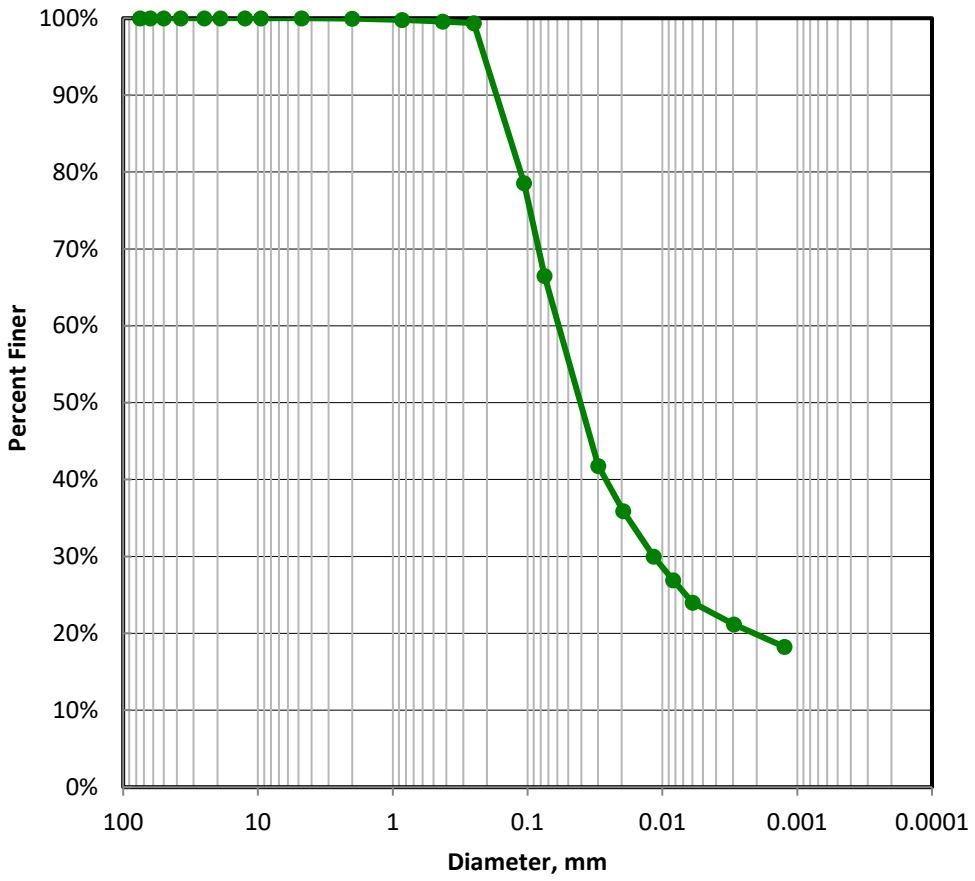
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-7
Client Project	345-817.0004 AEP Kammer Plant	Depth	3.0'-5.0'
Project No.	25-04143	Sample	ST-1
		Lab Sample	25-04143 -05

Sample Color: **STRONG BROWN**

USCS Group Name: **SANDY LEAN CLAY**

USCS Group Symbol: **CL** USDA: **LOAM** AASHTO: **A-6 (6)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	100.0%
No. 20	0.85	99.8%
No. 40	0.425	99.6%
No. 60	0.25	99.3%
No. 140	0.106	78.5%
No. 200	0.075	66.5%
NA	0.0299	41.8%
NA	0.0195	35.9%
NA	0.0116	30.0%
NA	0.0083	26.9%
NA	0.0060	24.0%
NA	0.0029	21.2%
NA	0.0012	18.2%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=43.2% Clay=23.3%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**33.5**	D30, mm	NA
Coarse=0; Medium=0.4; Fine=33.1		D10, mm	NA
% Fines (-#200)	**66.5**	Cc	NA
% Plus #200 (-3")	**33.5**	Cu	NA

USCS Description

SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)
100	100
2	100.0
0.05	55.6
0.002	19.9

Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
Gravel	0.0	0
Sand	44.4	44.4
Silt	35.7	35.7
Clay	19.9	19.9

USDA Classification

LOAM

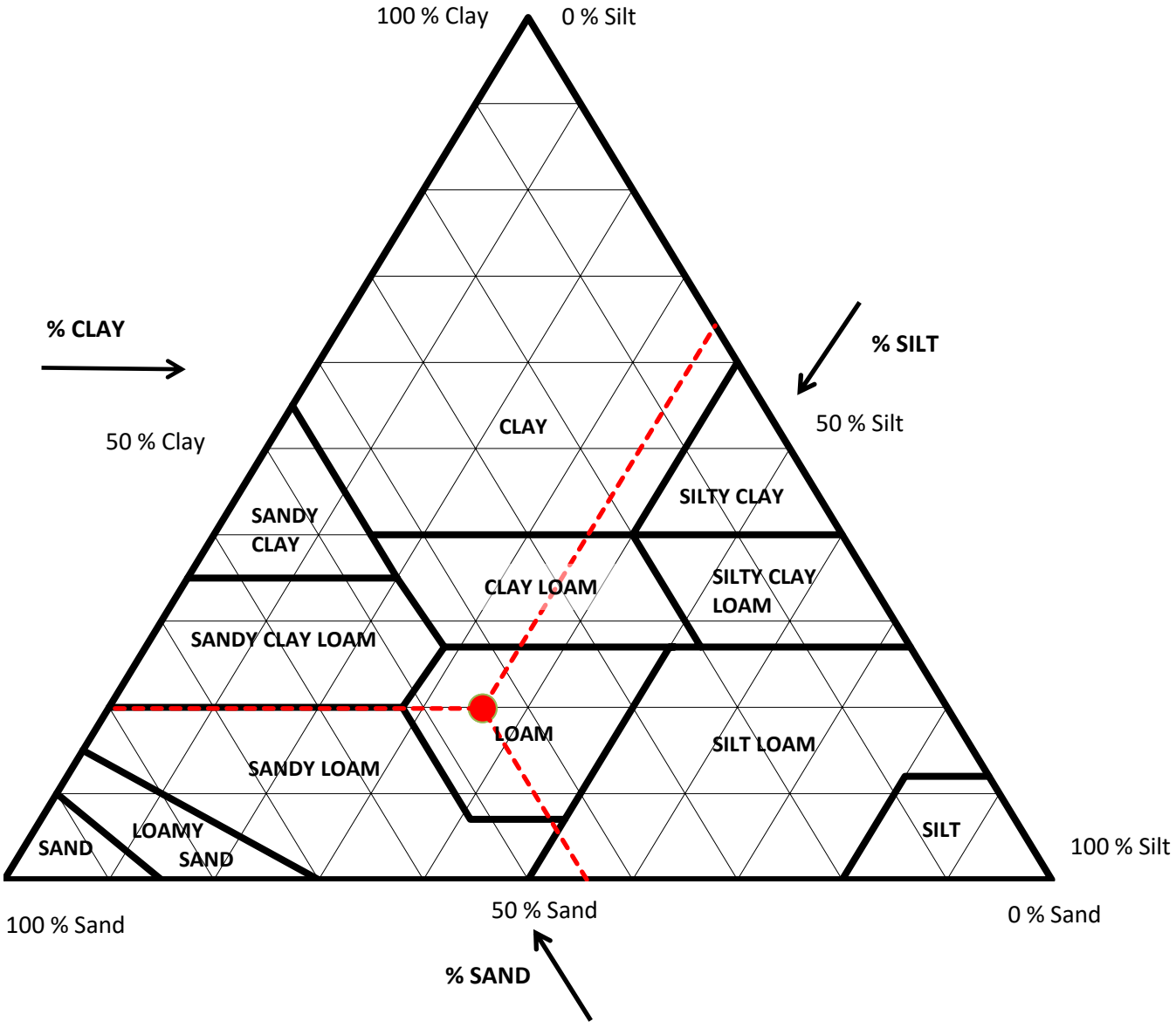
USDA CLASSIFICATION CHART

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-7
Client Project	345-817.0004 AEP Kammer Plant	Depth	3.0'-5.0'
Project No.	25-04143	Sample	ST-1
		Lab Sample	25-04143 -05

Sample Color: **STRONG BROWN**
USCS Group Name: **SANDY LEAN CLAY**
USCS Group Symbol: **CL** USDA: **LOAM** AASHTO: **A-6 (6)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	44.4
Percent Silt, %	35.7
Percent Clay, %	19.9

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.1
Coarse Sand; 1-0.5	0.2
Medium Sand; 0.5-0.25	0.3
Fine Sand; 0.25-0.1	22.9
Very Fine Sand; 0.1-0.05	20.9
Total	**44.4**

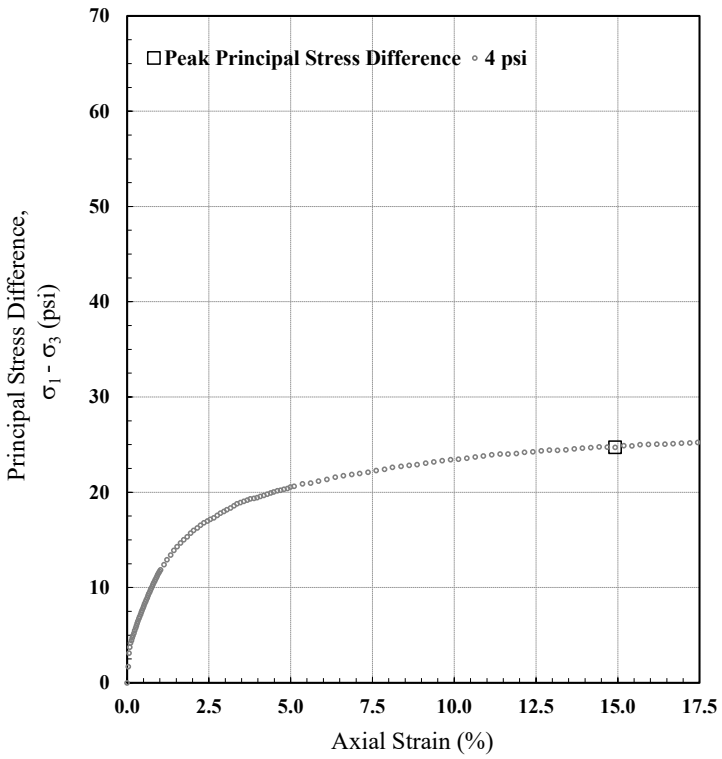


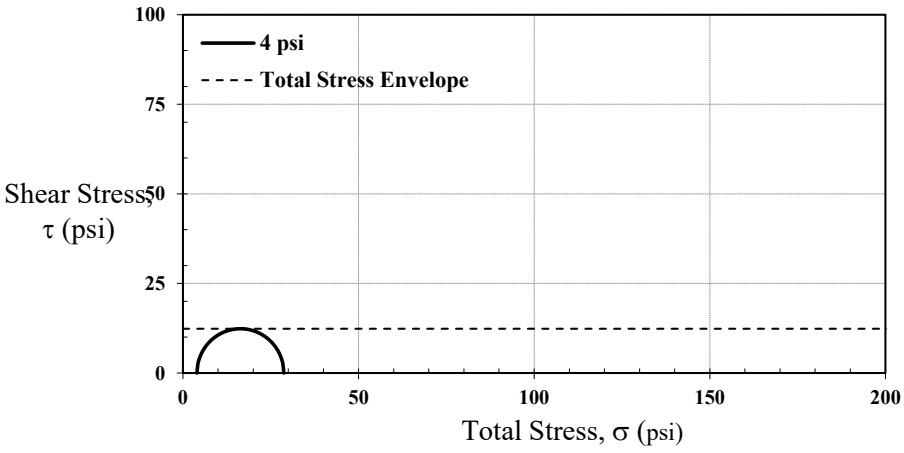
GEOTECHNICAL TESTING SERVICES
A TRI ENVIRONMENTAL COMPANY

Unconsolidated-Undrained (Q) Triaxial Compression

Client: Civil & Environmental Consultants, Inc.
Project: 345-817.0004 AEP Kammer
Sample: AP-7 (3.0' - 5.0'); ST-1

TRI Log #: 25-04143.5
Test Method: ASTM D2850





Test Parameters	
Minor Principal Stress (psi)	4.0
Rate of Strain (%/hr)	60

Initial Properties	
Avg. Diameter (in)	2.78
Avg. Height (in)	6.09
Avg. Water Content (%)	17.4
Bulk Density (pcf)	130.2
Dry Density (pcf)	110.9
Saturation (%)	87.2
Void Ratio	0.55
Specific Gravity (Assumed)	2.75

At Failure - Maximum Deviator Stress	
Axial Strain at Failure (%)	14.9
Minor Total Stress (psi)	4.0
Major Total Stress (psi)	28.7
Principal Stress Diff. (psi)	24.7

Total Stress Envelope	
Friction Angle (deg)	0
Undrained Shear Strength, S_u (psi)	12.4
S_u / σ_3	3.1

Note: The calculated value of specimen saturation was less than 95%. The Mohr failure envelope was taken as a horizontal straight line, but noting that the calculated value of saturation indicates a partially saturated specimen.

Jeffrey A. Kuhn , Ph.D., P.E., 9/9/2025
Analysis & Quality Review/Date

GEOTECHNICAL TESTING SERVICES, INC., A TRI ENVIRONMENTAL COMPANY; 1-800-853-7309
103 Coraopolis Road, Coraopolis, PA, 15108

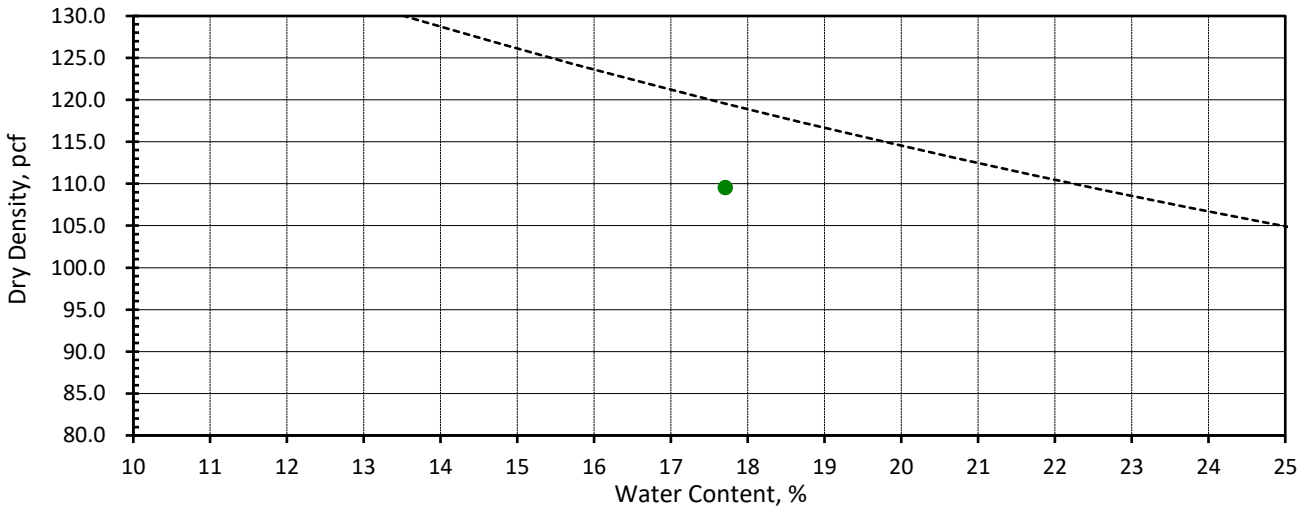
LABORATORY COMPACTION CHARACTERISTICS OF SOIL

Client	Civil & Environmental Consultants, Inc.	Boring	AP-7
Client Project	345-817.0004 AEP Kammer Plant	Depth	3.0' - 5.0'
Project No.	25-04143	Sample	ST-1
		Lab Sample No.	25-04143-05

Visual Description: STRONG BROWN SANDY LEAN CLAY

WET DENSITY						TEST PARAMETERS	
Mold ID	G					Test Method	ASTM D1557
Compaction Point #	1					Compaction Energy	Modified
Wt. Mold & WS, gm.	6297.8					Test Procedure	B
Wt. Mold, gm.	4357					Mold Diameter, in	4
Wt. WS, gm.	1941					Compacted Layers	5
Mold Volume, cc	939					Blows Per Layer	25
Wet Density, gm./cc	2.07					Rammer Weight / Fall	10 lbs / 18 in.
Wet Density, pcf	129.0					Size of Material Used	-3/8" Sieve
						Use: <5% Retained on 3/8"	
WATER CONTENT						**OVERSIZE PARTICLE CORRECTION**	
						No Corrections Needed	
Tare Number	803						
Wt. Tare & WS, gm.	228.9						
Wt. Tare & DS, gm.	209.78					Percent of Oversize Rock (+3/8" Sieve) = <5%	
Wt. Tare, gm.	101.8					(Based on As-received Screening & Soaking)	
Water Content, %	17.7						
						W.C. of Finer Material, % (-3/8" Sieve) = NA	
DRY DENSITY vs. WATER CONTENT						**SAMPLE SUMMARY**	
LABORATORY TEST VALUES							
Water Content, %	17.7					***Lab 1 Pt Water Content, %***	***17.7***
Dry Density, pcf	109.6					***Lab 1 pt Dry Density, pcf***	***109.6***

Note: Maximum Density and Optimum Water Content reported from estimated best fit smooth curve!



Note: Compacted using manual hammer.

Input Validation: JSJ Reviewed By: BLS Date Tested: 09/02/25

PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	**Boring**	AP-7
Client Project	345-817.0004 AEP Kammer Plant	**Depth**	8.0'-10.0'
Project No.	25-04143	**Sample**	ST-2
		Lab Sample	25-04143 -06

Sample Color: BROWN
USCS Group Name: CLAYEY SAND
USCS Group Symbol: SC USDA: SANDY LOAM AASHTO: A-6 (4)

Dry Prep: R58-11(2018) [1]

MECHANICAL SIEVE

Total Sample	
Tare No.	824
Tare + WS., gm	629.66
Tare + DS., gm	549.31
Tare, gm	179.56
Total sample WC	**21.7%**
Total Sample Dry Wt, gm (-3")	370

Hygroscopic WC (-#10)	
Tare No.	257
Tare + WS., gm	46.92
Tare + DS., gm	46.64
Tare, gm	16.30
Hygroscopic WC	0.92%
-#10 Hydro/Sieve air dry wt.	57.59
Wt. of +#200 Sample, gm	30.03

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0	0.0%	100.0%	
No. 10	2	0.04	0.0%	100.0%	
No. 20	0.85	0.00	0.0%	100.0%	
No. 40	0.425	1.32	2.3%	97.7%	
No. 60	0.25	1.74	3.0%	94.7%	
No. 140	0.106	21.02	36.5%	58.2%	
No. 200	0.075	5.95	10.3%	47.8%	

HYDROMETER (-#10)

Split Air Dry Wt 58.12
Hygroscopic WC 0.92%
Corrected Dry wt 57.6

-#10 Dispersed 1min in Hamilton Beach Mixer

Specific Gravity 2.7 Assumed
a Factor *0.9889*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	29.0	23.5	4.7	24.3	0.0129	41.7	0.0309	41.7%
5	27.0	23.5	4.7	22.3	0.0129	38.3	0.0198	38.3%
15	24.0	23.5	4.7	19.3	0.0129	33.1	0.0117	33.1%
30	22.5	23.6	4.7	17.8	0.0129	30.6	0.0083	30.6%
60	20.0	23.7	4.6	15.4	0.0129	26.4	0.0060	26.4%
250	17.0	23.8	4.6	12.4	0.0129	21.3	0.0030	21.3%
1440	15.0	23.8	4.6	10.4	0.0129	17.9	0.0013	17.9%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=22.7% Clay=25.1%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**52.2**	D30, mm	NA
Coarse=0; Medium=2.3; Fine=49.8		D10, mm	NA
% Fines (-#200)	**47.8**	Cc	NA
% Plus #200 (-3")	**52.2**	Cu	NA

USCS Description
CLAYEY SAND

USCS Group Symbol	Atterberg Limits Group Symbol
SC	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)
100	100
2	100.0
0.05	45.0
0.002	19.7

Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
Gravel	0.0	0
Sand	54.9	54.9
Silt	25.3	25.3
Clay	19.7	19.7

USDA Classification
SANDY LOAM

Performed By: RH Input Validation: MA Reviewed By: BS Date Tested: 9/8/2025

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-7
Client Project	345-817.0004 AEP Kammer Plant	Depth	8.0'-10.0'
Project No.	25-04143	Sample	ST-2
		Lab Sample	25-04143 -06

Soil Description: BROWN LEAN CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	824
Wt. Tare & WS, gm	629.66
Wt. Tare & DS, gm	549.31
Wt. Tare, gm	179.56
Water Content, %	21.7

SAMPLE SUMMARY

Liquid Limit (LL), %	**31**
Plastic Limit (PL), %	**16**
Plasticity Index (PI)	**15**
USCS Group Symbol (*-#40 Fraction*)	**CL**
USCS Group Name (*-#40 Fraction*)	**LEAN CLAY**
Sample Color:	**BROWN**

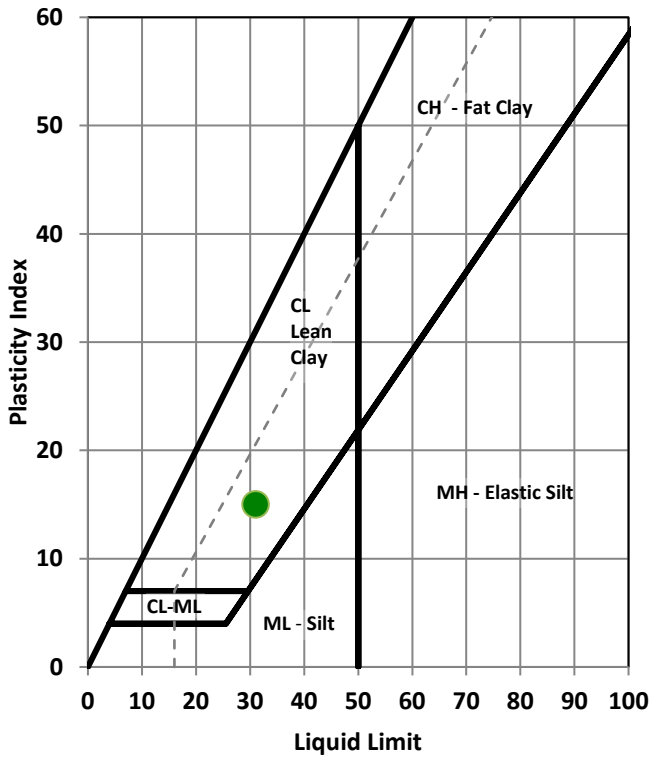
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	711	510	308
Wt. Tare & WS, gm	17.70	16.89	17.48
Wt. Tare & DS, gm	16.85	16.02	16.60
Wt. Tare, gm	11.28	10.79	11.32
Water Content, %	15.3	16.6	16.7

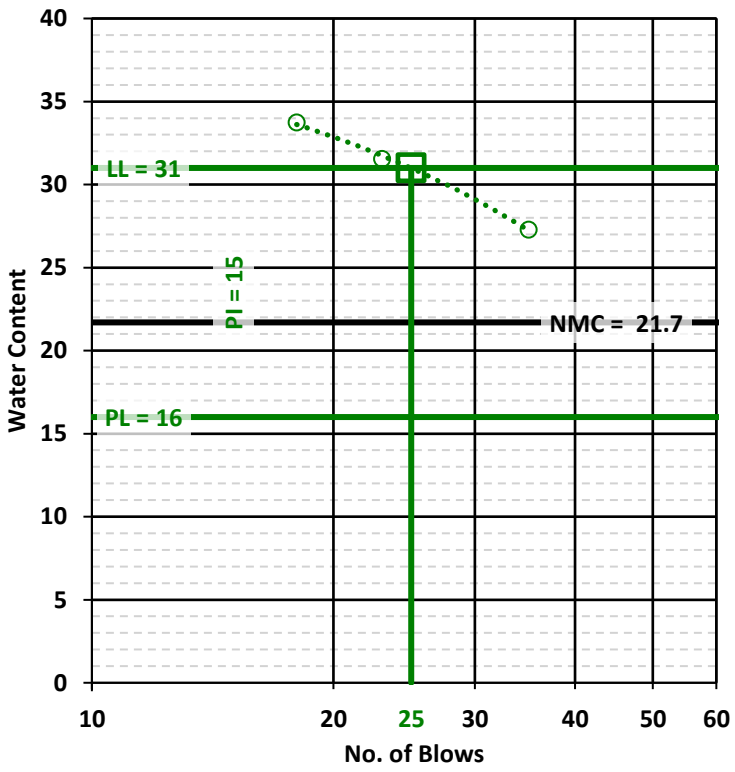
LIQUID LIMIT

	3 Points		
	496	323	1113
	18.32	20.25	16.97
	16.42	18.07	15.78
	10.79	11.16	11.42
	33.7	31.5	27.3
# of Blows	18	23	35

PLASTICITY CHART



FLOW CURVE



Performed By: RH | Input Validation:MA | Reviewed By: BS | Date Tested:9/5/25

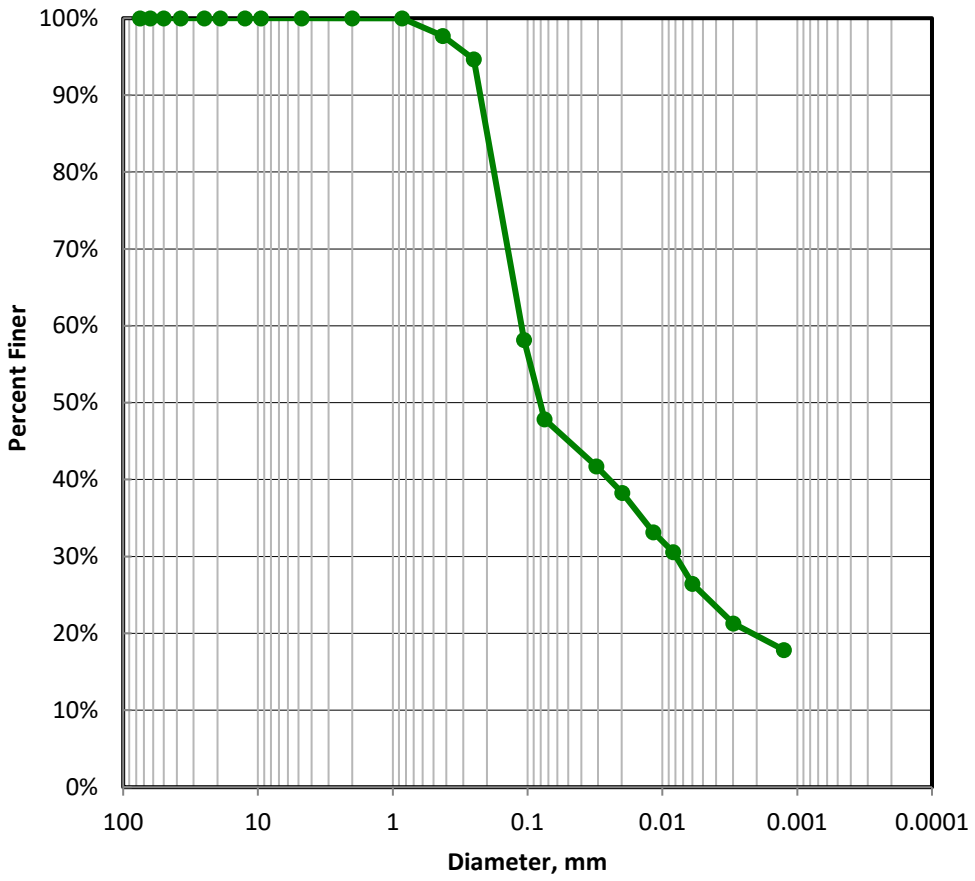
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-7
Client Project	345-817.0004 AEP Kammer Plant	Depth	8.0'-10.0'
Project No.	25-04143	Sample	ST-2
		Lab Sample	25-04143 -06

Sample Color: **BROWN**

USCS Group Name: **CLAYEY SAND**

USCS Group Symbol: **SC** USDA: **SANDY LOAM** AASHTO: **A-6 (4)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	100.0%
No. 20	0.85	100.0%
No. 40	0.425	97.7%
No. 60	0.25	94.7%
No. 140	0.106	58.2%
No. 200	0.075	47.8%
NA	0.0309	41.7%
NA	0.0198	38.3%
NA	0.0117	33.1%
NA	0.0083	30.6%
NA	0.0060	26.4%
NA	0.0030	21.3%
NA	0.0013	17.9%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=22.7% Clay=25.1%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**52.2**	D30, mm	NA
Coarse=0; Medium=2.3; Fine=49.8		D10, mm	NA
% Fines (-#200)	**47.8**	Cc	NA
% Plus #200 (-3")	**52.2**	Cu	NA

USCS Description

CLAYEY SAND

USCS Group Symbol	Atterberg Limits Group Symbol
SC	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.0	0
2	100.0			
		Sand	54.9	54.9
0.05	45.0			
		Silt	25.3	25.3
0.002	19.7			
		Clay	19.7	19.7

USDA Classification

SANDY LOAM

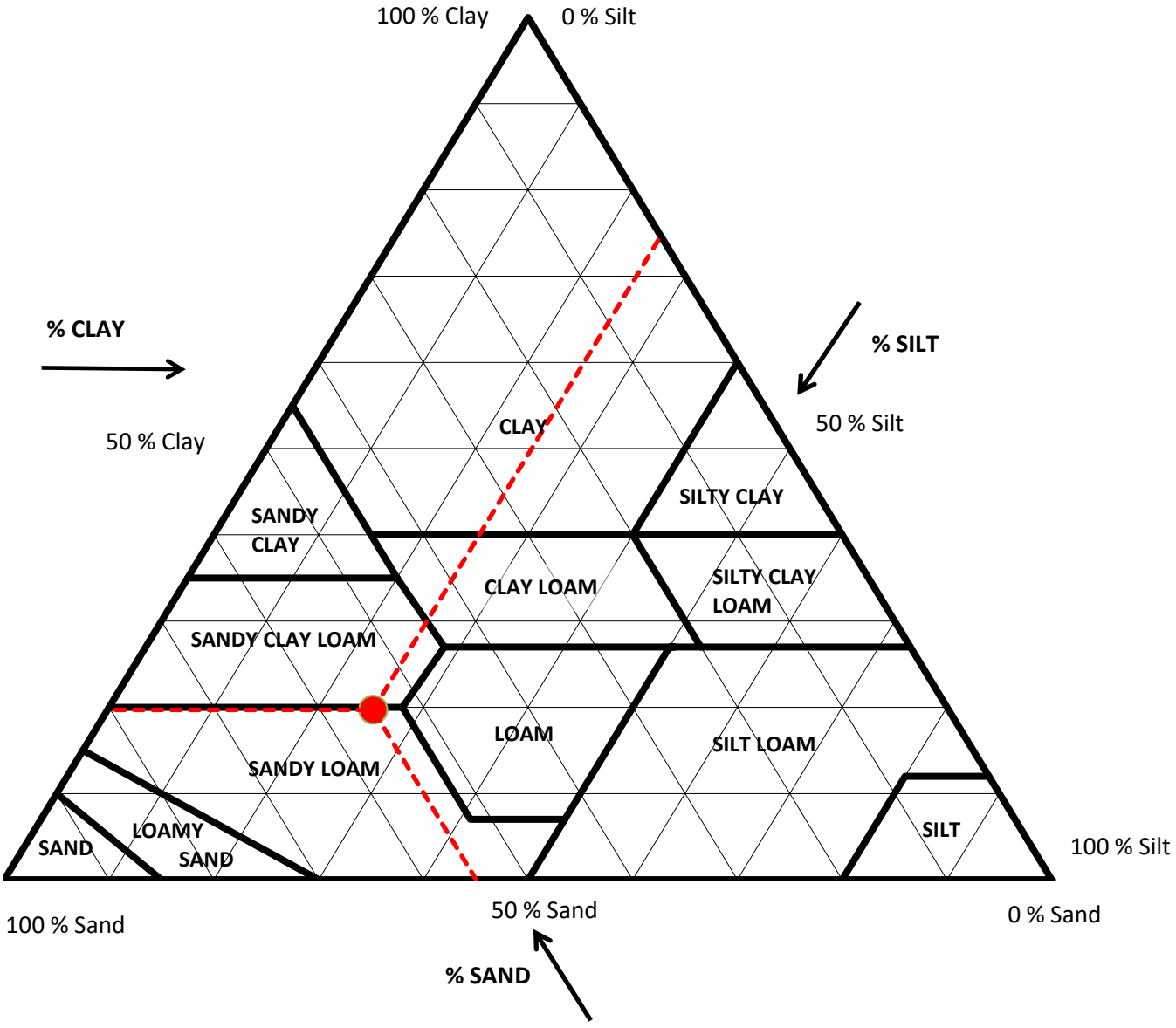
USDA CLASSIFICATION CHART

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-7
Client Project	345-817.0004 AEP Kammer Plant	Depth	8.0'-10.0'
Project No.	25-04143	Sample	ST-2
		Lab Sample	25-04143 -06

Sample Color: **BROWN**
USCS Group Name: **CLAYEY SAND**
USCS Group Symbol: **SC** USDA: **SANDY LOAM** AASHTO: **A-6 (4)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	54.9
Percent Silt, %	25.3
Percent Clay, %	19.7

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.0
Coarse Sand; 1-0.5	1.8
Medium Sand; 0.5-0.25	3.6
Fine Sand; 0.25-0.1	38.2
Very Fine Sand; 0.1-0.05	11.4
Total	**54.9**



GEOTECHNICAL TESTING SERVICES
A TRI ENVIRONMENTAL COMPANY

Consolidated-Undrained Triaxial Compression

Client: Civil & Environmental Consultants, Inc.
Project: 345-817.0004 AEP Krammer Plant
Sample: AP-7 (8.0' - 10.0') ST-2

TRI Log #: 25-04143.6
Test Method: ASTM D4767

Specimens				
Identification	1	2	3	4
Depth/Elev. (ft)	-	-	-	-
Eff. Consol. Stress (psi)	5.0	20.0	40.0	-
Initial Specimen Properties				
Avg. Diameter (in)	2.81	2.82	2.83	-
Avg. Height (in)	5.99	6.02	5.88	-
Avg. Water Content (%)	23.1	22.6	22.6	-
Bulk Density (pcf)	125.1	124.5	126.5	-
Dry Density (pcf)	101.6	101.5	103.2	-
Specific Gravity (Assumed)	2.75			
Saturation (%)	92.2	90.2	93.9	-
Void Ratio, n	0.69	0.69	0.66	-
B-Value, End of Saturation	0.92	0.91	0.91	-

Test Setup	
Specimen Condition	Undisturbed / Intact
Specimen Preparation	Trimmed
Mounting Method	Wet
Consolidation	Isotropic

Post-Consolidation / Pre-Shear				
Void Ratio	0.69	0.67	0.62	-

Shear / Post-Shear				
Rate of Strain (%/hr)	1.00	1.00	1.00	-
Avg. Water Content (%)	23.6	22.0	20.9	-

At Failure								
Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1'-\sigma_3')_{max}$				Ratio, $(\sigma_1'/\sigma_3')_{max}$			
Axial Strain at Failure (%), $\varepsilon_{a,f}$	15.0	15.0	15.0	-	4.7	9.9	10.5	-
Minor Effective Stress (psi), $\sigma_3'_f$	4.7	5.7	11.9	-	3.1	5.1	11.2	-
Principal Stress Difference (psi), $(\sigma_1-\sigma_3)_f$	11.7	16.0	30.0	-	9.4	14.9	28.8	-
Pore Water Pressure, Δu_f (psi)	-0.3	14.4	28.1	-	1.3	14.9	28.8	-
Major Effective Stress (psi), $\sigma_1'_f$	16.4	21.7	41.9	-	12.5	20.0	39.9	-
Secant Friction Angle (degrees)	33.8	35.8	33.9	-	37.0	36.3	34.3	-
Effective Friction Angle (degrees)	33.2				32.9			
Effective Cohesion (psi)	0.3				0.6			

Note: The presented M-C parameters are based on a linear regression in modified stress space, across all assigned effective consolidation stresses. This fit does not purported to capture typical curvature of envelopes that may, in particular, be observed across broader range in effective stresses. Please note that the stresses associated with peak principal stress ratio and peak principal stress difference are presented in tabular form on the first page of the report. There are alternate interpretations to theses two failure criterion including but not limited to strain compatibility and post-peak.

Jeffrey A. Kuhn , Ph.D., P.E., 09/02/2025
Analysis & Quality Review/Date

GEOTECHNICAL TESTING SERVICES, INC., A TRI ENVIRONMENTAL COMPANY; 1-800-853-7309
103 Coraopolis Road, Coraopolis, PA, 15108

GEOTECHNICAL TESTING SERVICES
A TRI ENVIRONMENTAL COMPANY

Consolidated-Undrained Triaxial Compression

Client: Civil & Environmental Consultants, Inc.
Project: 345-817.0004 AEP Krammer Plant
Sample: AP-7 (8.0' - 10.0') ST-2

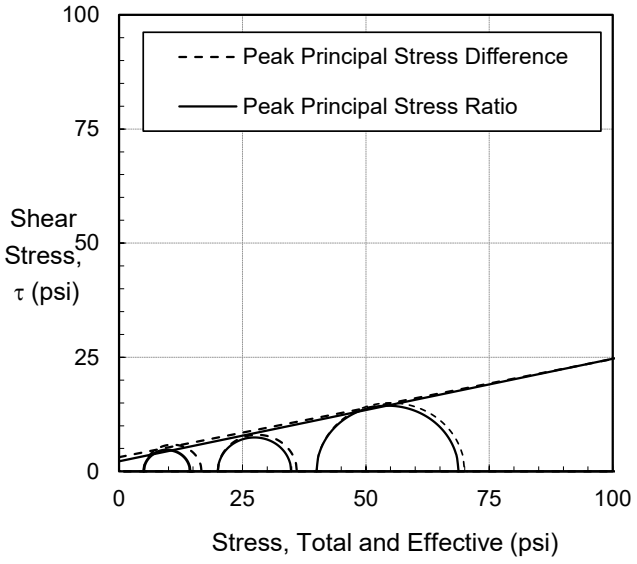
TRI Log #: 25-04143.6
Test Method: ASTM D4767

R / "Total Stress" Envelope			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Friction Angle (deg)	ϕ_R	12.1	12.7
Cohesion (psi)	c_R	3.1	2.2

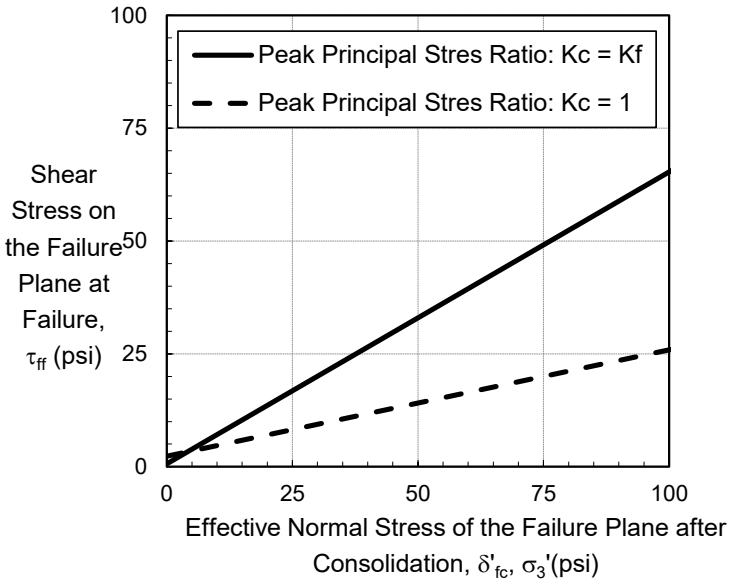
Kc = Kf Envelope, Effective Stress Envelope (Duncan et al. 1990)			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	ϕ'	33.2	32.9
Effective Cohesion (psi)	c'	0.3	0.6

Kc = 1 (τ_{ff} vs σ'_{fc}) Envelope, Total Stress Envelope (Duncan et al. 1990)			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Friction Angle (deg)	$d_{Kc=1}$	12.6	13.3
Cohesion (psi)	$\psi_{Kc=1}$	3.2	2.3

R / "Total Stress" Envelope



Three-Stage Rapid Drawdown



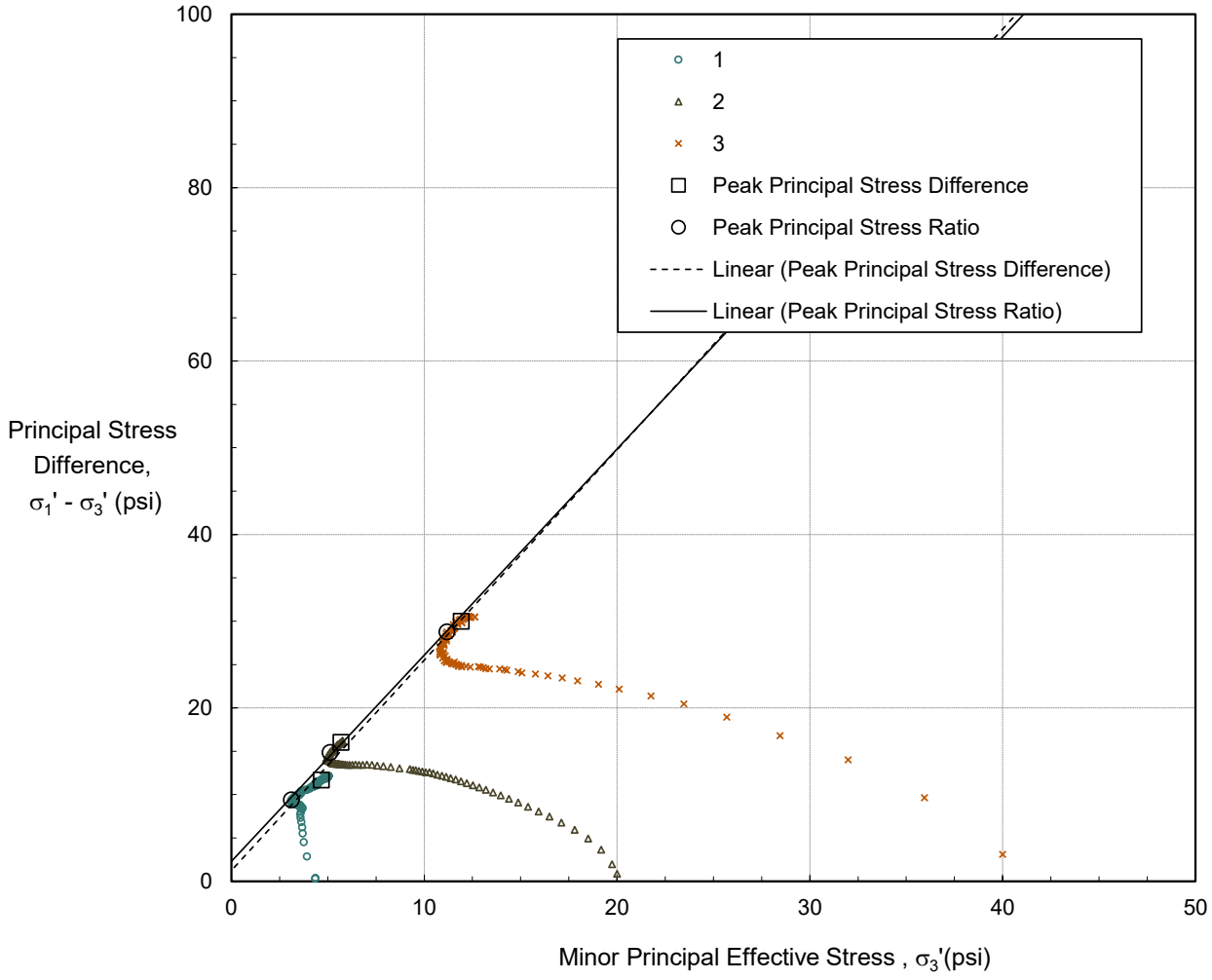
GEOTECHNICAL TESTING SERVICES
A TRI ENVIRONMENTAL COMPANY

Consolidated-Undrained Triaxial Compression

Client: Civil & Environmental Consultants, Inc.
Project: 345-817.0004 AEP Krammer Plant
Sample: AP-7 (8.0' - 10.0') ST-2

TRI Log #: 25-04143.6
Test Method: ASTM D4767

Modified Mohr-Coulomb



Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	33.2	32.9
Effective Cohesion (psi)	0.3	0.6

GEOTECHNICAL TESTING SERVICES, INC., A TRI ENVIRONMENTAL COMPANY; 1-800-853-7309
103 Coraopolis Road, Coraopolis, PA, 15108

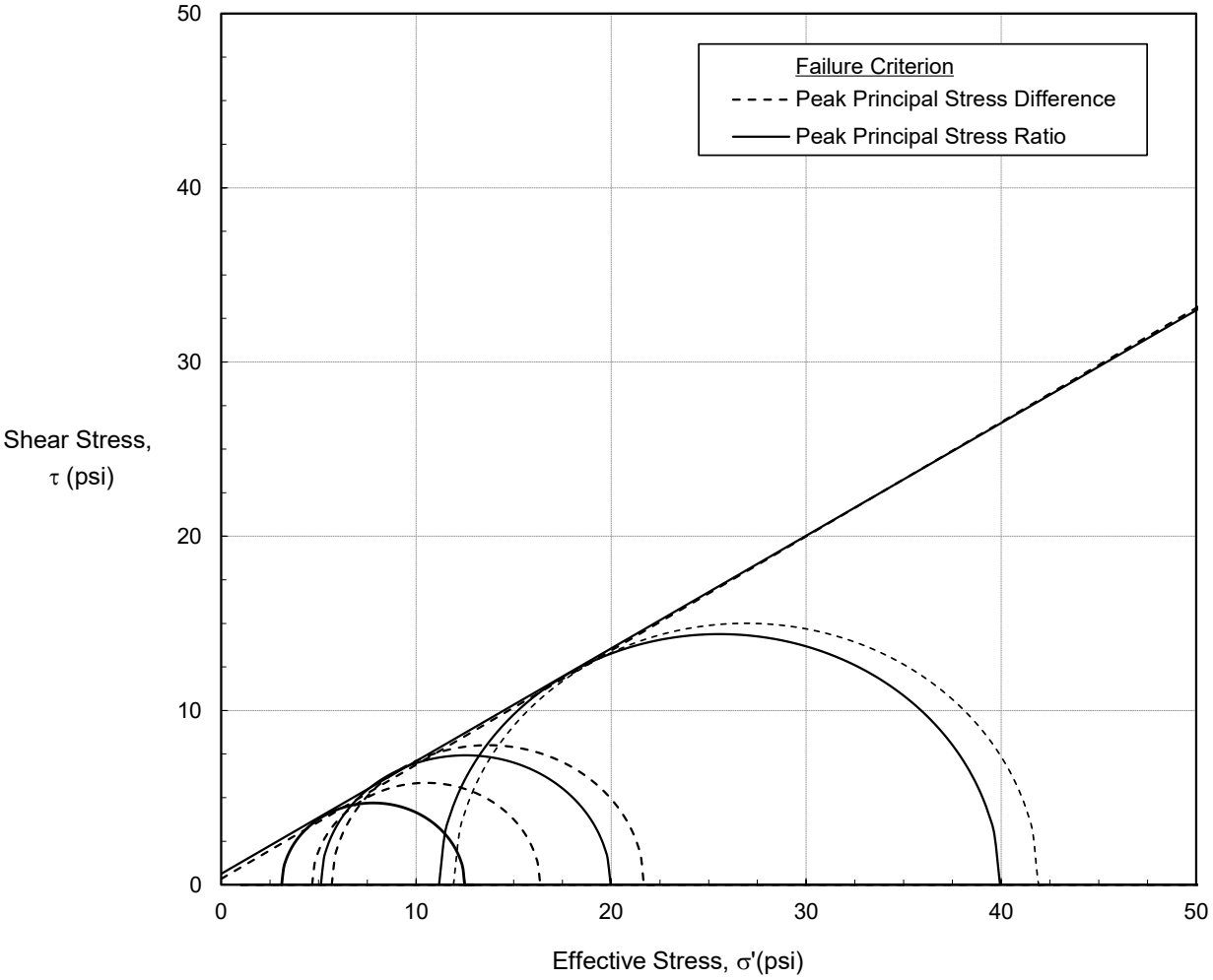
GEOTECHNICAL TESTING SERVICES
A TRI ENVIRONMENTAL COMPANY

Consolidated-Undrained Triaxial Compression

Client: Civil & Environmental Consultants, Inc.
Project: 345-817.0004 AEP Krammer Plant
Sample: AP-7 (8.0' - 10.0') ST-2

TRI Log #: 25-04143.6
Test Method: ASTM D4767

Mohr-Coulomb



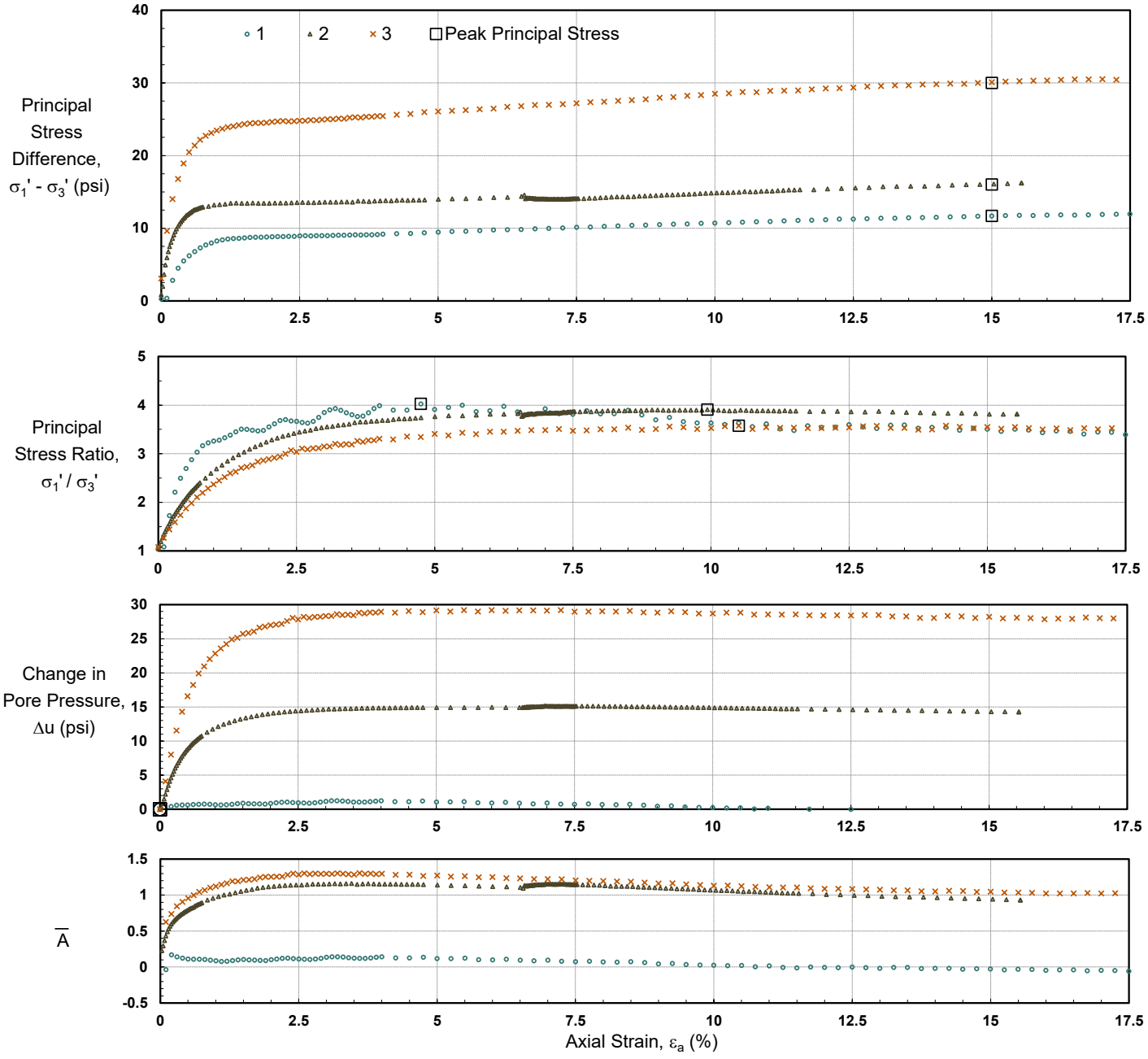
Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	33.2	32.9
Effective Cohesion (psi)	0.3	0.6

GEOTECHNICAL TESTING SERVICES, INC., A TRI ENVIRONMENTAL COMPANY; 1-800-853-7309
103 Coraopolis Road, Coraopolis, PA, 15108

Consolidated-Undrained Triaxial Compression

Client: Civil & Environmental Consultants, Inc.
Project: 345-817.0004 AEP Krammer Plant
Sample: AP-7 (8.0' - 10.0') ST-2

TRI Log #: 25-04143.6
Test Method: ASTM D4767

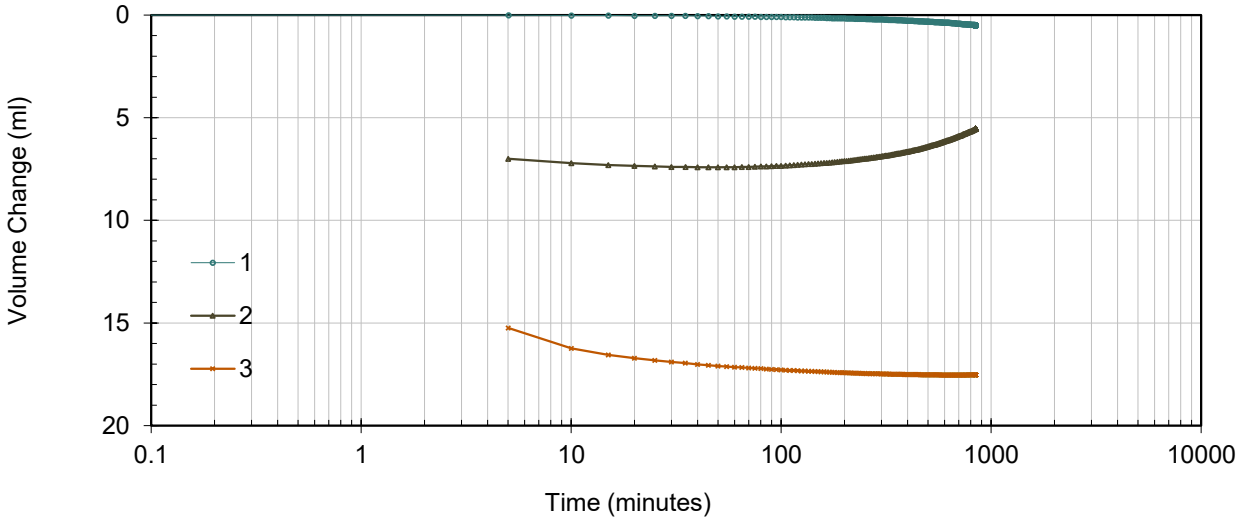


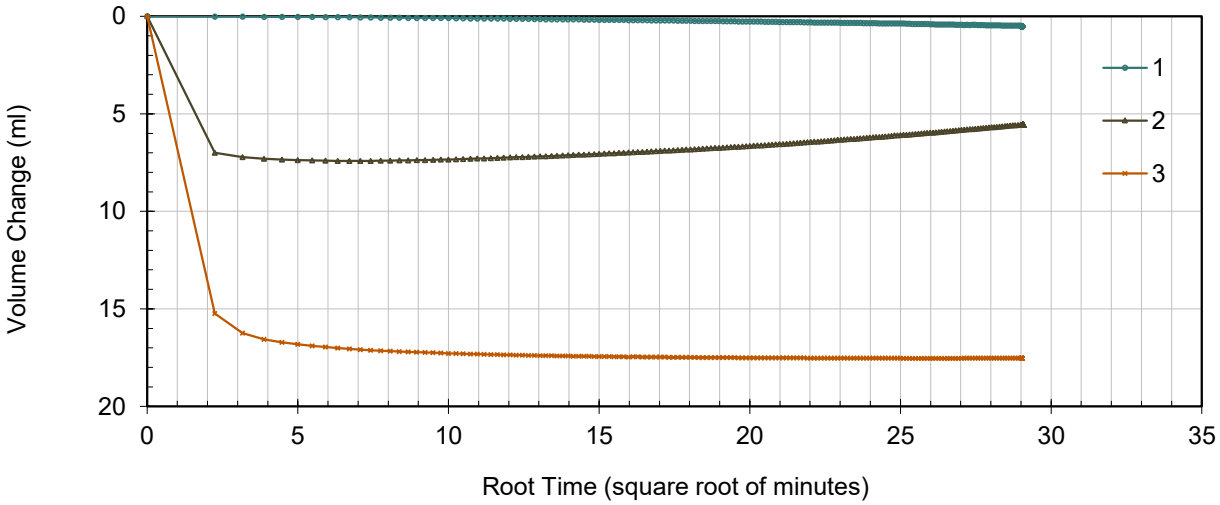
Consolidated-Undrained Triaxial Compression

Client: Civil & Environmental Consultants, Inc.
Project: 345-817.0004 AEP Krammer Plant
Sample: AP-7 (8.0' - 10.0') ST-2

TRI Log #: 25-04143.6
Test Method: ASTM D4767

Consolidation





GEOTECHNICAL TESTING SERVICES, INC., A TRI ENVIRONMENTAL COMPANY; 1-800-853-7309
103 Coraopolis Road, Coraopolis, PA, 15108

PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	**Boring**	AP-7
Client Project	345-817.0004 AEP Kammer Plant	**Depth**	11.0'-13.0'
Project No.	25-04143	**Sample**	ST-3
		Lab Sample	25-04143 -07

Sample Color: BROWN
USCS Group Name: SANDY LEAN CLAY
USCS Group Symbol: CL USDA: LOAM AASHTO: A-6 (7)

Dry Prep: R58-11(2018) [1]

MECHANICAL SIEVE

Total Sample	
Tare No.	908
Tare + WS., gm	715.56
Tare + DS., gm	622.03
Tare, gm	186.44
Total sample WC	**21.5%**
Total Sample Dry Wt, gm (-3")	436

Hygroscopic WC (-#10)	
Tare No.	402
Tare + WS., gm	32.89
Tare + DS., gm	32.65
Tare, gm	10.61
Hygroscopic WC	1.09%
-#10 Hydro/Sieve air dry wt.	69.66
Wt. of +#200 Sample, gm	30.16

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0	0.0%	100.0%	
No. 10	2	0	0.0%	100.0%	
No. 20	0.85	0.01	0.0%	100.0%	
No. 40	0.425	0.04	0.1%	99.9%	
No. 60	0.25	0.12	0.2%	99.8%	
No. 140	0.106	20.45	29.4%	70.4%	
No. 200	0.075	9.54	13.7%	56.7%	

HYDROMETER (-#10)

Split Air Dry Wt 70.42
Hygroscopic WC 1.09%
Corrected Dry wt 69.7

-#10 Dispersed 1min in Hamilton Beach Mixer

Specific Gravity 2.7 Assumed
a Factor *0.9889*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	32.0	23.4	4.7	27.3	0.0129	38.8	0.0303	38.8%
5	31.0	22.4	5.0	26.0	0.0131	36.9	0.0195	36.9%
15	27.0	23.4	4.7	22.3	0.0129	31.7	0.0115	31.7%
30	24.0	23.4	4.7	19.3	0.0129	27.4	0.0083	27.4%
60	22.5	23.6	4.7	17.8	0.0129	25.3	0.0059	25.3%
250	20.5	23.8	4.6	15.9	0.0129	22.6	0.0029	22.6%
1440	17.0	23.8	4.6	12.4	0.0129	17.6	0.0012	17.6%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4) **0.0** Silt=32.1% Clay=24.6%
Coarse=0; Fine=0 D60, mm NA
% Sand (-#4 & +#200) **43.3** D30, mm NA
Coarse=0; Medium=0.1; Fine=43.2 D10, mm NA
% Fines (-#200) **56.7** Cc NA
% Plus #200 (-3") **43.3** Cu NA

USCS Description
SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	CL - LEAN CLAY

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.0	0
2	100.0			
		Sand	51.3	51.3
0.05	48.7			
		Silt	28.3	28.3
0.002	20.4			
		Clay	20.4	20.4

USDA Classification
LOAM

Performed By: RH Input Validation: MA Reviewed By: BS Date Tested: 9/8/2025

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-7
Client Project	345-817.0004 AEP Kammer Plant	Depth	11.0'-13.0'
Project No.	25-04143	Sample	ST-3
		Lab Sample	25-04143 -07

Soil Description: BROWN LEAN CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	908
Wt. Tare & WS, gm	715.56
Wt. Tare & DS, gm	622.03
Wt. Tare, gm	186.44
Water Content, %	21.5

SAMPLE SUMMARY

Liquid Limit (LL), %	**33**
Plastic Limit (PL), %	**15**
Plasticity Index (PI)	**18**
USCS Group Symbol (*-#40 Fraction*)	**CL**
USCS Group Name (*-#40 Fraction*)	**LEAN CLAY**
Sample Color:	**BROWN**

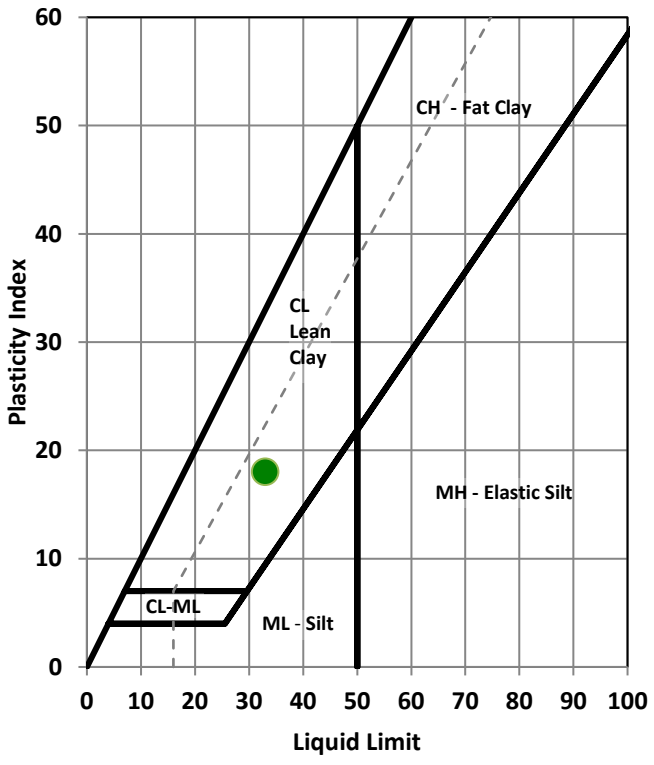
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	434	449	314
Wt. Tare & WS, gm	16.88	16.87	17.59
Wt. Tare & DS, gm	16.05	16.03	16.82
Wt. Tare, gm	10.76	10.73	11.35
Water Content, %	15.7	15.8	14.1

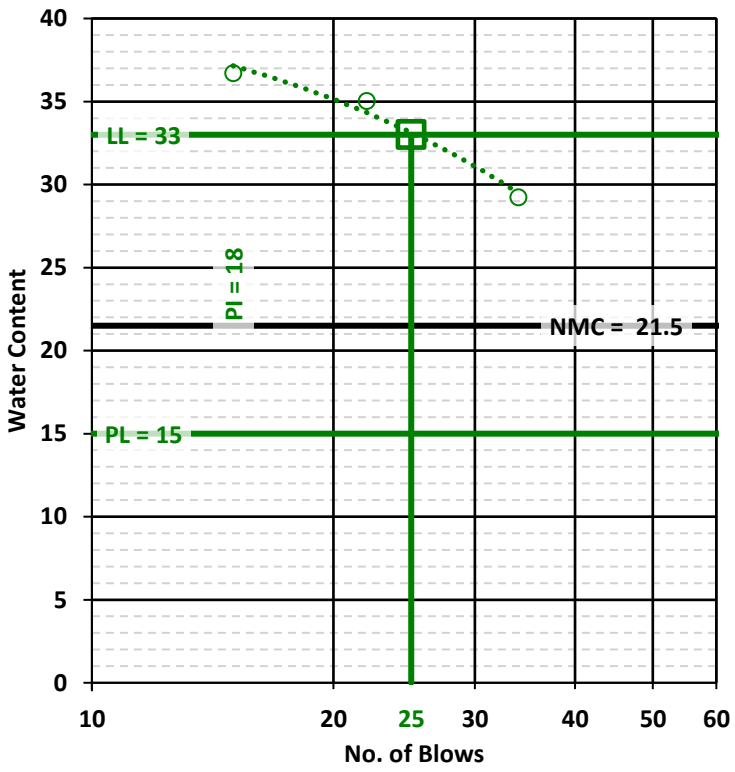
LIQUID LIMIT

	3 Points		
	337	316	420
	17.45	18.41	16.91
	15.78	16.56	15.51
	11.23	11.28	10.72
	36.7	35.0	29.2
# of Blows	15	22	34

PLASTICITY CHART



FLOW CURVE



Performed By: RH | Input Validation:MA | Reviewed By: BS | Date Tested:9/5/25

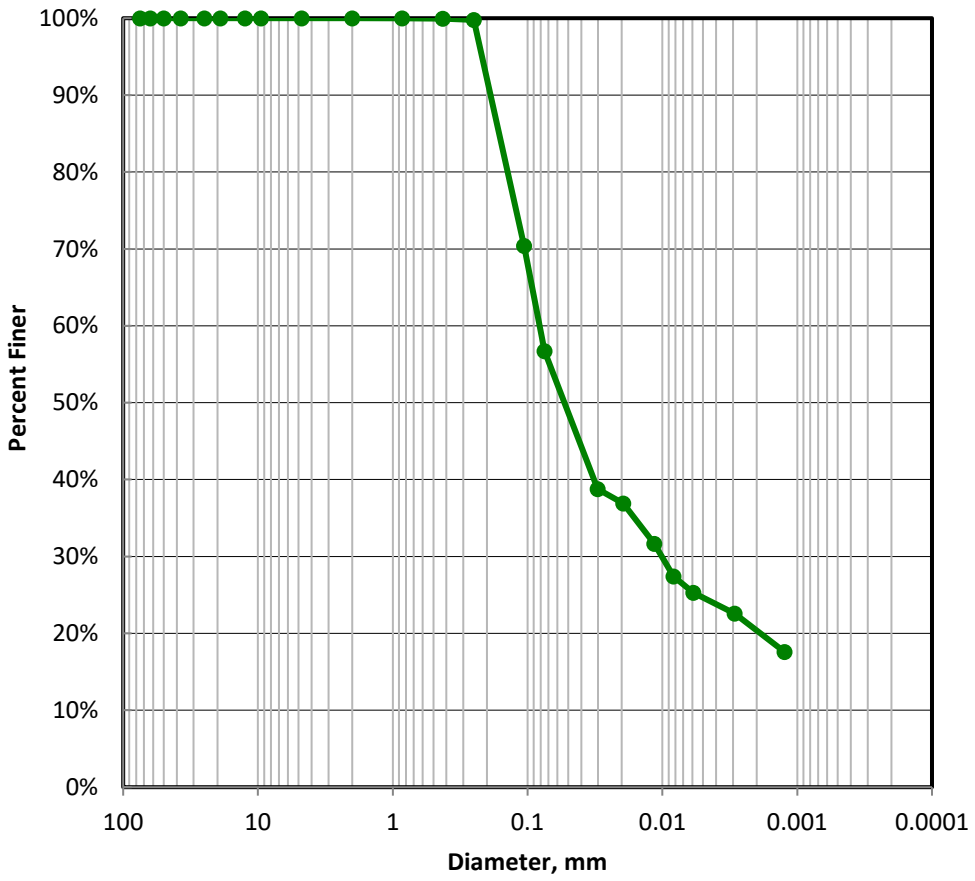
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-7
Client Project	345-817.0004 AEP Kammer Plant	Depth	11.0'-13.0'
Project No.	25-04143	Sample	ST-3
		Lab Sample	25-04143 -07

Sample Color: **BROWN**

USCS Group Name: **SANDY LEAN CLAY**

USCS Group Symbol: **CL** USDA: **LOAM** AASHTO: **A-6 (7)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	100.0%
No. 20	0.85	100.0%
No. 40	0.425	99.9%
No. 60	0.25	99.8%
No. 140	0.106	70.4%
No. 200	0.075	56.7%
NA	0.0303	38.8%
NA	0.0195	36.9%
NA	0.0115	31.7%
NA	0.0083	27.4%
NA	0.0059	25.3%
NA	0.0029	22.6%
NA	0.0012	17.6%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=32.1% Clay=24.6%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**43.3**	D30, mm	NA
Coarse=0; Medium=0.1; Fine=43.2		D10, mm	NA
% Fines (-#200)	**56.7**	Cc	NA
% Plus #200 (-3")	**43.3**	Cu	NA

USCS Description

SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)
100	100
2	100.0
0.05	48.7
0.002	20.4

Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
Gravel	0.0	0
Sand	51.3	51.3
Silt	28.3	28.3
Clay	20.4	20.4

USDA Classification

LOAM

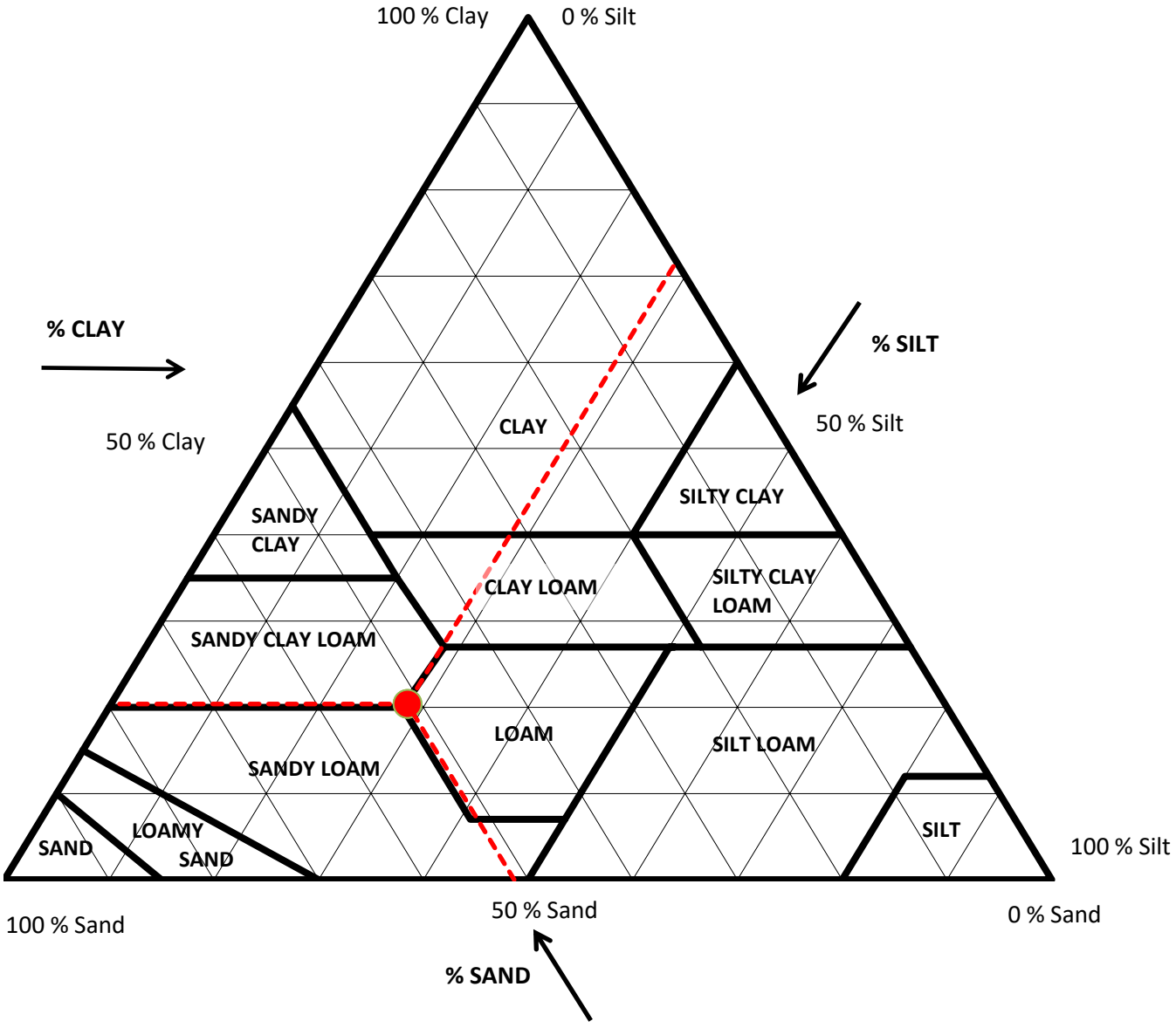
USDA CLASSIFICATION CHART

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-7
Client Project	345-817.0004 AEP Kammer Plant	Depth	11.0'-13.0'
Project No.	25-04143	Sample	ST-3
		Lab Sample	25-04143 -07

Sample Color: **BROWN**
USCS Group Name: **SANDY LEAN CLAY**
USCS Group Symbol: **CL** USDA: **LOAM** AASHTO: **A-6 (7)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	51.3
Percent Silt, %	28.3
Percent Clay, %	20.4

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.0
Coarse Sand; 1-0.5	0.0
Medium Sand; 0.5-0.25	0.2
Fine Sand; 0.25-0.1	31.7
Very Fine Sand; 0.1-0.05	19.4
Total	**51.3**



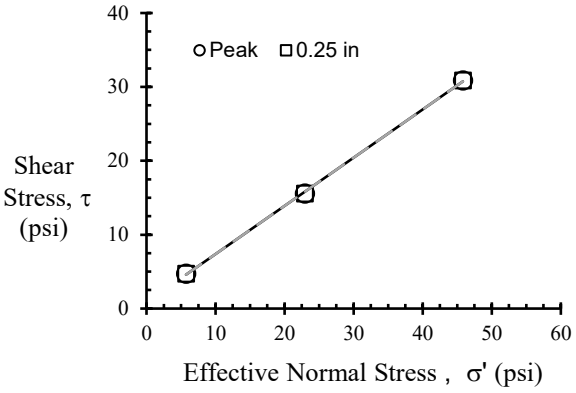
GEOTECHNICAL TESTING SERVICES
A TRI ENVIRONMENTAL COMPANY

Direct Shear Test Under Consolidated Drained Conditions (ASTM D3080)

Client: Civil & Environmental Consultants, Inc.
Client Project: 345-817.0004 AEP Kammer Plant
Project No. 25-04143

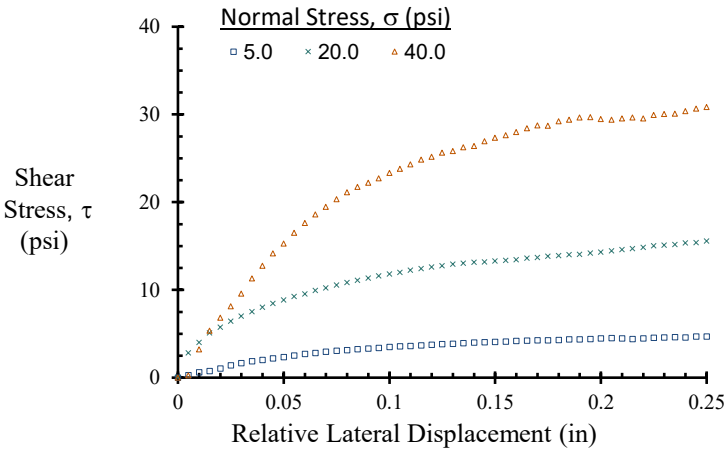
Boring AP-7
Depth 11.0' - 13.0'
Sample ST-3
Lab No. 25-04143-07

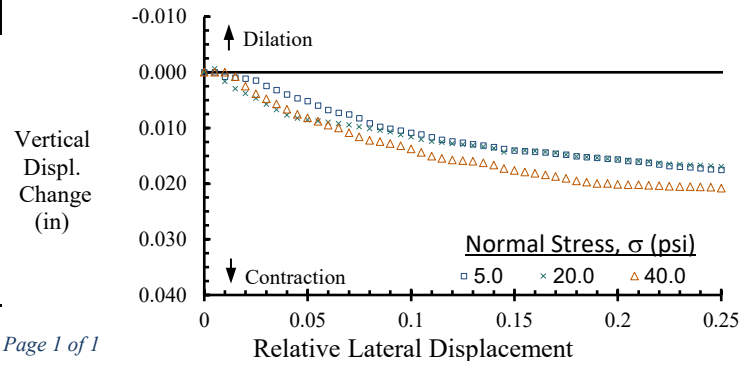
Strength Envelope Linear Regression		
Criterion	C' (psi)	ϕ' (deg)
Peak	0.9	33.1
0.25 in	0.9	33.1



Specimen Number		1	2	3
Initial Condition	Diameter (in)	2.50	2.50	2.50
	Height (in)	1.00	1.00	1.00
	Water Content (%)	21.5	21.5	21.5
	Dry Density (pcf)	96.7	98.2	100.1
Consol	Normal Stress (psi)	5.0	20.0	40.0
	Duration (min)	708	708	708
	Height (in)	1.0	1.0	1.0
Displacement rate (in/min)		6E-04		
Peak	Displacement, in	0.25	0.25	0.25
	Normal Stress (psi)	5.7	22.9	45.8
	Shear Stress (psi)	4.7	15.6	30.8
0.25 in	Normal Stress (psi)	5.7	22.9	45.8
	Shear Stress (psi)	4.7	15.6	30.8

Note: Area Correction Has Been Applied





Jeffrey A. Kuhn, Ph.D, P.E. 9/9/2025
Analysis & Quality Review/Date

GEOTECHNICAL TESTING SERVICES, INC., A TRI ENVIRONMENTAL COMPANY; 1-800-853-7309
103 Coraopolis Road, Coraopolis, PA, 15108

PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	**Boring**	AP-7
Client Project	345-817.0004 AEP Kammer Plant	**Depth**	11.0'-13.0'
Project No.	25-04143	**Sample**	BS-1
		Lab Sample	25-04143 -11

Sample Color: BROWN
USCS Group Name: SANDY LEAN CLAY
USCS Group Symbol: CL USDA: LOAM AASHTO: A-4 (3)

Dry Prep: R58-11(2018) [1]

MECHANICAL SIEVE

Total Sample	
Tare No.	Q62
Tare + WS., gm	1046.20
Tare + DS., gm	911.95
Tare, gm	188.60
Total sample WC	**18.6%**
Total Sample Dry Wt, gm (-3")	723

Hygroscopic WC (-#10)	
Tare No.	262
Tare + WS., gm	45.60
Tare + DS., gm	45.49
Tare, gm	16.87
Hygroscopic WC	0.38%
-#10 Hydro/Sieve air dry wt.	69.11
Wt. of +#200 Sample, gm	27.69

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	1.20	0.2%	99.8%	
No. 10	2	4.74	0.7%	99.2%	
No. 20	0.85	2.52	3.6%	95.6%	
No. 40	0.425	0.95	1.4%	94.2%	
No. 60	0.25	0.27	0.4%	93.8%	
No. 140	0.106	15.98	22.9%	70.9%	
No. 200	0.075	7.97	11.4%	59.4%	

HYDROMETER (-#10)

Split Air Dry Wt 69.38
Hygroscopic WC 0.38%
Corrected Dry wt 69.1

-#10 Dispersed 1min in Hamilton Beach Mixer

Specific Gravity 2.7 Assumed
a Factor *0.9889*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	33.0	24.0	4.5	28.5	0.0128	40.8	0.0298	40.4%
5	30.0	24.0	4.5	25.5	0.0128	36.5	0.0193	36.2%
15	27.0	24.1	4.5	22.5	0.0128	32.2	0.0114	31.9%
30	25.0	24.2	4.5	20.5	0.0128	29.3	0.0081	29.1%
60	23.0	24.1	4.5	18.5	0.0128	26.5	0.0058	26.3%
250	20.0	24.3	4.4	15.6	0.0128	22.3	0.0029	22.1%
1440	16.0	24.2	4.5	11.5	0.0128	16.5	0.0012	16.3%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4) **0.2** Silt=34.1% Clay=25.3%
Coarse=0; Fine=0.2 D60, mm NA
% Sand (-#4 & +#200) **40.4** D30, mm NA
Coarse=0.7; Medium=5; Fine=34.8 D10, mm NA
% Fines (-#200) **59.4** Cc NA
% Plus #200 (-3") **40.6** Cu NA

USCS Description
SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	CL - LEAN CLAY

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.8	0
2	99.2			
		Sand	48.1	48.5
0.05	51.1			
		Silt	31.5	31.8
0.002	19.6			
		Clay	19.6	19.7

USDA Classification
LOAM

Performed By: RH Input Validation: MA Reviewed By: BS Date Tested: 9/8/2025

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-7
Client Project	345-817.0004 AEP Kammer Plant	Depth	11.0'-13.0'
Project No.	25-04143	Sample	BS-1
		Lab Sample	25-04143 -11

Soil Description: BROWN LEAN CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	Q62
Wt. Tare & WS, gm	1046.2
Wt. Tare & DS, gm	911.95
Wt. Tare, gm	188.6
Water Content, %	18.6

SAMPLE SUMMARY

Liquid Limit (LL), %	**27**
Plastic Limit (PL), %	**17**
Plasticity Index (PI)	**10**
USCS Group Symbol (*-#40 Fraction*)	**CL**
USCS Group Name (*-#40 Fraction*)	**LEAN CLAY**
Sample Color:	**BROWN**

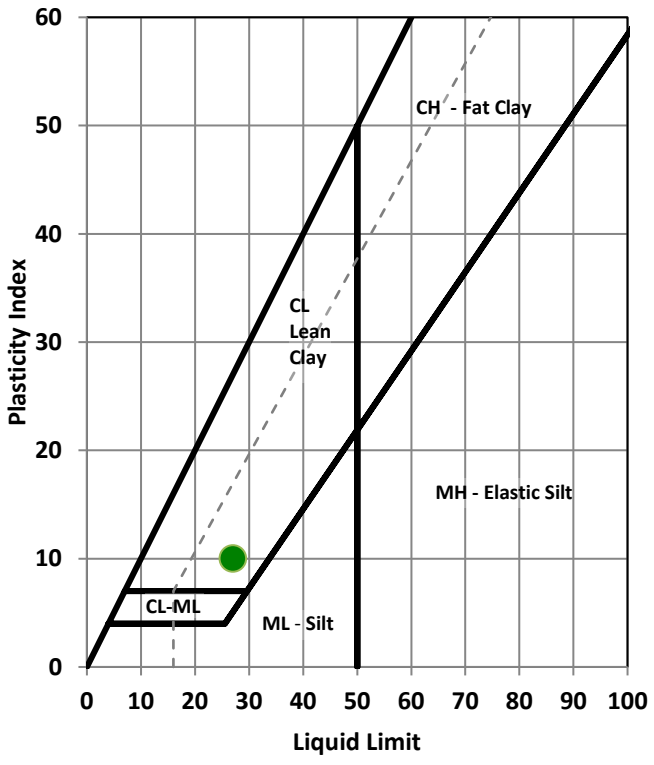
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	378	499	510
Wt. Tare & WS, gm	25.04	20.20	21.43
Wt. Tare & DS, gm	23.01	18.84	19.95
Wt. Tare, gm	11.06	10.82	10.95
Water Content, %	17.0	17.0	16.4

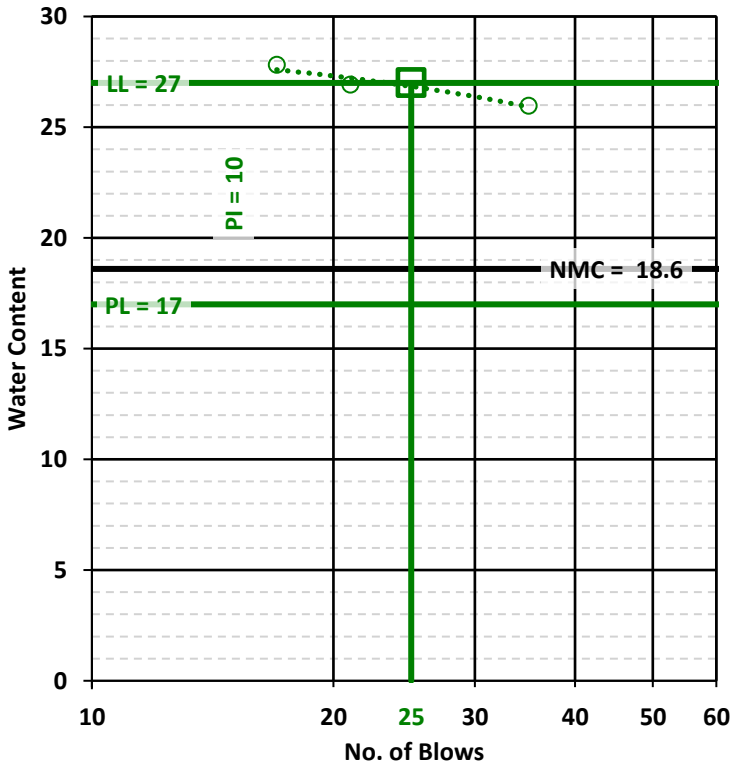
LIQUID LIMIT

	3 Points		
	476	311	490
	17.84	18.19	16.24
	16.31	16.69	15.11
	10.81	11.12	10.76
	27.8	26.9	26.0
# of Blows	17	21	35

PLASTICITY CHART



FLOW CURVE



Performed By: RH | Input Validation:MA | Reviewed By: BS | Date Tested: 9/8/2025

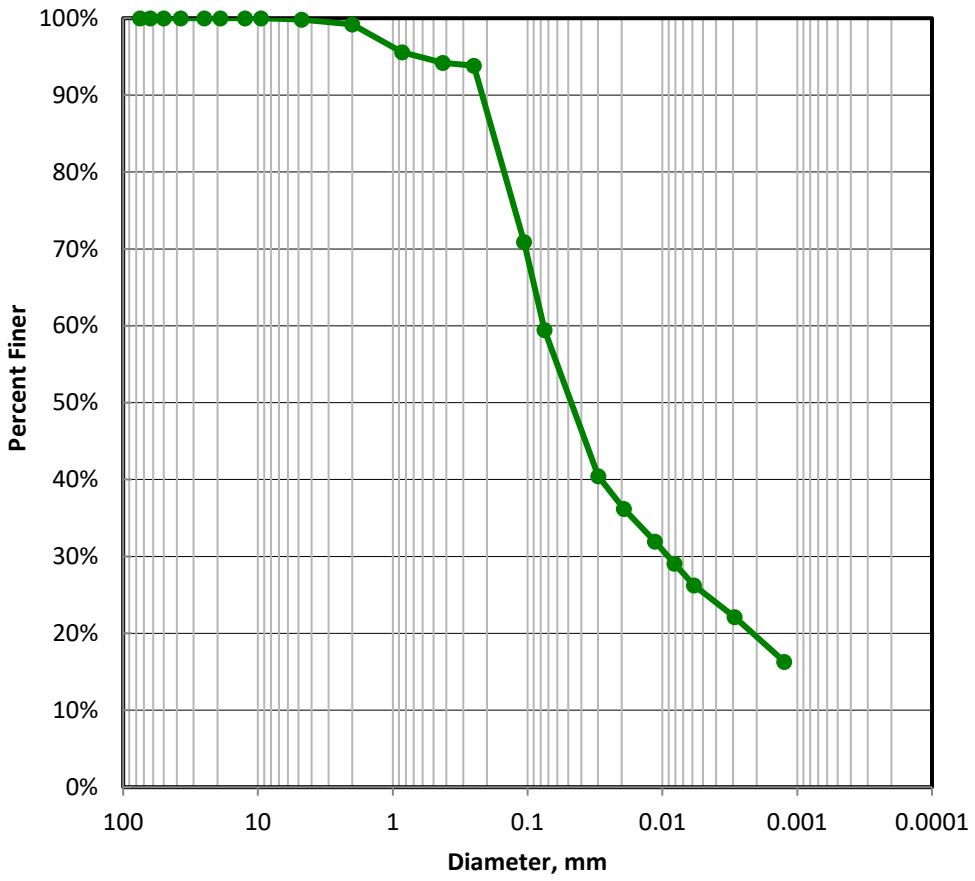
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-7
Client Project	345-817.0004 AEP Kammer Plant	Depth	11.0'-13.0'
Project No.	25-04143	Sample	BS-1
		Lab Sample	25-04143 -11

Sample Color: **BROWN**

USCS Group Name: **SANDY LEAN CLAY**

USCS Group Symbol: **CL** USDA: **LOAM** AASHTO: **A-4 (3)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	99.8%
No. 10	2	99.2%
No. 20	0.85	95.6%
No. 40	0.425	94.2%
No. 60	0.25	93.8%
No. 140	0.106	70.9%
No. 200	0.075	59.4%
NA	0.0298	40.4%
NA	0.0193	36.2%
NA	0.0114	31.9%
NA	0.0081	29.1%
NA	0.0058	26.3%
NA	0.0029	22.1%
NA	0.0012	16.3%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.2**	Silt=34.1% Clay=25.3%	
Coarse=0; Fine=0.2		D60, mm	NA
% Sand (-#4 & +#200)	**40.4**	D30, mm	NA
Coarse=0.7; Medium=5; Fine=34.8		D10, mm	NA
% Fines (-#200)	**59.4**	Cc	NA
% Plus #200 (-3")	**40.6**	Cu	NA

USCS Description

SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.8	0
2	99.2			
		Sand	48.1	48.5
0.05	51.1			
		Silt	31.5	31.8
0.002	19.6			
		Clay	19.6	19.7

USDA Classification

LOAM

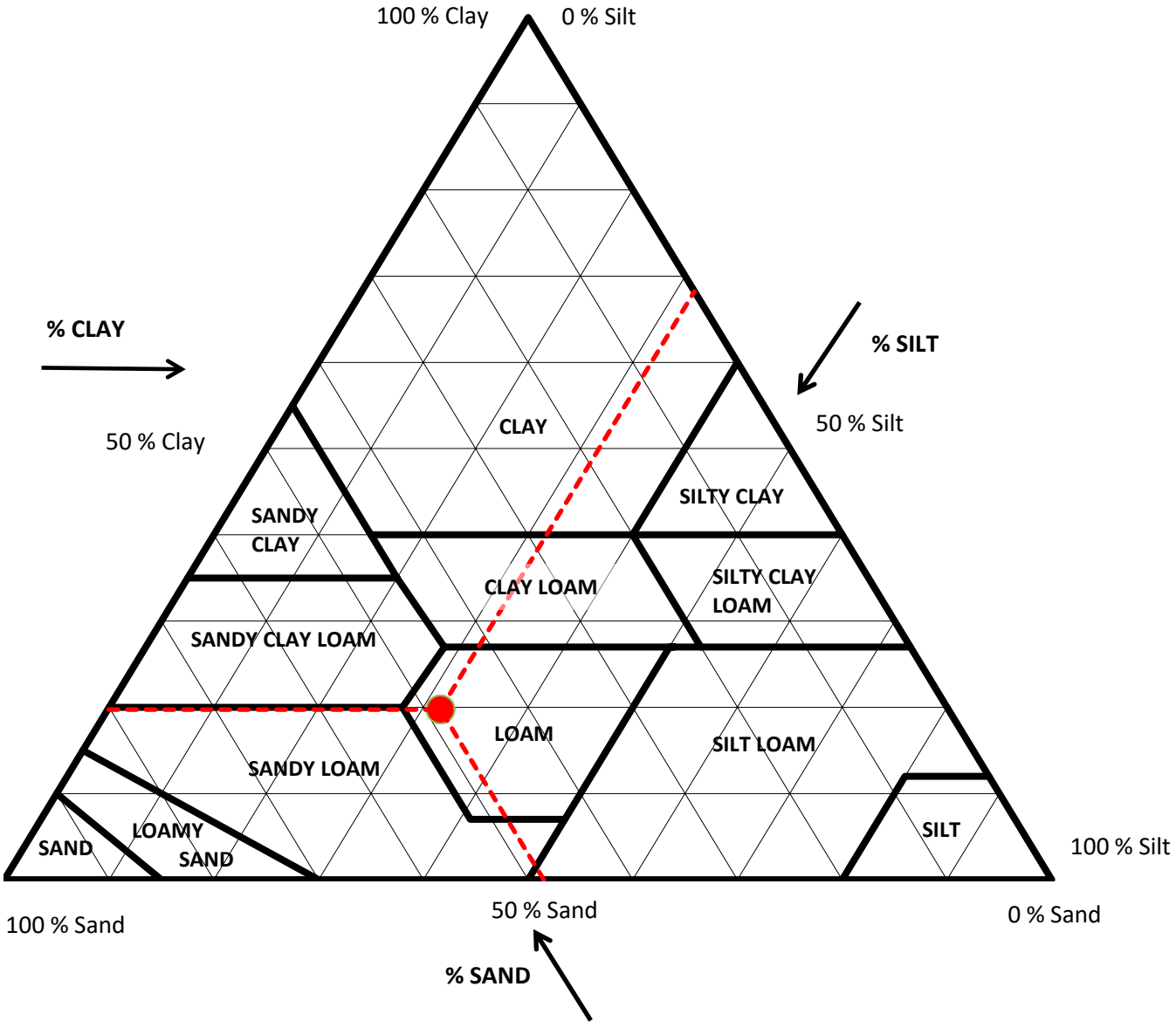
USDA CLASSIFICATION CHART

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-7
Client Project	345-817.0004 AEP Kammer Plant	Depth	11.0'-13.0'
Project No.	25-04143	Sample	BS-1
		Lab Sample	25-04143 -11

Sample Color: **BROWN**
USCS Group Name: **SANDY LEAN CLAY**
USCS Group Symbol: **CL** USDA: **LOAM** AASHTO: **A-4 (3)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	48.5
Percent Silt, %	31.8
Percent Clay, %	19.7

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	3.0
Coarse Sand; 1-0.5	1.7
Medium Sand; 0.5-0.25	0.7
Fine Sand; 0.25-0.1	25.1
Very Fine Sand; 0.1-0.05	18.0
Total	**48.5**



LABORATORY COMPACTION CHARACTERISTICS OF SOIL

Client	Civil & Environmental Consultants, Inc.	Boring	AP-7
Client Project	345-817.0004 AEP Kammer Plant	Depth	11.0' - 13.0'
Project No.	25-04143	Sample	BS-1
		Lab Sample No.	25-04143-11
Visual Description:	BROWN SANDY LEAN CLAY		

WET DENSITY					
Mold ID	J	J	J	J	
Compaction Point #	1	2	3	4	
Wt. Mold & WS, gm.	10353	10722	10879	10688	
Wt. Mold, gm.	6450	6450	6450	6450	
Wt. WS, gm.	3903	4272	4429	4238	
Mold Volume, cc	2127	2127	2127	2127	
Wet Density, gm./cc	1.83	2.01	2.08	1.99	
Wet Density, pcf	114.5	125.3	129.9	124.3	

WATER CONTENT					
Tare Number	B06	457	66	B07	
Wt. Tare & WS, gm.	324.7	311.4	435.5	428.5	
Wt. Tare & DS, gm.	305.5	287.9	391.9	376.4	
Wt. Tare, gm.	85.1	84.8	84.5	84.3	
Water Content, %	8.7	11.6	14.2	17.8	

DRY DENSITY vs. WATER CONTENT					
LABORATORY TEST VALUES					
Water Content, %	8.7	11.6	14.2	17.8	
Dry Density, pcf	105.3	112.3	113.8	105.5	

TEST PARAMETERS	
Test Method	ASTM D698
Compaction Energy	Standard
Test Procedure	C
Mold Diameter, in	6
Compacted Layers	3
Blows Per Layer	56
Rammer Weight / Fall	5.5 lbs / 12 in.
Size of Material Used	-3/4" Sieve
Use: <5% Retained on 3/4"	

OVERSIZE PARTICLE CORRECTION

No Corrections Needed

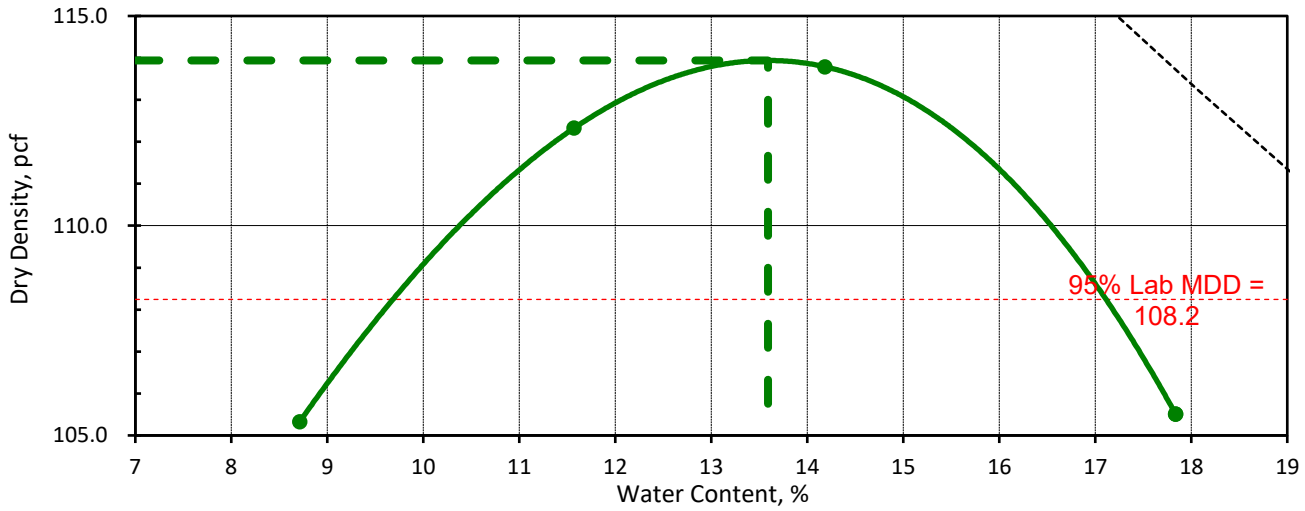
Percent of Oversize Rock (+3/4" Sieve) = <5%
(Based on As-received Screening & Soaking)

W.C. of Finer Material, % (-3/4" Sieve) = NA

SAMPLE SUMMARY

Lab Optimum Water Content, %	***13.6***
Lab Maximum Dry Density, pcf	***113.9***

Note: Maximum Density and Optimum Water Content reported from estimated best fit smooth curve!



Note: Compacted with automatic compaction machine

Input Validation: MA Reviewed By: BLS Date Tested: 09/02/25

PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	**Boring**	AP-7
Client Project	345-817.0004 AEP Kammer Plant	**Depth**	14.0'-16.0'
Project No.	25-04143	**Sample**	ST-4
		Lab Sample	25-04143 -08

Sample Color: BROWN
USCS Group Name: SANDY LEAN CLAY
USCS Group Symbol: CL USDA: SANDY LOAM AASHTO: A-6 (7)

Dry Prep: R58-11(2018)[1]

MECHANICAL SIEVE

Total Sample	
Tare No.	754
Tare + WS., gm	605.39
Tare + DS., gm	534.34
Tare, gm	183.25
Total sample WC	**20.2%**
Total Sample Dry Wt, gm (-3")	351

Hygroscopic WC (-#10)	
Tare No.	503
Tare + WS., gm	29.82
Tare + DS., gm	29.65
Tare, gm	10.63
Hygroscopic WC	0.89%
-#10 Hydro/Sieve air dry wt.	59.90
Wt. of +#200 Sample, gm	25.69

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0	0.0%	100.0%	
No. 10	2	0.05	0.0%	100.0%	
No. 20	0.85	0.03	0.1%	99.9%	
No. 40	0.425	0.13	0.2%	99.7%	
No. 60	0.25	0.23	0.4%	99.3%	
No. 140	0.106	17.42	29.1%	70.3%	
No. 200	0.075	7.88	13.2%	57.1%	

HYDROMETER (-#10)

Split Air Dry Wt 60.44
Hygroscopic WC 0.89%
Corrected Dry wt 59.9

-#10 Dispersed 1min in Hamilton Beach Mixer

Specific Gravity 2.7 Assumed
a Factor *0.9889*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	27.5	22.1	5.1	22.4	0.0131	37.0	0.0318	37.0%
5	25.0	23.3	4.7	20.3	0.0129	33.5	0.0202	33.5%
15	23.0	23.3	4.7	18.3	0.0129	30.2	0.0118	30.2%
30	22.0	23.4	4.7	17.3	0.0129	28.6	0.0084	28.6%
60	20.0	23.6	4.7	15.3	0.0129	25.3	0.0060	25.3%
250	15.0	23.8	4.6	10.4	0.0129	17.2	0.0030	17.2%
1440	10.0	23.8	4.6	5.4	0.0129	8.9	0.0013	8.9%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4) **0.0** Silt=34% Clay=23.1%
Coarse=0; Fine=0 D60, mm NA
% Sand (-#4 & +#200) **42.9** D30, mm NA
Coarse=0; Medium=0.3; Fine=42.6 D10, mm NA
% Fines (-#200) **57.1** Cc NA
% Plus #200 (-3") **42.9** Cu NA

USCS Description
SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	CL - LEAN CLAY

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)
100	100
2	100.0
0.05	47.6
0.002	13.2

Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
Gravel	0.0	0
Sand	52.4	52.4
Silt	34.4	34.5
Clay	13.2	13.2

USDA Classification
SANDY LOAM

Performed By: RH Input Validation: MA Reviewed By: BS Date Tested: 9/8/2025

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-7
Client Project	345-817.0004 AEP Kammer Plant	Depth	14.0'-16.0'
Project No.	25-04143	Sample	ST-4
		Lab Sample	25-04143 -08

Soil Description: BROWN LEAN CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	754
Wt. Tare & WS, gm	605.39
Wt. Tare & DS, gm	534.34
Wt. Tare, gm	183.25
Water Content, %	20.2

SAMPLE SUMMARY

Liquid Limit (LL), %	**35**
Plastic Limit (PL), %	**17**
Plasticity Index (PI)	**18**
USCS Group Symbol (*-#40 Fraction*)	**CL**
USCS Group Name (*-#40 Fraction*)	**LEAN CLAY**
Sample Color:	**BROWN**

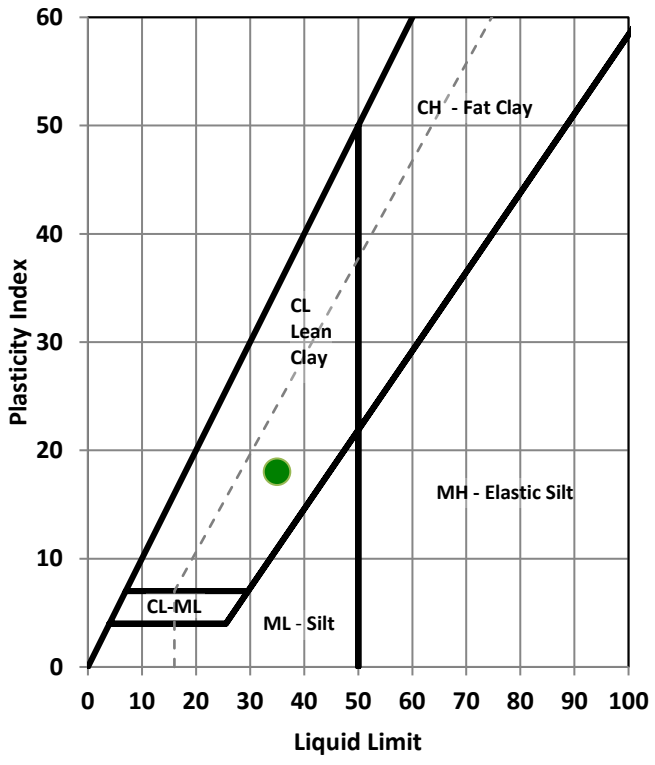
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	453	497	470
Wt. Tare & WS, gm	16.83	17.16	16.90
Wt. Tare & DS, gm	15.96	16.26	16.00
Wt. Tare, gm	10.78	10.84	10.70
Water Content, %	16.8	16.6	17.0

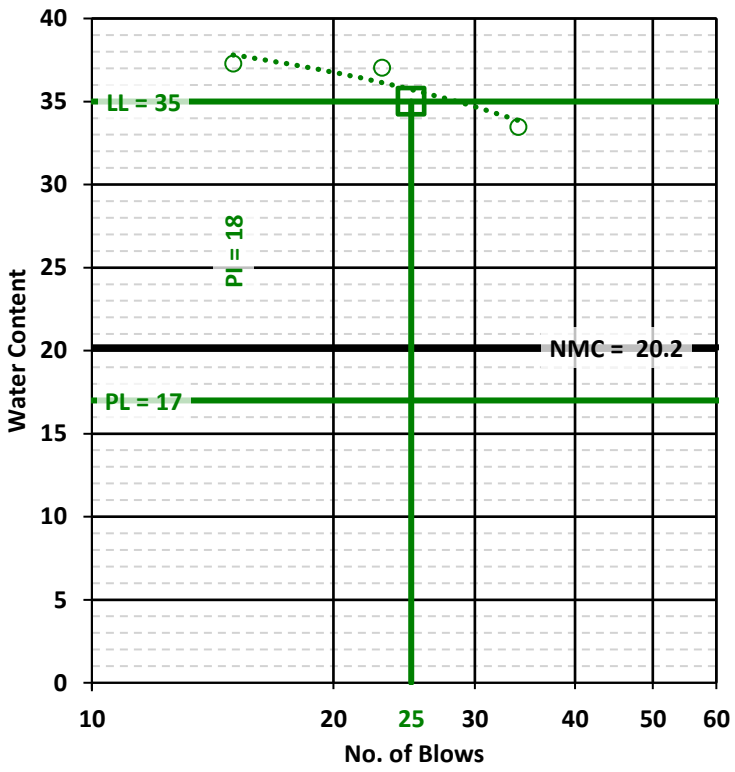
LIQUID LIMIT

	3 Points		
	701	462	512
	20.68	18.89	16.91
	18.13	16.69	15.36
	11.29	10.75	10.73
	37.3	37.0	33.5
# of Blows	15	23	34

PLASTICITY CHART



FLOW CURVE



Performed By: RH Input Validation:MA Reviewed By: BS Date Tested:

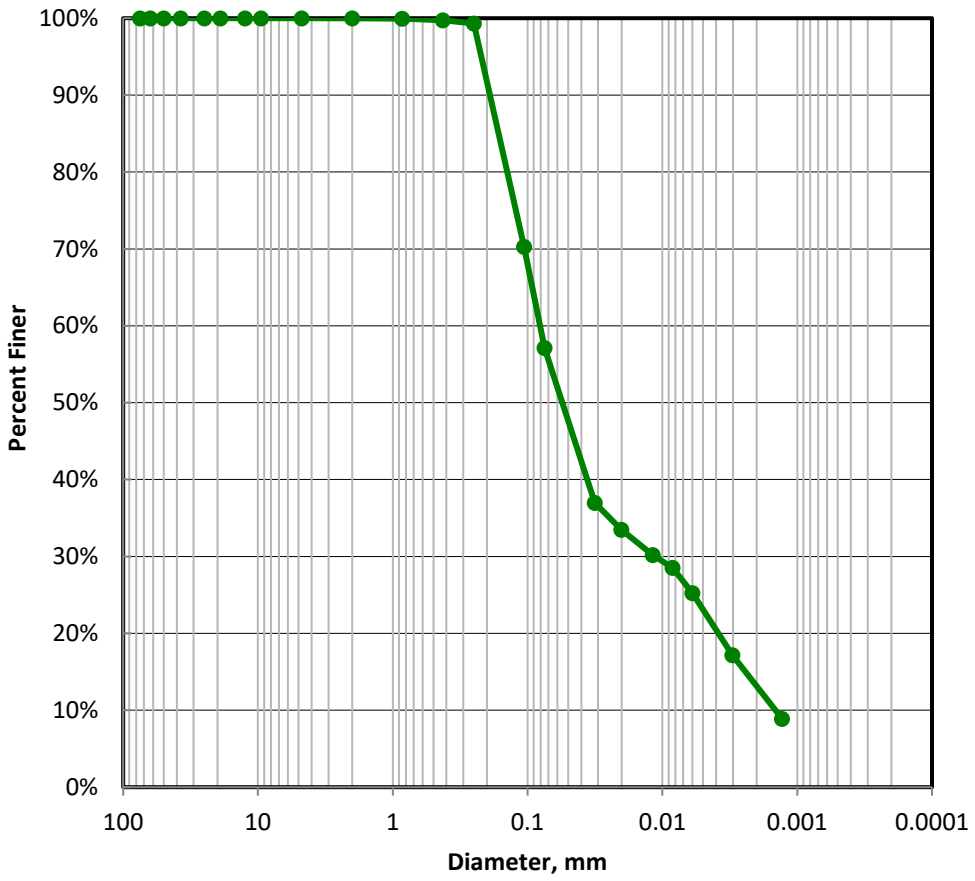
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-7
Client Project	345-817.0004 AEP Kammer Plant	Depth	14.0'-16.0'
Project No.	25-04143	Sample	ST-4
		Lab Sample	25-04143 -08

Sample Color: **BROWN**

USCS Group Name: **SANDY LEAN CLAY**

USCS Group Symbol: **CL** USDA: **SANDY LOAM** AASHTO: **A-6 (7)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	100.0%
No. 20	0.85	99.9%
No. 40	0.425	99.7%
No. 60	0.25	99.3%
No. 140	0.106	70.3%
No. 200	0.075	57.1%
NA	0.0318	37.0%
NA	0.0202	33.5%
NA	0.0118	30.2%
NA	0.0084	28.6%
NA	0.0060	25.3%
NA	0.0030	17.2%
NA	0.0013	8.9%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=34% Clay=23.1%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**42.9**	D30, mm	NA
Coarse=0; Medium=0.3; Fine=42.6		D10, mm	NA
% Fines (-#200)	**57.1**	Cc	NA
% Plus #200 (-3")	**42.9**	Cu	NA

USCS Description

SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.0	0
2	100.0			
		Sand	52.4	52.4
0.05	47.6			
		Silt	34.4	34.5
0.002	13.2			
		Clay	13.2	13.2

USDA Classification

SANDY LOAM

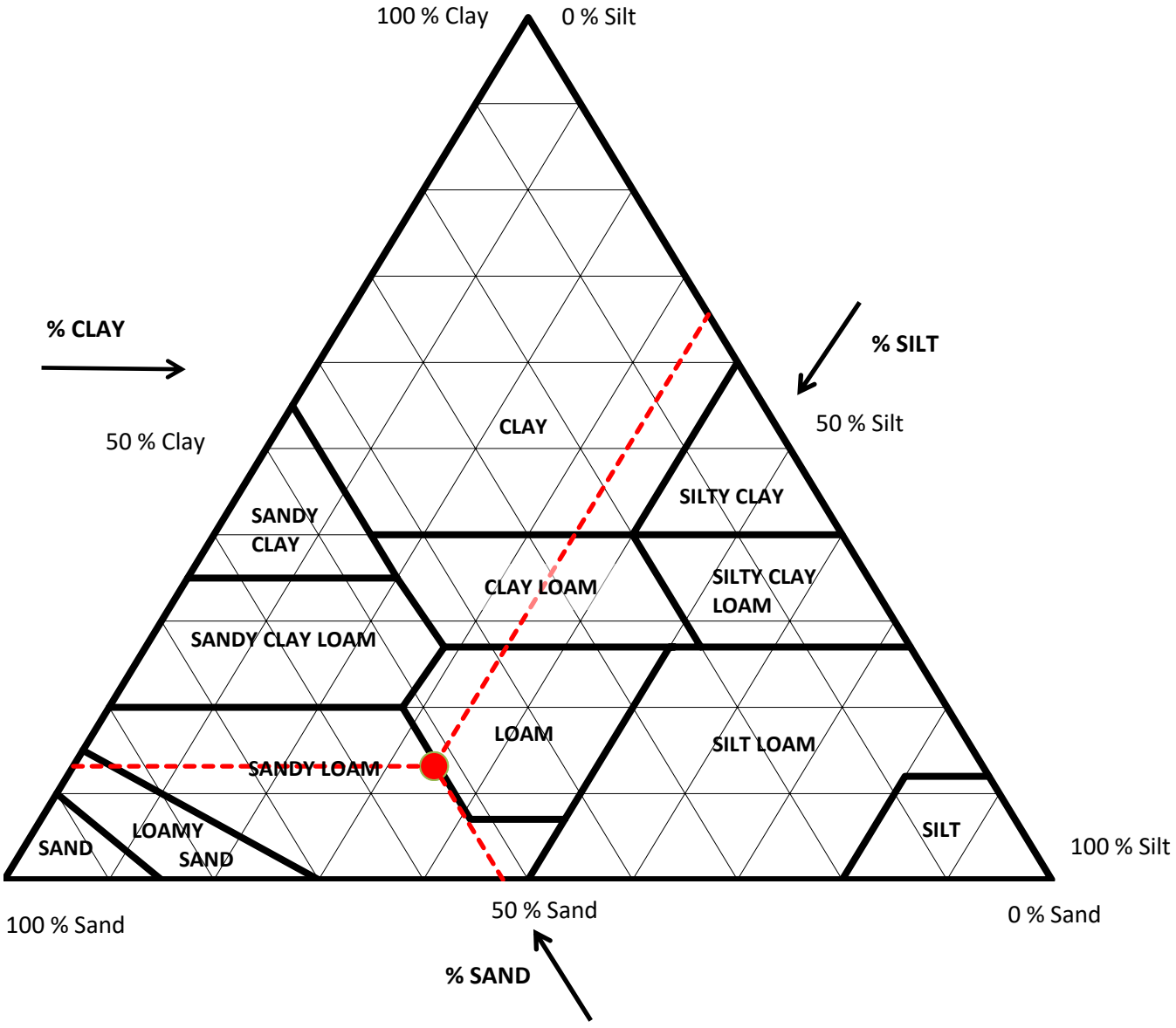
USDA CLASSIFICATION CHART

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-7
Client Project	345-817.0004 AEP Kammer Plant	Depth	14.0'-16.0'
Project No.	25-04143	Sample	ST-4
		Lab Sample	25-04143 -08

Sample Color: **BROWN**
USCS Group Name: **SANDY LEAN CLAY**
USCS Group Symbol: **CL** USDA: **SANDY LOAM** AASHTO: **A-6 (7)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	52.4
Percent Silt, %	34.5
Percent Clay, %	13.2

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.0
Coarse Sand; 1-0.5	0.2
Medium Sand; 0.5-0.25	0.4
Fine Sand; 0.25-0.1	31.3
Very Fine Sand; 0.1-0.05	20.4
Total	**52.4**

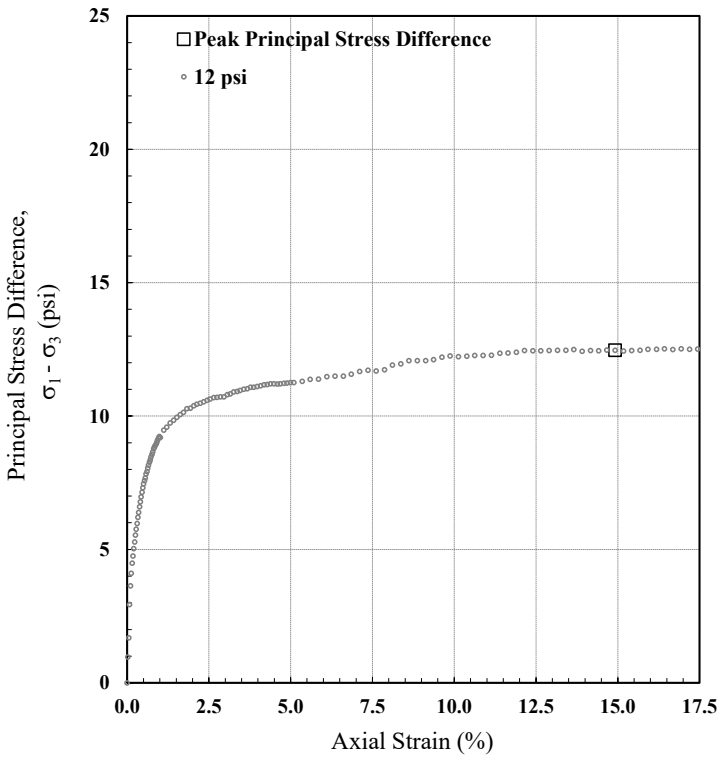


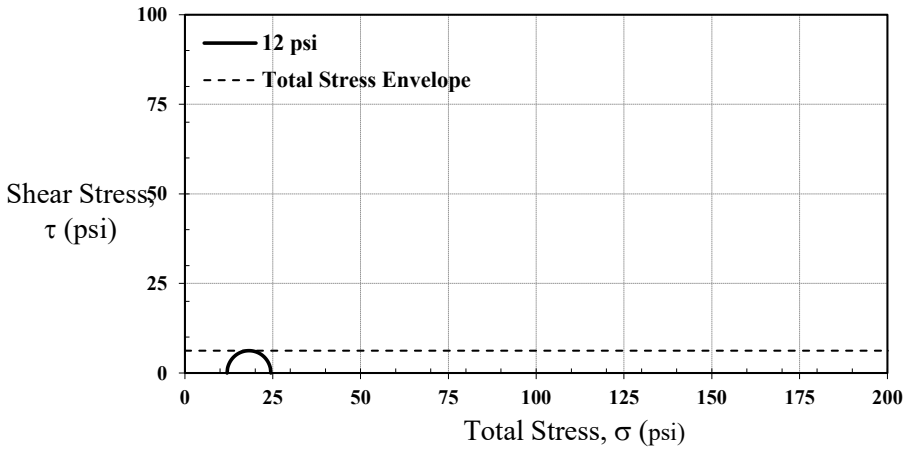
GEOTECHNICAL TESTING SERVICES
A TRI ENVIRONMENTAL COMPANY

Unconsolidated-Undrained (Q) Triaxial Compression

Client: Civil & Environmental Consultants, Inc.
Project: 345-817.0004 AEP Kammer
Sample: AP-7 (14.0' - 16.0'); ST-4

TRI Log #: 25-04143.8
Test Method: ASTM D2850





Test Parameters	
Minor Principal Stress (psi)	12.0
Rate of Strain (%/hr)	60

Initial Properties	
Avg. Diameter (in)	2.84
Avg. Height (in)	5.82
Avg. Water Content (%)	21.8
Bulk Density (pcf)	129.3
Dry Density (pcf)	106.2
Saturation (%)	97.1
Void Ratio	0.62
Specific Gravity (Assumed)	2.75

At Failure - Maximum Deviator Stress	
Axial Strain at Failure (%)	14.9
Minor Total Stress (psi)	12.0
Major Total Stress (psi)	24.5
Principal Stress Diff. (psi)	12.5

Total Stress Envelope	
Friction Angle (deg)	0
Undrained Shear Strength, S_u (psi)	6.2
S_u / σ_3	0.5

Note: The calculated value of specimen saturation was approximately 95% or greater. The Mohr failure envelope was taken as a horizontal straight line.

Jeffrey A. Kuhn , Ph.D., P.E., 9/9/2025
Analysis & Quality Review/Date

GEOTECHNICAL TESTING SERVICES, INC., A TRI ENVIRONMENTAL COMPANY; 1-800-853-7309
103 Coraopolis Road, Coraopolis, PA, 15108

PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	**Boring**	AP-7
Client Project	345-817.0004 AEP Kammer Plant	**Depth**	18.0'-20.0'
Project No.	25-04143	**Sample**	ST-5
		Lab Sample	25-04143 -09

Sample Color: BROWN
USCS Group Name: SANDY LEAN CLAY
USCS Group Symbol: CL USDA: SANDY LOAM AASHTO: A-6 (7)

Dry Prep: R58-11(2018)[1]

MECHANICAL SIEVE

Total Sample	
Tare No.	834
Tare + WS., gm	500.51
Tare + DS., gm	440.13
Tare, gm	181.99
Total sample WC	**23.4%**
Total Sample Dry Wt, gm (-3")	258

Hygroscopic WC (-#10)	
Tare No.	203
Tare + WS., gm	52.95
Tare + DS., gm	52.44
Tare, gm	16.81
Hygroscopic WC	1.43%
-#10 Hydro/Sieve air dry wt.	61.59
Wt. of +#200 Sample, gm	26.09

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	0	0.0%	100.0%	
3/4"	19	0	0.0%	100.0%	
1/2"	12.5	0	0.0%	100.0%	
3/8"	9.5	0	0.0%	100.0%	
No. 4	4.75	0	0.0%	100.0%	
No. 10	2	0	0.0%	100.0%	
No. 20	0.85	0.05	0.1%	99.9%	
No. 40	0.425	0.09	0.1%	99.8%	
No. 60	0.25	0.10	0.2%	99.6%	
No. 140	0.106	17.42	28.3%	71.3%	
No. 200	0.075	8.43	13.7%	57.6%	

HYDROMETER (-#10)

Split Air Dry Wt 62.47
Hygroscopic WC 1.43%
Corrected Dry wt 61.6

-#10 Dispersed 1min in Hamilton Beach Mixer

Specific Gravity 2.7 Assumed
a Factor *0.9889*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	27.0	23.6	4.7	22.3	0.0129	35.8	0.0313	35.8%
5	25.0	23.6	4.7	20.3	0.0129	32.6	0.0201	32.6%
15	22.0	23.7	4.6	17.4	0.0129	27.9	0.0118	27.9%
30	21.0	23.7	4.6	16.4	0.0129	26.3	0.0084	26.3%
60	19.0	23.8	4.6	14.4	0.0129	23.1	0.0060	23.1%
250	16.0	23.8	4.6	11.4	0.0129	18.3	0.0030	18.3%
1440	14.0	23.8	4.6	9.4	0.0129	15.1	0.0013	15.1%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4) **0.0** Silt=35.8% Clay=21.8%
Coarse=0; Fine=0 D60, mm NA
% Sand (-#4 & +#200) **42.4** D30, mm NA
Coarse=0; Medium=0.2; Fine=42.1 D10, mm NA
% Fines (-#200) **57.6** Cc NA
% Plus #200 (-3") **42.4** Cu NA

USCS Description
SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	CL - LEAN CLAY

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.0	0
2	100.0			
		Sand	52.5	52.5
0.05	47.5			
		Silt	30.7	30.7
0.002	16.8			
		Clay	16.8	16.8

USDA Classification
SANDY LOAM

Performed By: RH Input Validation: MA Reviewed By: BS Date Tested: 9/8/2025

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-7
Client Project	345-817.0004 AEP Kammer Plant	Depth	18.0'-20.0'
Project No.	25-04143	Sample	ST-5
		Lab Sample	25-04143 -09

Soil Description: BROWN LEAN CLAY
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	834
Wt. Tare & WS, gm	500.51
Wt. Tare & DS, gm	440.13
Wt. Tare, gm	181.99
Water Content, %	23.4

SAMPLE SUMMARY

Liquid Limit (LL), %	**34**
Plastic Limit (PL), %	**16**
Plasticity Index (PI)	**18**
USCS Group Symbol (*-#40 Fraction*)	**CL**
USCS Group Name (*-#40 Fraction*)	**LEAN CLAY**
Sample Color:	**BROWN**

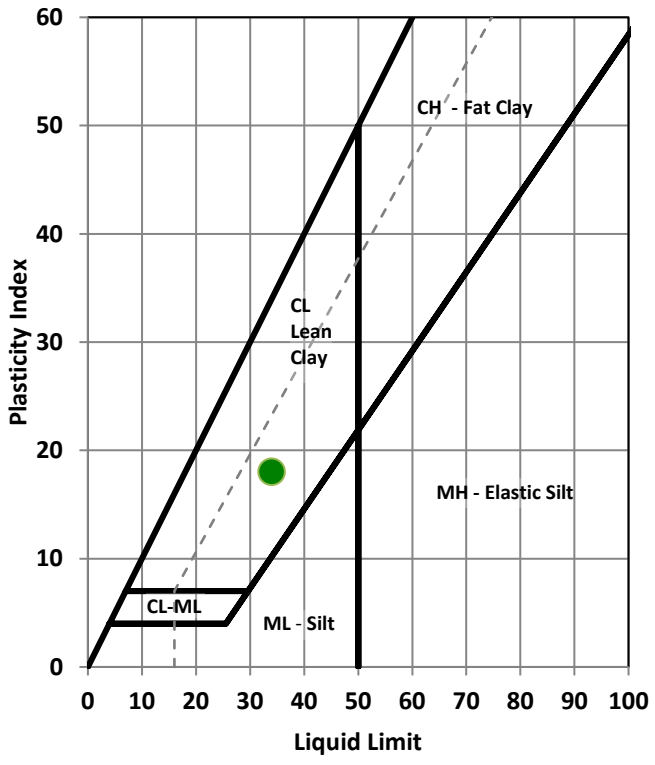
PLASTIC LIMIT

Points Run	3 Points		
Tare Number	508	405	709
Wt. Tare & WS, gm	17.32	16.77	19.02
Wt. Tare & DS, gm	16.41	15.94	18.08
Wt. Tare, gm	10.77	10.60	12.67
Water Content, %	16.1	15.5	17.4

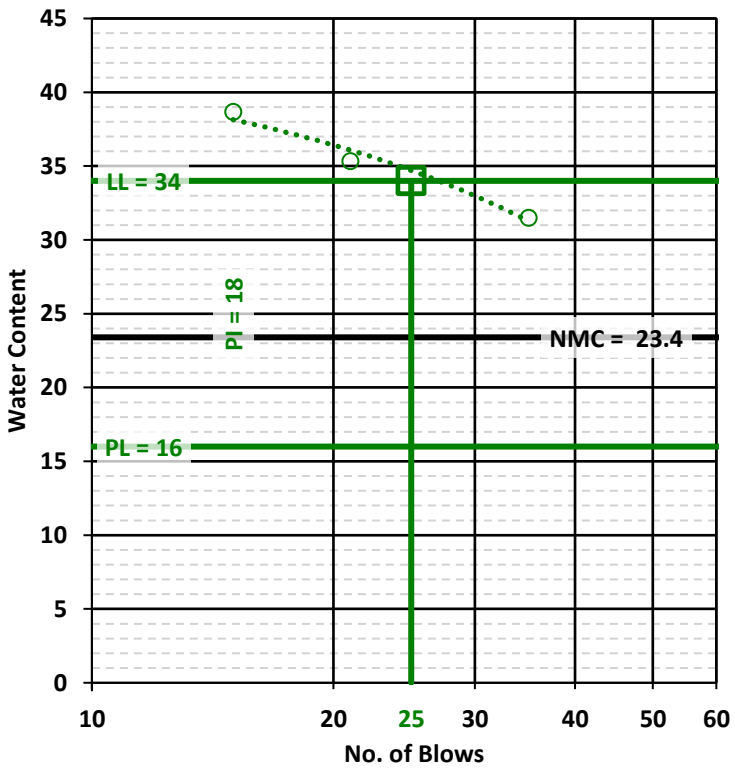
LIQUID LIMIT

	3 Points		
	427	460	310
	18.47	17.28	17.56
	16.32	15.57	16.07
	10.76	10.73	11.34
	38.7	35.3	31.5
# of Blows	15	21	35

PLASTICITY CHART



FLOW CURVE



Performed By: RH | Input Validation:MA | Reviewed By: BS | Date Tested:9/9/25

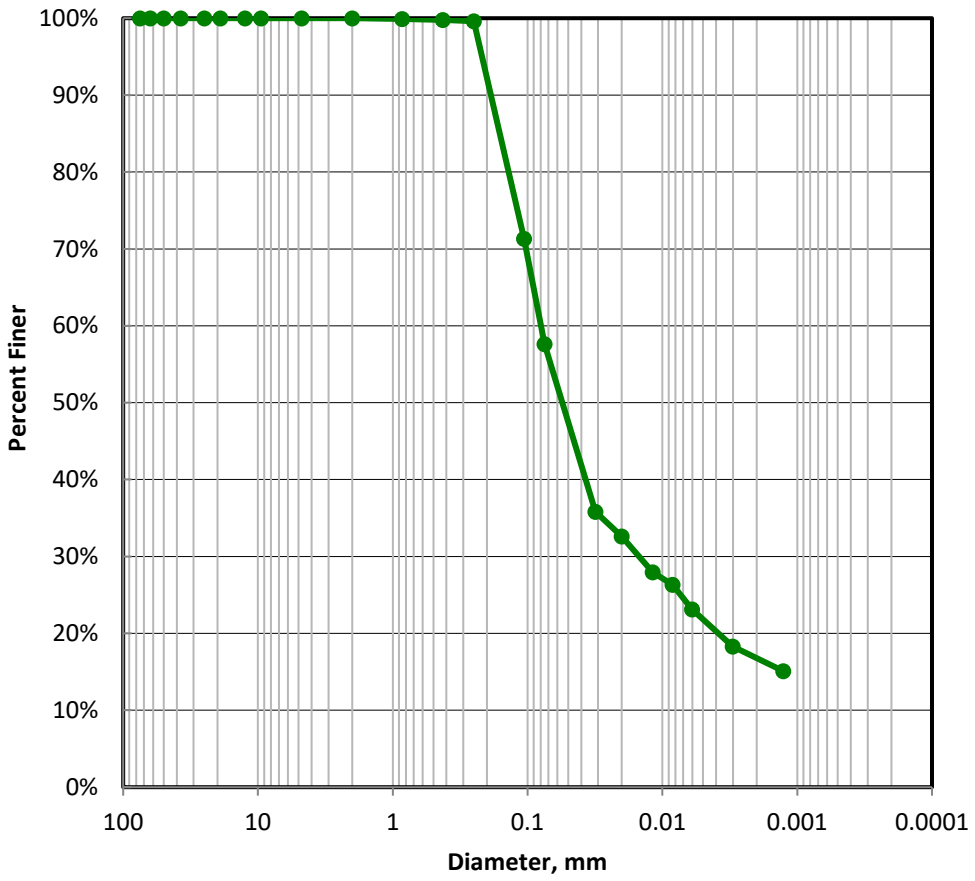
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-7
Client Project	345-817.0004 AEP Kammer Plant	Depth	18.0'-20.0'
Project No.	25-04143	Sample	ST-5
		Lab Sample	25-04143 -09

Sample Color: **BROWN**

USCS Group Name: **SANDY LEAN CLAY**

USCS Group Symbol: **CL** USDA: **SANDY LOAM** AASHTO: **A-6 (7)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	100.0%
3/4"	19	100.0%
1/2"	12.5	100.0%
3/8"	9.5	100.0%
No. 4	4.75	100.0%
No. 10	2	100.0%
No. 20	0.85	99.9%
No. 40	0.425	99.8%
No. 60	0.25	99.6%
No. 140	0.106	71.3%
No. 200	0.075	57.6%
NA	0.0313	35.8%
NA	0.0201	32.6%
NA	0.0118	27.9%
NA	0.0084	26.3%
NA	0.0060	23.1%
NA	0.0030	18.3%
NA	0.0013	15.1%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**0.0**	Silt=35.8% Clay=21.8%	
Coarse=0; Fine=0		D60, mm	NA
% Sand (-#4 & +#200)	**42.4**	D30, mm	NA
Coarse=0; Medium=0.2; Fine=42.1		D10, mm	NA
% Fines (-#200)	**57.6**	Cc	NA
% Plus #200 (-3")	**42.4**	Cu	NA

USCS Description

SANDY LEAN CLAY

USCS Group Symbol	Atterberg Limits Group Symbol
CL	**CL - LEAN CLAY**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	0.0	0
2	100.0			
		Sand	52.5	52.5
0.05	47.5			
		Silt	30.7	30.7
0.002	16.8			
		Clay	16.8	16.8

USDA Classification

SANDY LOAM

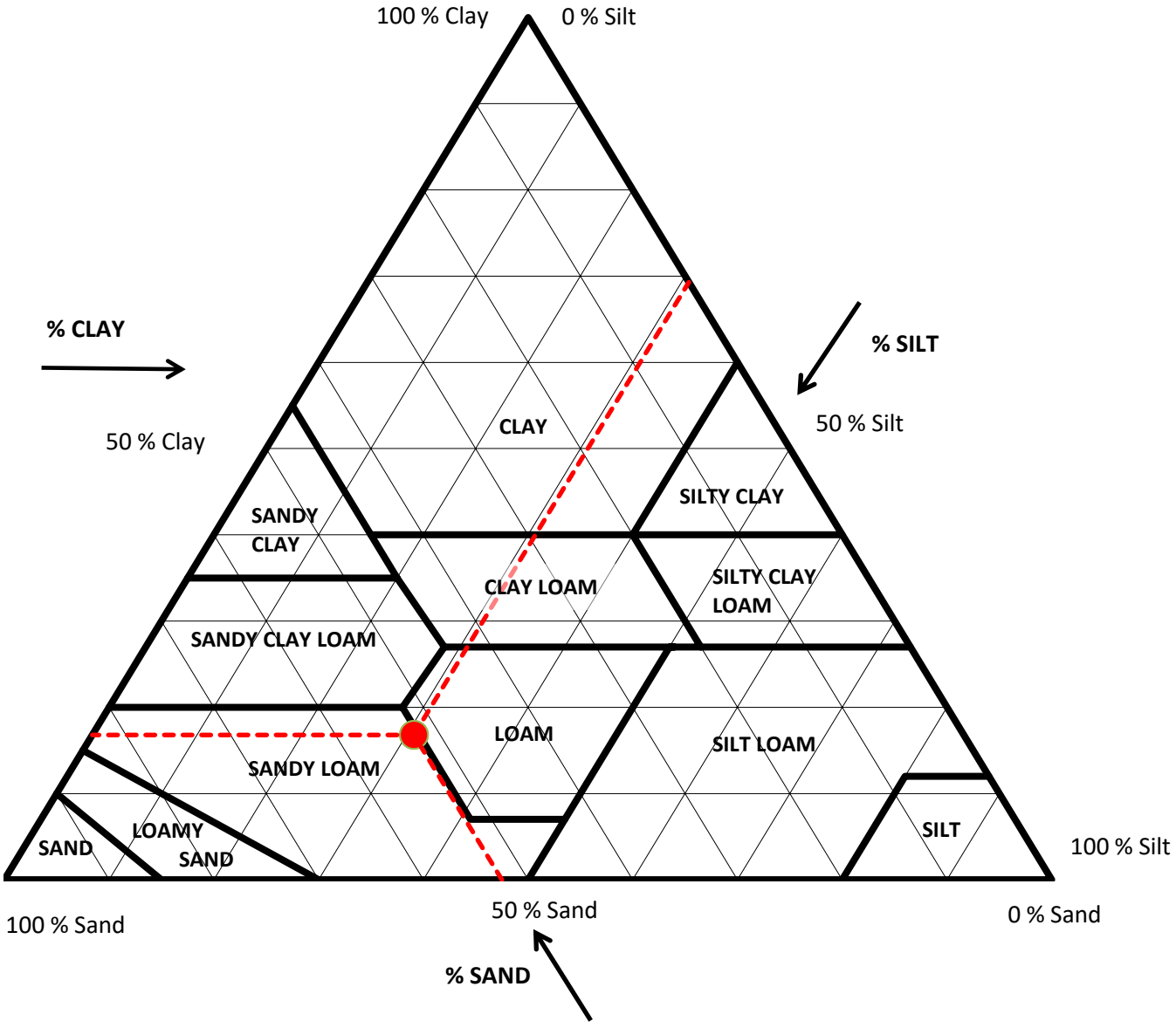
USDA CLASSIFICATION CHART

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	AP-7
Client Project	345-817.0004 AEP Kammer Plant	Depth	18.0'-20.0'
Project No.	25-04143	Sample	ST-5
		Lab Sample	25-04143 -09

Sample Color: **BROWN**
USCS Group Name: **SANDY LEAN CLAY**
USCS Group Symbol: **CL** USDA: **SANDY LOAM** AASHTO: **A-6 (7)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	52.5
Percent Silt, %	30.7
Percent Clay, %	16.8

Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	0.1
Coarse Sand; 1-0.5	0.1
Medium Sand; 0.5-0.25	0.2
Fine Sand; 0.25-0.1	30.6
Very Fine Sand; 0.1-0.05	21.5
Total	**52.5**



GEOTECHNICAL TESTING SERVICES
A TRI ENVIRONMENTAL COMPANY

Consolidated-Undrained Triaxial Compression

Client: Civil & Environmental Consultants, Inc.
Project: 345-817.0004 AEP Kammer Plant
Sample: A-7 (18'-20') ST-5

TRI Log #: 25-04143.9
Test Method: ASTM D4767

Specimens				
Identification	1	2	3	4
Depth/Elev. (ft)	-	-	-	-
Eff. Consol. Stress (psi)	5.0	20.0	40.0	-
Initial Specimen Properties				
Avg. Diameter (in)	2.81	2.80	2.77	-
Avg. Height (in)	5.92	5.95	5.96	-
Avg. Water Content (%)	22.6	23.2	22.3	-
Bulk Density (pcf)	130.9	131.6	136.3	-
Dry Density (pcf)	106.8	106.9	111.5	-
Specific Gravity (Assumed)	2.75			
Saturation (%)	102.3	105.2	113.5	-
Void Ratio, n	0.61	0.61	0.54	-
B-Value, End of Saturation	0.97	0.99	0.98	-

Test Setup	
Specimen Condition	Undisturbed / Intact
Specimen Preparation	Trimmed
Mounting Method	Wet
Consolidation	Isotropic

Post-Consolidation / Pre-Shear				
Void Ratio	0.61	0.56	0.46	-

Shear / Post-Shear				
Rate of Strain (%/hr)	1.00	1.00	1.00	-
Avg. Water Content (%)	24.2	23.7	23.2	-

At Failure								
Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1'-\sigma_3')_{max}$				Ratio, $(\sigma_1'/\sigma_3')_{max}$			
Axial Strain at Failure (%), $\varepsilon_{a,f}$	15.0	15.0	15.0	-	12.3	12.2	13.2	-
Minor Effective Stress (psi), $\sigma_3'_f$	5.9	6.9	16.2	-	5.2	6.6	15.8	-
Principal Stress Difference (psi), $(\sigma_1-\sigma_3)_f$	13.6	19.5	37.9	-	13.2	19.1	37.6	-
Pore Water Pressure, Δu_f (psi)	-0.9	13.1	23.8	-	-0.2	13.4	24.2	-
Major Effective Stress (psi), $\sigma_1'_f$	19.6	26.4	54.2	-	18.4	25.7	53.4	-
Secant Friction Angle (degrees)	32.4	35.9	32.6	-	33.8	36.3	32.9	-
Effective Friction Angle (degrees)	31.6				31.6			
Effective Cohesion (psi)	0.7				0.8			

Note: The presented M-C parameters are based on a linear regression in modified stress space, across all assigned effective consolidation stresses. This fit does not purported to capture typical curvature of envelopes that may, in particular, be observed across broader range in effective stresses. Please note that the stresses associated with peak principal stress ratio and peak principal stress difference are presented in tabular form on the first page of the report. There are alternate interpretations to theses two failure criterion including but not limited to strain compatibility and post-peak.

Jeffrey A. Kuhn , Ph.D., P.E., 09/02/2025
Analysis & Quality Review/Date

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GEOTECHNICAL TESTING SERVICES
A TRI ENVIRONMENTAL COMPANY

Consolidated-Undrained Triaxial Compression

Client: Civil & Environmental Consultants, Inc.
Project: 345-817.0004 AEP Kammer Plant
Sample: A-7 (18'-20') ST-5

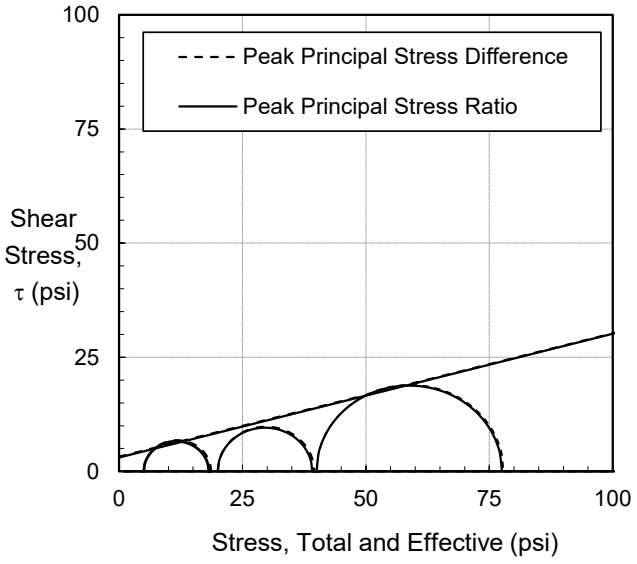
TRI Log #: 25-04143.9
Test Method: ASTM D4767

R / "Total Stress" Envelope			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Friction Angle (deg)	ϕ_R	15.1	15.2
Cohesion (psi)	c_R	3.2	3.0

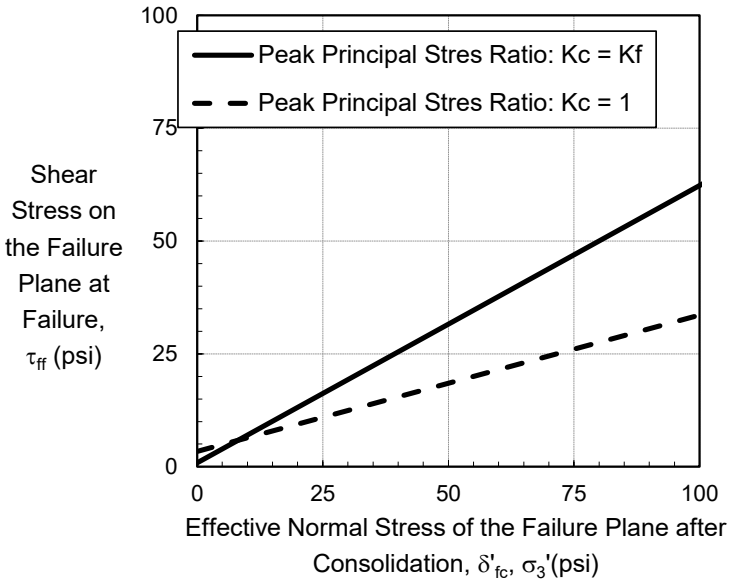
Kc = Kf Envelope, Effective Stress Envelope (Duncan et al. 1990)			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	ϕ'	31.6	31.6
Effective Cohesion (psi)	c'	0.7	0.8

Kc = 1 (τ_{ff} vs σ'_{fc}) Envelope, Total Stress Envelope (Duncan et al. 1990)			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Friction Angle (deg)	$d_{Kc=1}$	16.7	16.8
Cohesion (psi)	$\psi_{Kc=1}$	3.6	3.4

R / "Total Stress" Envelope



Three-Stage Rapid Drawdown

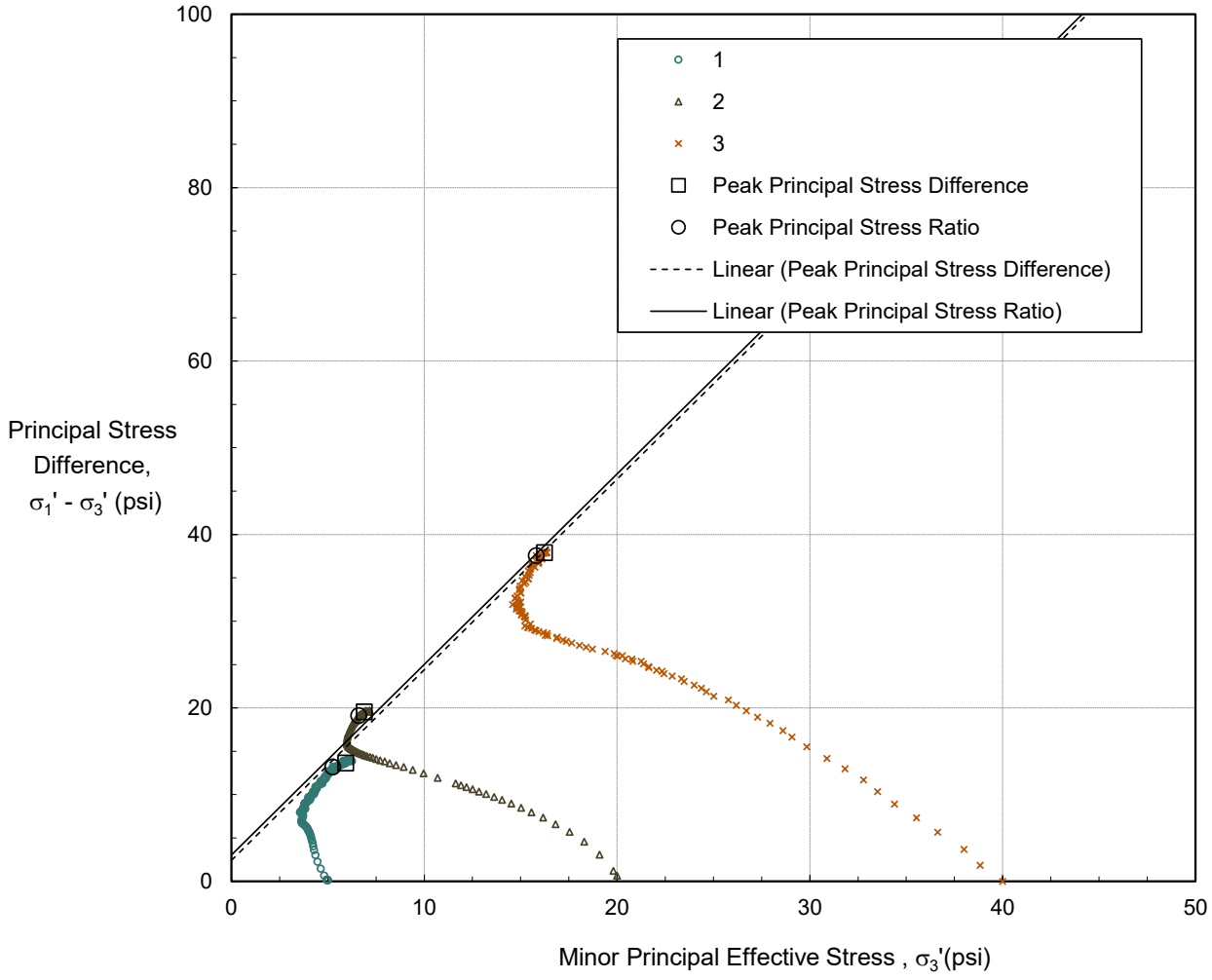


Consolidated-Undrained Triaxial Compression

Client: Civil & Environmental Consultants, Inc.
Project: 345-817.0004 AEP Kammer Plant
Sample: A-7 (18'-20') ST-5

TRI Log #: 25-04143.9
Test Method: ASTM D4767

Modified Mohr-Coulomb



Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	31.6	31.6
Effective Cohesion (psi)	0.7	0.8

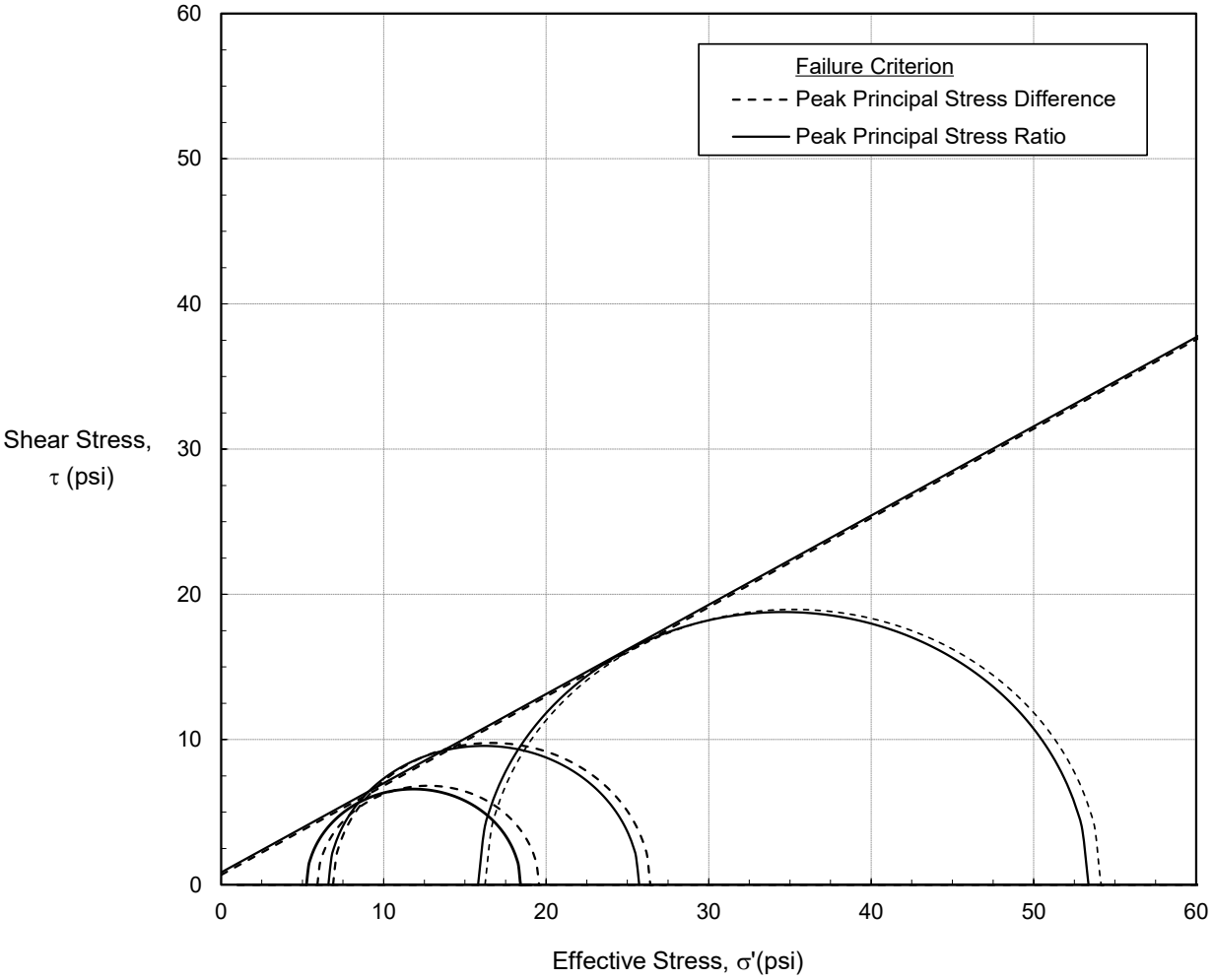
GEOTECHNICAL TESTING SERVICES
A TRI ENVIRONMENTAL COMPANY

Consolidated-Undrained Triaxial Compression

Client: Civil & Environmental Consultants, Inc.
Project: 345-817.0004 AEP Kammer Plant
Sample: A-7 (18'-20') ST-5

TRI Log #: 25-04143.9
Test Method: ASTM D4767

Mohr-Coulomb



Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1'-\sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	31.6	31.6
Effective Cohesion (psi)	0.7	0.8

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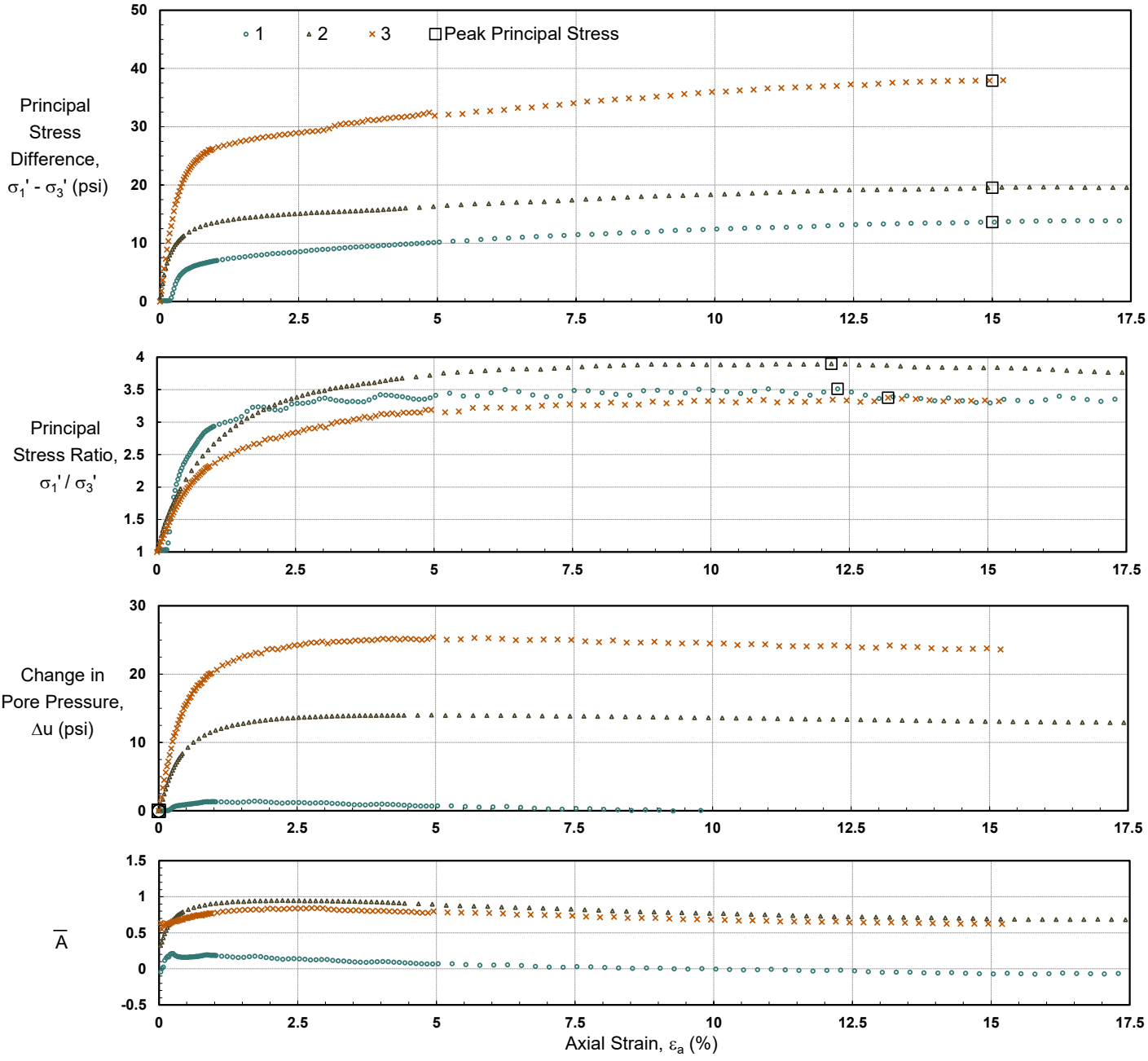
Consolidated-Undrained Triaxial Compression

Client: Civil & Environmental Consultants, Inc.
Project: 345-817.0004 AEP Kammer Plant
Sample: A-7 (18'-20') ST-5

TRI Log #: 25-04143.9
Test Method: ASTM D4767

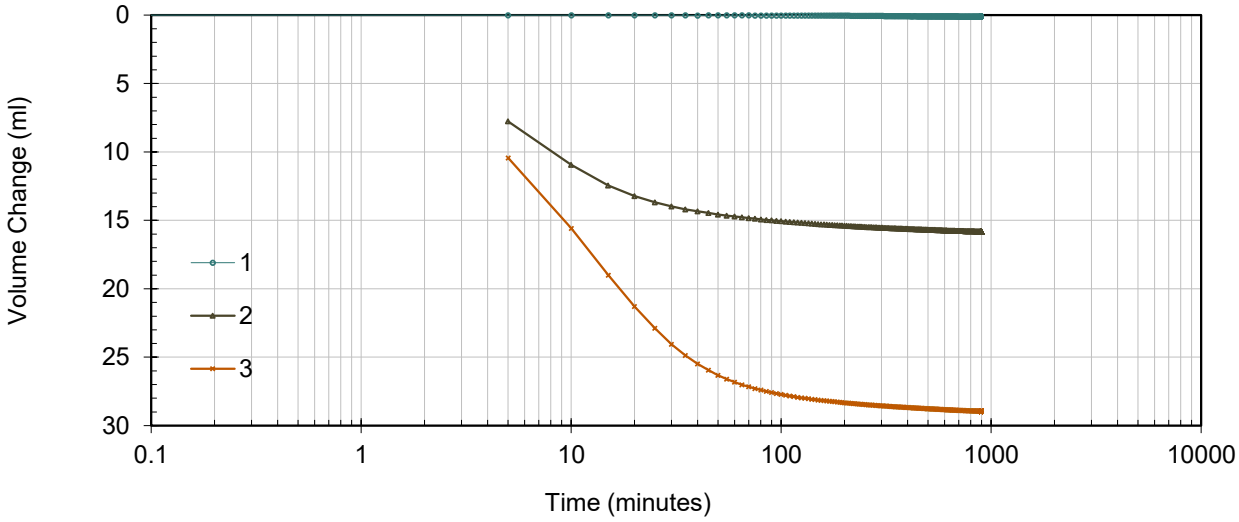


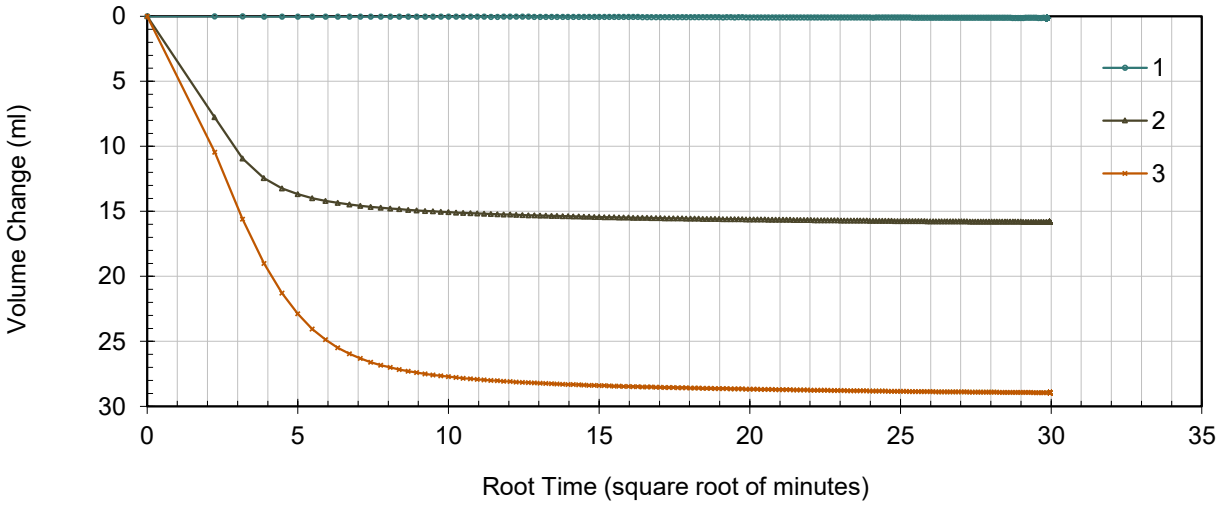
Consolidated-Undrained Triaxial Compression

Client: Civil & Environmental Consultants, Inc.
Project: 345-817.0004 AEP Kammer Plant
Sample: A-7 (18'-20') ST-5

TRI Log #: 25-04143.9
Test Method: ASTM D4767

Consolidation





GEOTECHNICAL TESTING SERVICES, INC., A TRI ENVIRONMENTAL COMPANY; 1-800-853-7309
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PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	**Boring**	MW-10
Client Project	345-817.0004 AEP Kammer Plant	**Depth**	8.5'-10.0'
Project No.	25-04143	**Sample**	SS-2
		Lab Sample	25-04143 -36

Sample Color: BROWN
USCS Group Name: WELL-GRADED GRAVEL WITH SILT AND SAND *Dry Prep: R58-11(2018)[1]*
USCS Group Symbol: GW-GM USDA: LOAMY SAND AASHTO: A-1-b (0)

MECHANICAL SIEVE

Total Sample	
Tare No.	88
Tare + WS., gm	394.38
Tare + DS., gm	385.73
Tare, gm	145.90
Total sample WC	**3.6%**
Total Sample Dry Wt, gm (-3")	240

Hygroscopic WC (-#10)	
Tare No.	236
Tare + WS., gm	24.99
Tare + DS., gm	24.91
Tare, gm	16.37
Hygroscopic WC	0.94%
-#10 Hydro/Sieve air dry wt.	60.64
Wt. of +#200 Sample, gm	46.21

Sieve Size	Nominal Opening, mm	Dry Wt, gm	Split Normalized % Retained	Split Normalized % Finer	Project Specifications
3"	75	0	0.0%	100.0%	
2-1/2"	63	0	0.0%	100.0%	
2"	50	0	0.0%	100.0%	
1-1/2"	37.5	0	0.0%	100.0%	
1"	25	48.56	20.2%	79.8%	
3/4"	19	25.87	10.8%	69.0%	
1/2"	12.5	10.8	4.5%	64.5%	
3/8"	9.5	6.40	2.7%	61.8%	
No. 4	4.75	30.43	12.7%	49.1%	
No. 10	2	37.50	15.6%	33.5%	
No. 20	0.85	10.35	5.7%	27.8%	
No. 40	0.425	13.89	7.7%	20.1%	
No. 60	0.25	6.71	3.7%	16.4%	
No. 140	0.106	13.38	7.4%	9.0%	
No. 200	0.075	1.88	1.0%	8.0%	

HYDROMETER (-#10)

Split Air Dry Wt 61.21 *23.6* Specific Gravity 2.7
Hygroscopic WC 0.94% Assumed
Corrected Dry wt 60.6 *-#10 Dispersed 1min in Hamilton Beach Mixer* *a Factor* *0.9889*

Elapsed Time (min.)	R Measured	Temp *C	Composite Correction	R Corrected	K Factor	Percent Finer (%)	Particle Diameter (mm)	Adjusted % Finer (%)
2	15.0	23.6	4.7	10.3	0.0129	16.8	0.0338	5.6%
5	11.5	23.6	4.7	6.8	0.0129	11.1	0.0218	3.7%
15	11.0	23.6	4.7	6.3	0.0129	10.3	0.0126	3.4%
30	10.5	23.7	4.6	5.9	0.0129	9.6	0.0090	3.2%
60	9.5	23.8	4.6	4.9	0.0129	8.0	0.0064	2.7%
250	8.5	23.9	4.6	3.9	0.0129	6.4	0.0031	2.1%
1440	7.0	23.9	4.6	2.4	0.0129	3.9	0.0013	1.3%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**50.9**	Silt=5.5% Clay=2.5%	
Coarse=31; Fine=19.9		D60, mm	8.61
% Sand (-#4 & +#200)	**41.1**	D30, mm	1.19
Coarse=15.6; Medium=13.4; Fine=12.1		D10, mm	0.12
% Fines (-#200)	**8.0**	Cc	1.38
% Plus #200 (-3")	**92.0**	Cu	72.37

USCS Description
WELL-GRADED GRAVEL WITH SILT AND SAND

USCS Group Symbol	Atterberg Limits Group Symbol		
GW-GM	**NP - NON PLASTIC**		
Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	66.5	0
2	33.5			
		Sand	26.7	79.8
0.05	6.8			
		Silt	5.1	15.1
0.002	1.7			
		Clay	1.7	5.1

USDA Classification
LOAMY SAND

Performed By: RH Input Validation: MA Reviewed By: BS Date Tested: 9/8/2025

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318-17e1

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	MW-10
Client Project	345-817.0004 AEP Kammer Plant	Depth	8.5'-10.0'
Project No.	25-04143	Sample	SS-2
		Lab Sample	25-04143 -36

Soil Description: BROWN NON PLASTIC MATERIAL
(-#40 Fraction)

AS-RECEIVED W.C.

Tare Number	88
Wt. Tare & WS, gm	394.38
Wt. Tare & DS, gm	385.73
Wt. Tare, gm	145.9
Water Content, %	3.6

SAMPLE SUMMARY

Liquid Limit (LL), %	NA
Plastic Limit (PL), %	NA
Plasticity Index (PI)	NA
USCS Group Symbol (*-#40 Fraction*)	NP
USCS Group Name (*-#40 Fraction*)	NON PLASTIC
Sample Color:	BROWN

PLASTIC LIMIT

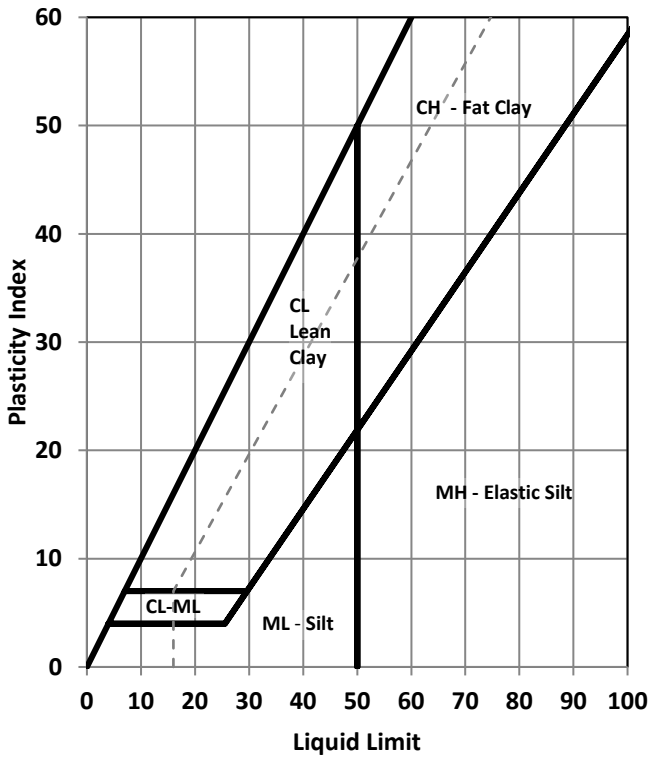
Points Run	0 Non-Plastic
Tare Number	
Wt. Tare & WS, gm	
Wt. Tare & DS, gm	
Wt. Tare, gm	
Water Content, %	

LIQUID LIMIT

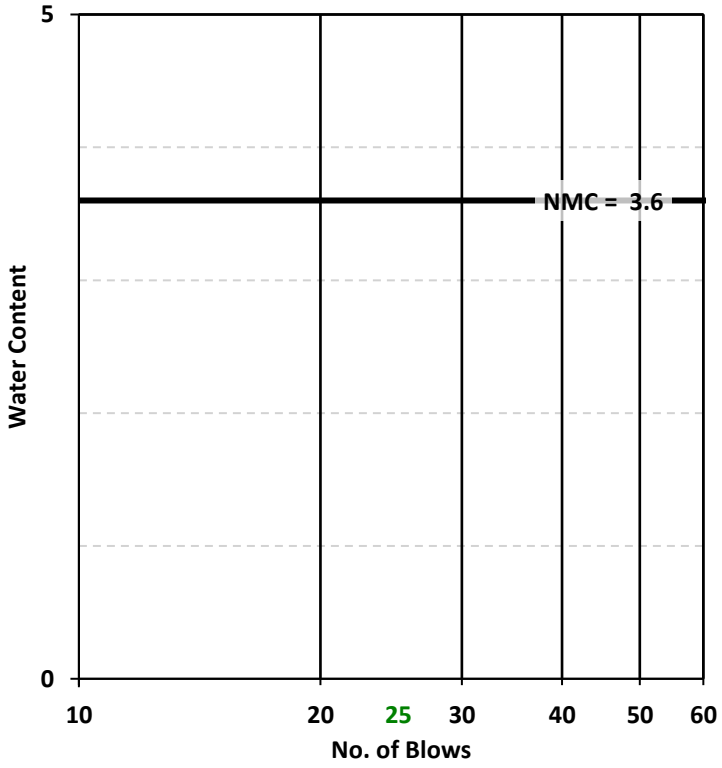
0 Non-Plastic

# of Blows

PLASTICITY CHART



FLOW CURVE



Performed By: RH | Input Validation:MA | Reviewed By: BS | Date Tested: 9/8/2025

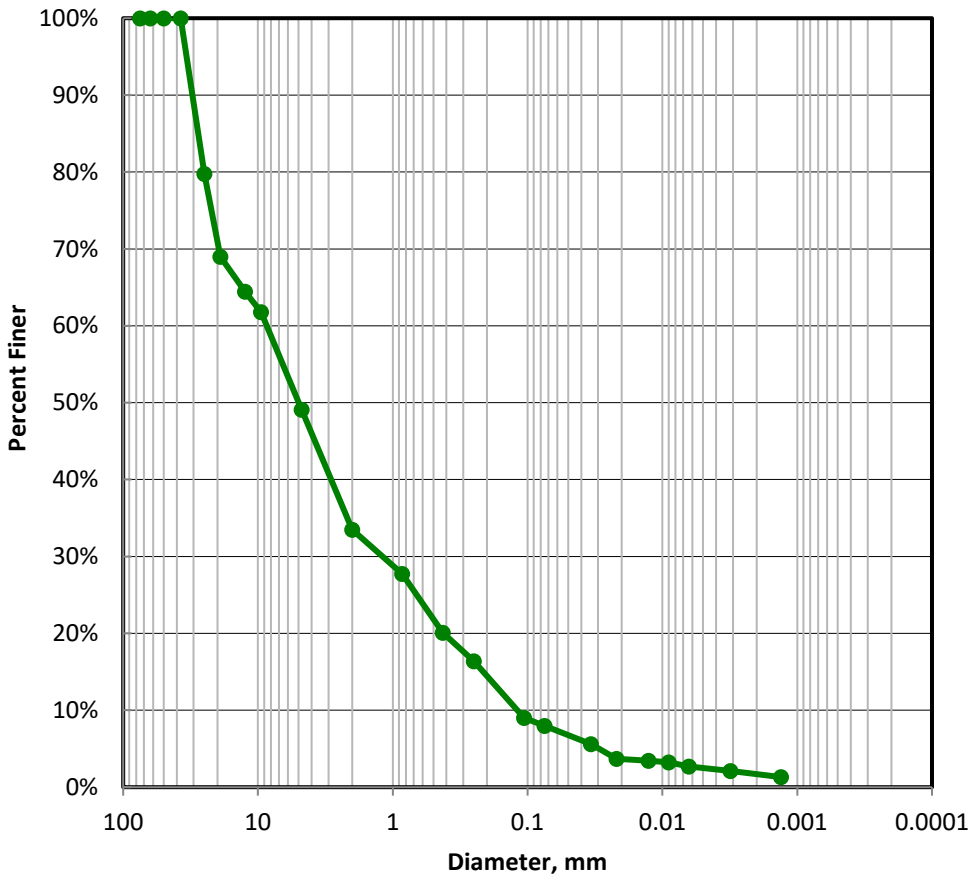
PARTICLE-SIZE ANALYSIS OF SOILS - ASTM D422-63(2007)

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	MW-10
Client Project	345-817.0004 AEP Kammer Plant	Depth	8.5'-10.0'
Project No.	25-04143	Sample	SS-2
		Lab Sample	25-04143 -36

Sample Color: **BROWN**

USCS Group Name: **WELL-GRADED GRAVEL WITH SILT AND SAND**

USCS Group Symbol: **GW-GM** USDA: **LOAMY SAND** AASHTO: **A-1-b (0)**



US Std. Sieve Size	Particle Diameter (mm)	Percent Finer
3"	75	100.0%
2-1/2"	63	100.0%
2"	50	100.0%
1-1/2"	37.5	100.0%
1"	25	79.8%
3/4"	19	69.0%
1/2"	12.5	64.5%
3/8"	9.5	61.8%
No. 4	4.75	49.1%
No. 10	2	33.5%
No. 20	0.85	27.8%
No. 40	0.425	20.1%
No. 60	0.25	16.4%
No. 140	0.106	9.0%
No. 200	0.075	8.0%
NA	0.0338	5.6%
NA	0.0218	3.7%
NA	0.0126	3.4%
NA	0.0090	3.2%
NA	0.0064	2.7%
NA	0.0031	2.1%
NA	0.0013	1.3%

USCS SOIL CLASSIFICATION

Corrected For 100% Passing a 3" Sieve

% Gravel (-3" & +#4)	**50.9**	Silt=5.5% Clay=2.5%	
Coarse=31; Fine=19.9		D60, mm	8.613
% Sand (-#4 & +#200)	**41.1**	D30, mm	1.189
Coarse=15.6; Medium=13.4; Fine=12.1		D10, mm	0.119
% Fines (-#200)	**8.0**	Cc	1.380
% Plus #200 (-3")	**92.0**	Cu	72.370

USCS Description

WELL-GRADED GRAVEL WITH SILT AND SAND

USCS Group Symbol	Atterberg Limits Group Symbol
GW-GM	**NP - NON PLASTIC**

Auxiliary Information	Wt Ret, gm	% Retained	% Finer
12" Sieve - 300 mm	0	0.0	100.0
6" Sieve - 150 mm	0	0.0	100.0
3" Sieve - 75 mm	0	0.0	100.0

USDA CLASSIFICATION

Particle Size (mm)	Percent Finer (%)	Percent of Each Component (Material)	(%)	Corrected Percent of -2.0 mm Material for USDA
100	100			
		Gravel	66.5	0
2	33.5			
		Sand	26.7	79.8
0.05	6.8			
		Silt	5.1	15.1
0.002	1.7			
		Clay	1.7	5.1

USDA Classification

LOAMY SAND

USDA CLASSIFICATION CHART

Client	Civil & Environmental Consultants, Inc. (CEC)	Boring	MW-10
Client Project	345-817.0004 AEP Kammer Plant	Depth	8.5'-10.0'
Project No.	25-04143	Sample	SS-2
		Lab Sample	25-04143 -36

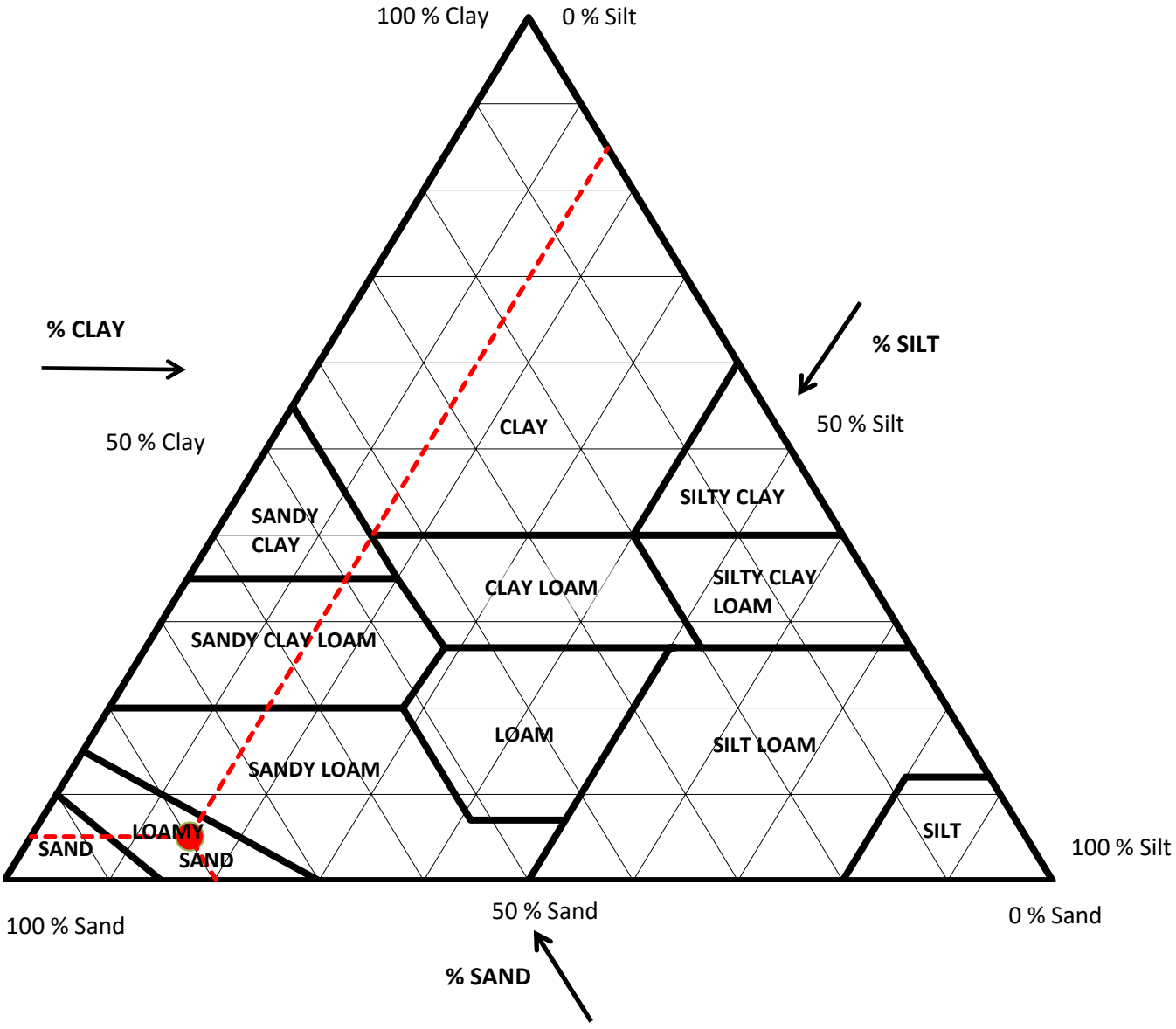
Sample Color: **BROWN**

USCS Group Name: **WELL-GRADED GRAVEL WITH SILT AND SAND**

USCS Group Symbol: **GW-GM** USDA: **LOAMY SAND** AASHTO: **A-1-b (0)**

Corrected for 0% gravel	
Percent Gravel, %	0.0
Percent Sand, %	79.8
Percent Silt, %	15.1
Percent Clay, %	5.1

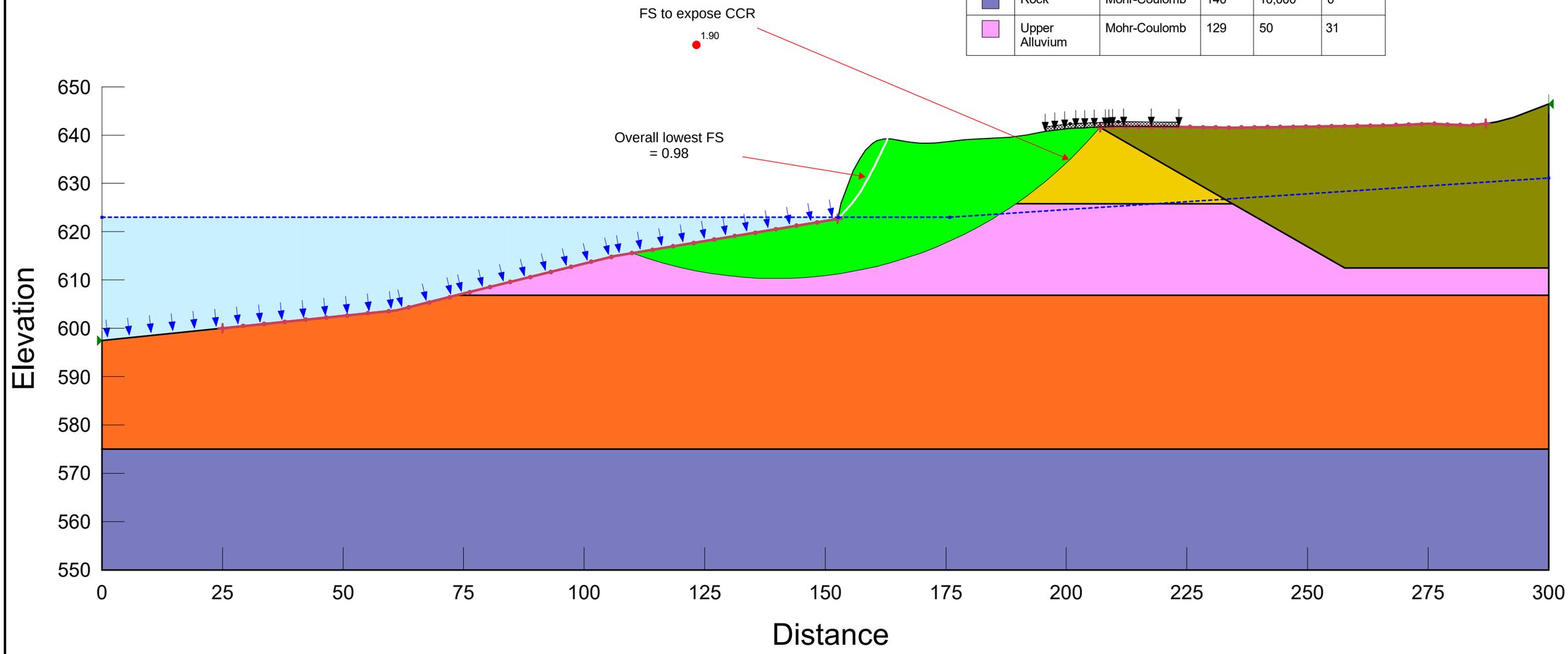
Sand Subsizes Corrected Percentages	
Very Coarse Sand; 2-1	13.8
Coarse Sand; 1-0.5	20.8
Medium Sand; 0.5-0.25	16.4
Fine Sand; 0.25-0.1	22.6
Very Fine Sand; 0.1-0.05	6.1
Total	**79.8**



APPENDIX IV

LONG-TERM MAXIMUM STORAGE POOL GEOSTUDIO OUTPUTS

Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	1966 Dike Fill	Mohr-Coulomb	124	50	32
	CCR	Mohr-Coulomb	90	0	24
	Dike Fill after 1966	Mohr-Coulomb	124	150	32
	Lower Alluvium	Mohr-Coulomb	130	0	33
	Rock	Mohr-Coulomb	140	10,000	0
	Upper Alluvium	Mohr-Coulomb	129	50	31

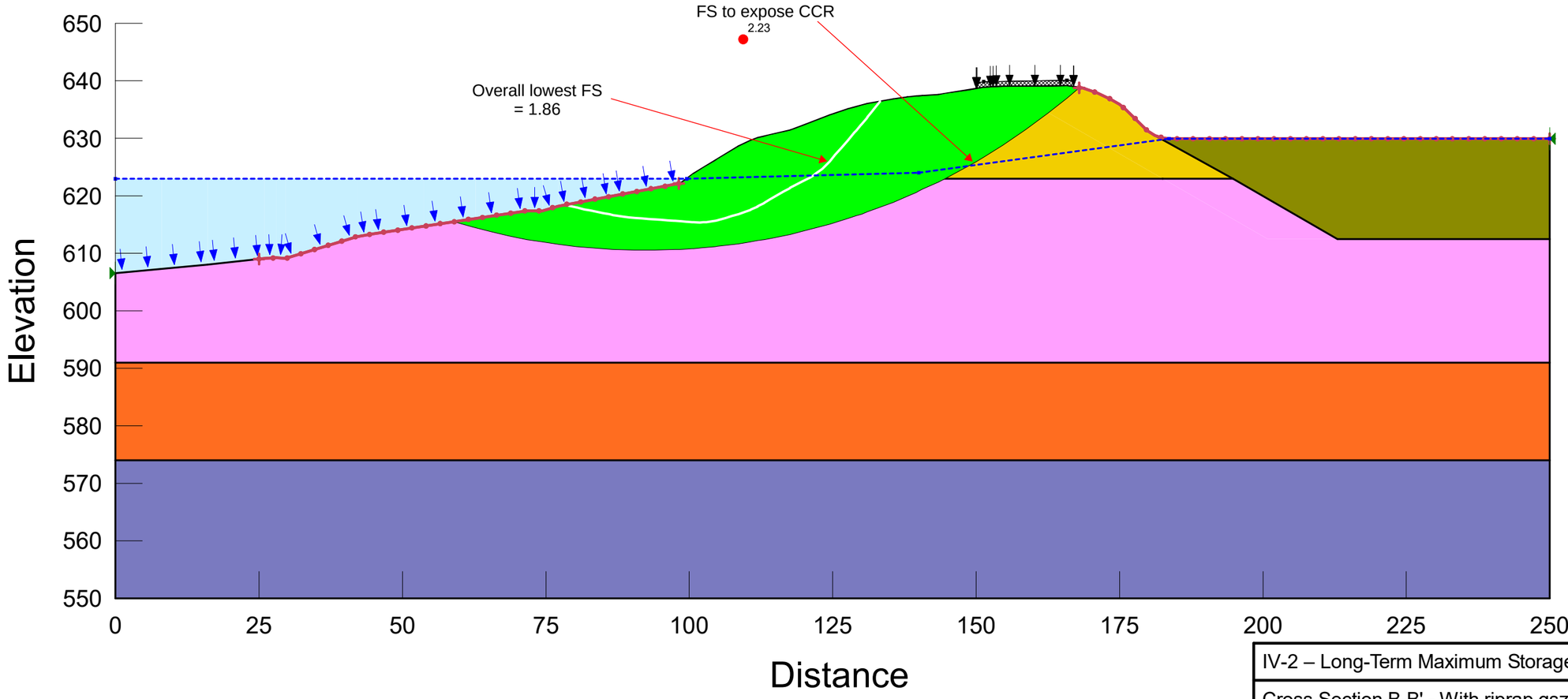


IV-1 – Long-Term Maximum Storage Pool - A-A' - Exterior

Cross Section A-A.gsz

12/2025 1:250

Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Piezometric Surface
	CCR	Mohr-Coulomb	90	0	24	1
	1966 Dike Fill	Mohr-Coulomb	124	50	32	1
	Lower Alluvium	Mohr-Coulomb	130	0	33	1
	Riprap	Mohr-Coulomb	150	0	38	1
	Rock	Mohr-Coulomb	140	10,000	0	1
	Upper Alluvium	Mohr-Coulomb	129	50	31	1



IV-2 – Long-Term Maximum Storage Pool – B-B’ – Exterior

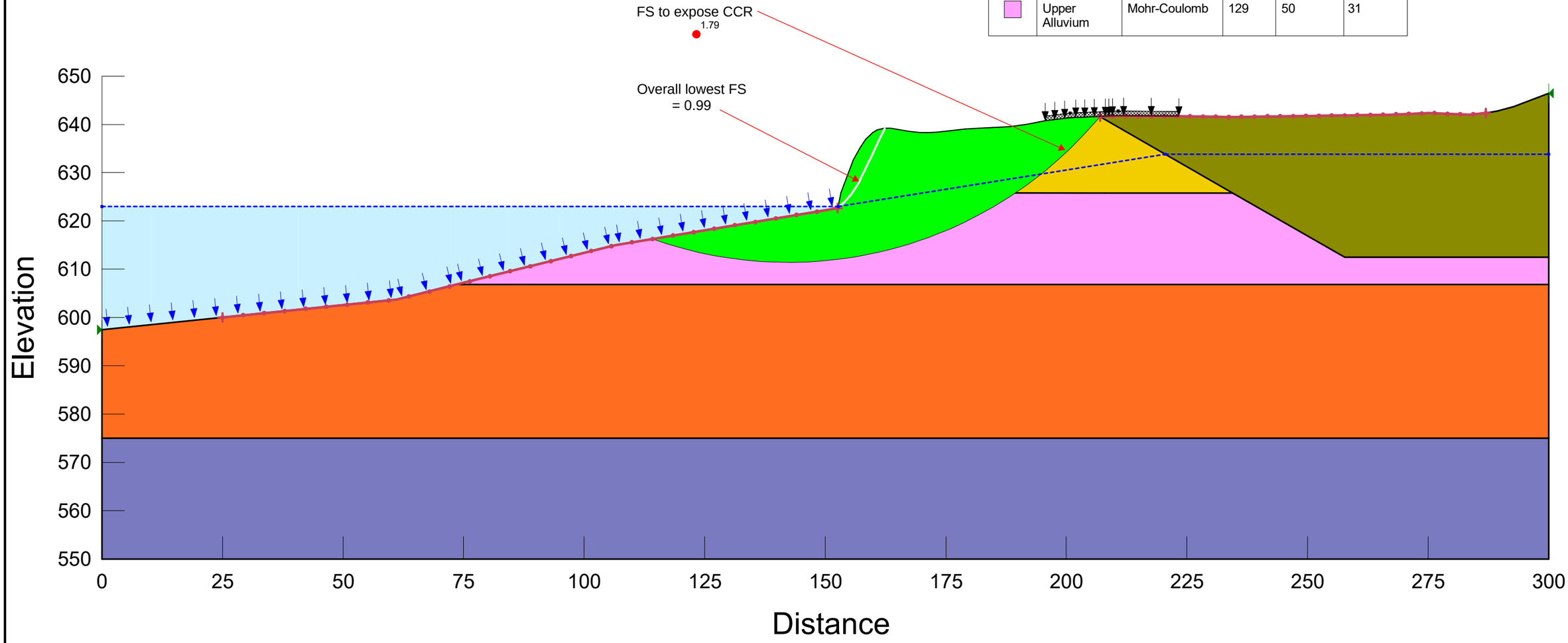
Cross Section B-B' - With riprap.gsz

12/2025 1:250

APPENDIX V

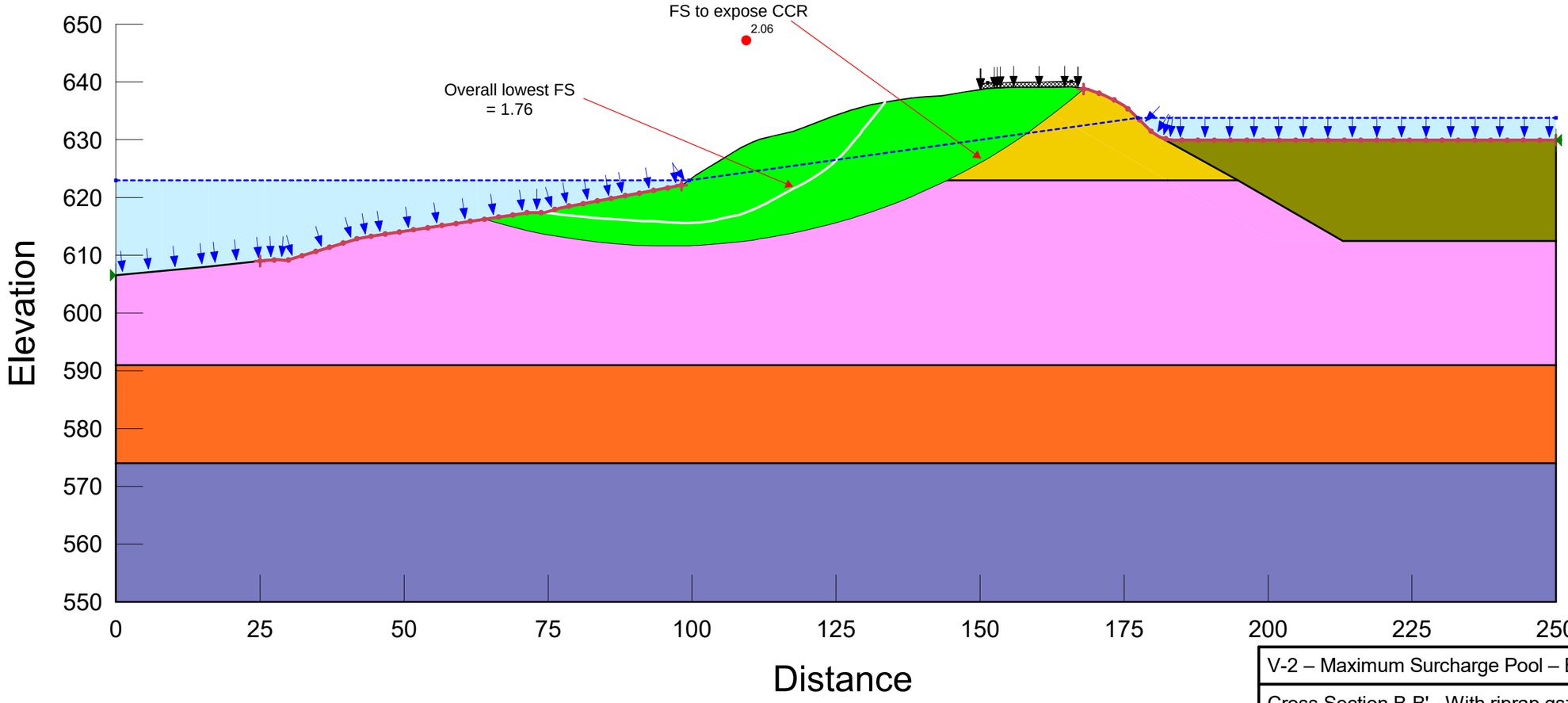
MAXIMUM SURCHARGE POOL GEOSTUDIO OUTPUTS

Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	1966 Dike Fill	Mohr-Coulomb	124	50	32
	CCR	Mohr-Coulomb	90	0	24
	Dike Fill after 1966	Mohr-Coulomb	124	150	32
	Lower Alluvium	Mohr-Coulomb	130	0	33
	Rock	Mohr-Coulomb	140	10,000	0
	Upper Alluvium	Mohr-Coulomb	129	50	31



V-1 – Maximum Surcharge Pool – A-A' –Exterior	
Cross Section A-A.gsz	
12/2025	1:250

Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Piezometric Surface
	CCR	Mohr-Coulomb	90	0	24	1
	1966 Dike Fill	Mohr-Coulomb	124	50	32	1
	Lower Alluvium	Mohr-Coulomb	130	0	33	1
	Riprap	Mohr-Coulomb	150	0	38	1
	Rock	Mohr-Coulomb	140	10,000	0	1
	Upper Alluvium	Mohr-Coulomb	129	50	31	1



V-2 – Maximum Surcharge Pool – B-B’ – Exterior

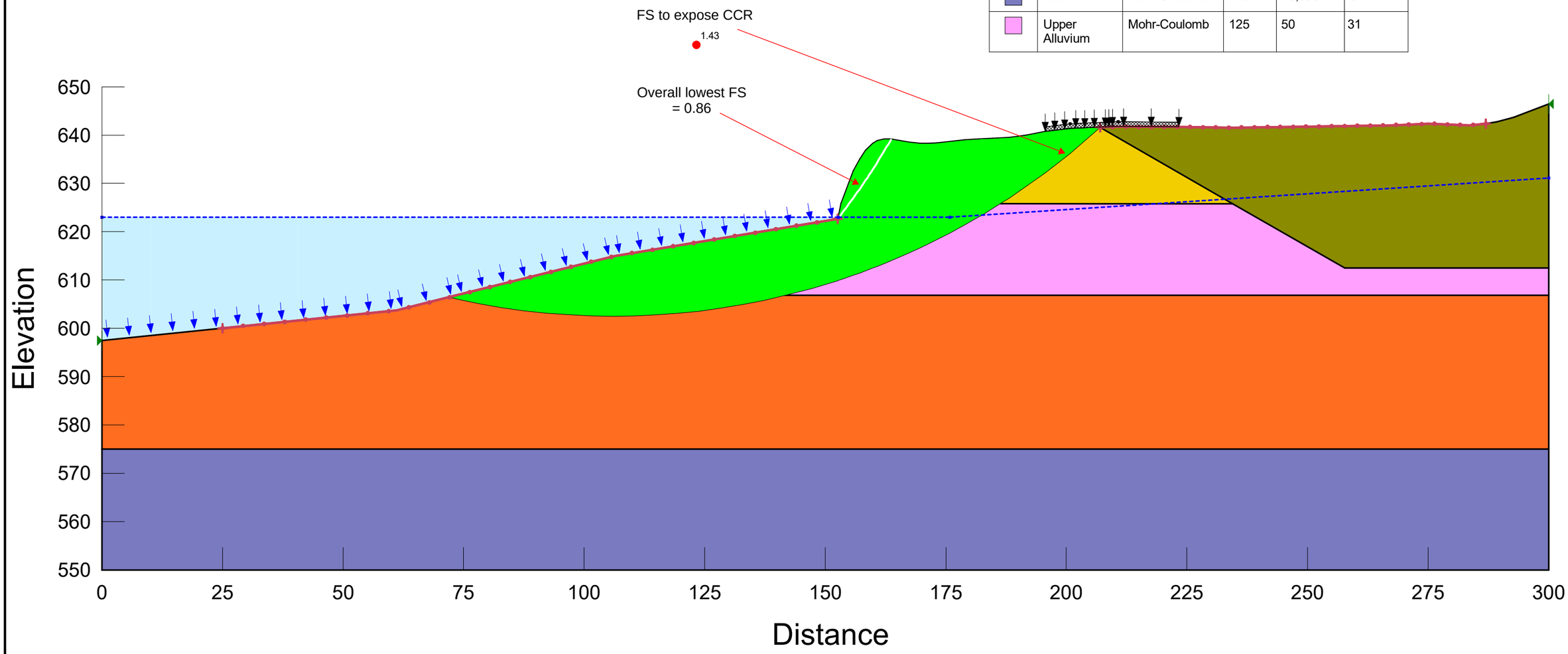
Cross Section B-B' - With riprap.gsz

12/2025 1:250

APPENDIX VI

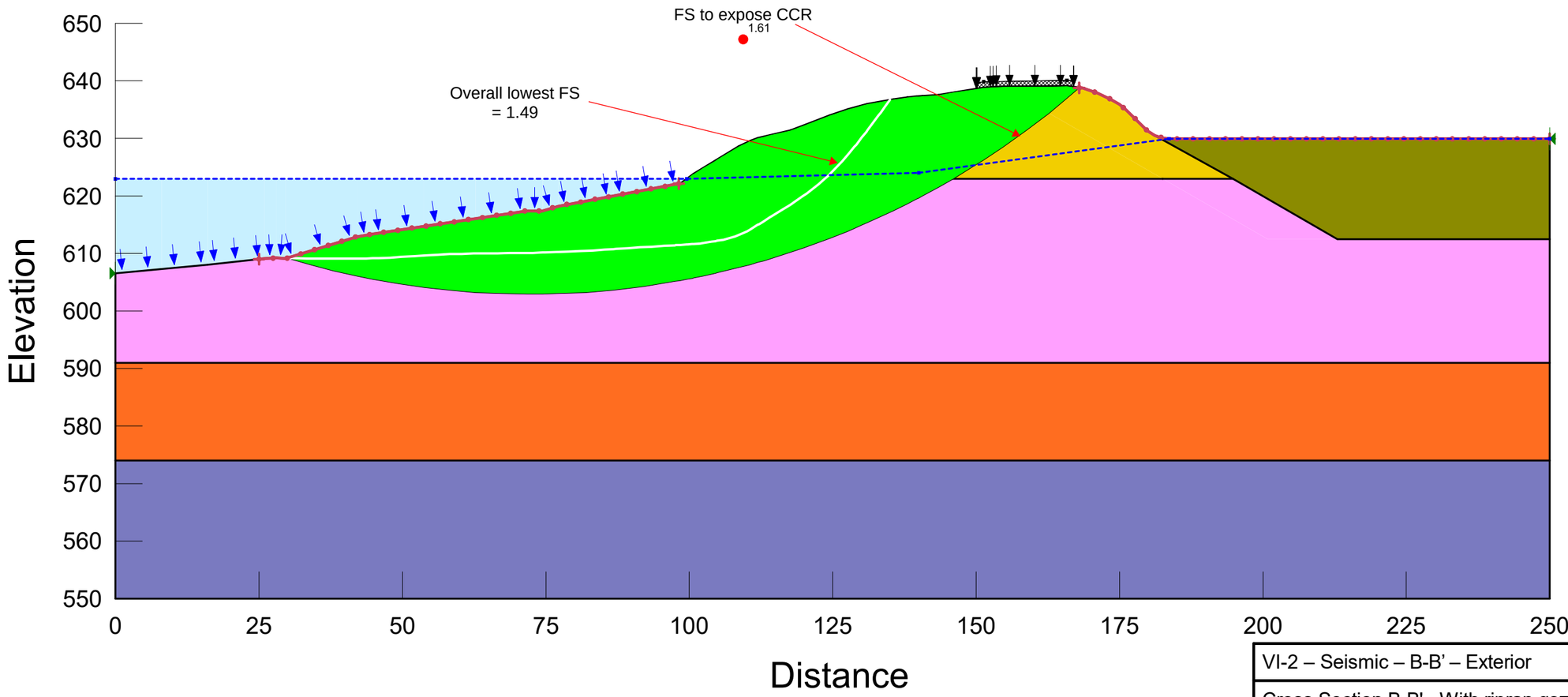
SEISMIC GEOSTUDIO OUTPUTS

Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	1966 Dike Fill	Mohr-Coulomb	124	50	32
	CCR	Mohr-Coulomb	90	0	24
	Dike Fill after 1966	Mohr-Coulomb	124	150	32
	Lower Alluvium	Mohr-Coulomb	130	0	33
	Rock	Mohr-Coulomb	140	10,000	0
	Upper Alluvium	Mohr-Coulomb	125	50	31



VI-1 – Seismic – A-A' – Exterior	
Cross Section A-A.gsz	
12/2025	1:250

Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Piezometric Surface
	CCR	Mohr-Coulomb	90	0	24	1
	1966 Dike Fill	Mohr-Coulomb	124	50	32	1
	Lower Alluvium	Mohr-Coulomb	130	0	33	1
	Riprap	Mohr-Coulomb	150	0	38	1
	Rock	Mohr-Coulomb	140	10,000	0	1
	Upper Alluvium	Mohr-Coulomb	129	50	31	1



VI-2 – Seismic – B-B’ – Exterior

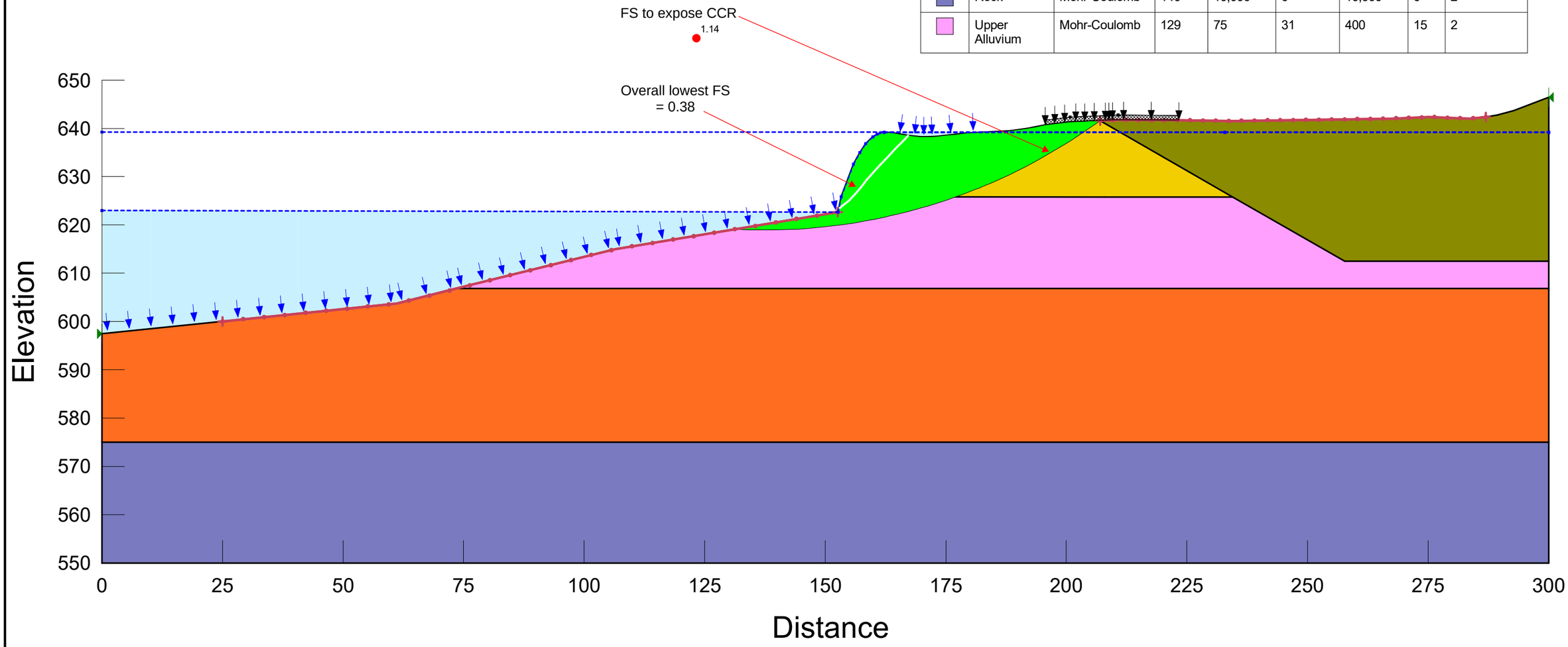
Cross Section B-B' - With riprap.gsz

12/2025 1:250

APPENDIX VII

RAPID DRAWDOWN GEOSTUDIO OUTPUTS

Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Cohesion R (psf)	Phi R (°)	Piezometric Surface After Drawdown
	1966 Dike Fill	Mohr-Coulomb	124	50	32	100	21	2
	CCR	Mohr-Coulomb	90	0	24	0	24	2
	Dike Fill after 1966	Mohr-Coulomb	124	150	32	100	21	2
	Lower Alluvium	Mohr-Coulomb	130	0	33	0	33	2
	Rock	Mohr-Coulomb	140	10,000	0	10,000	0	2
	Upper Alluvium	Mohr-Coulomb	129	75	31	400	15	2

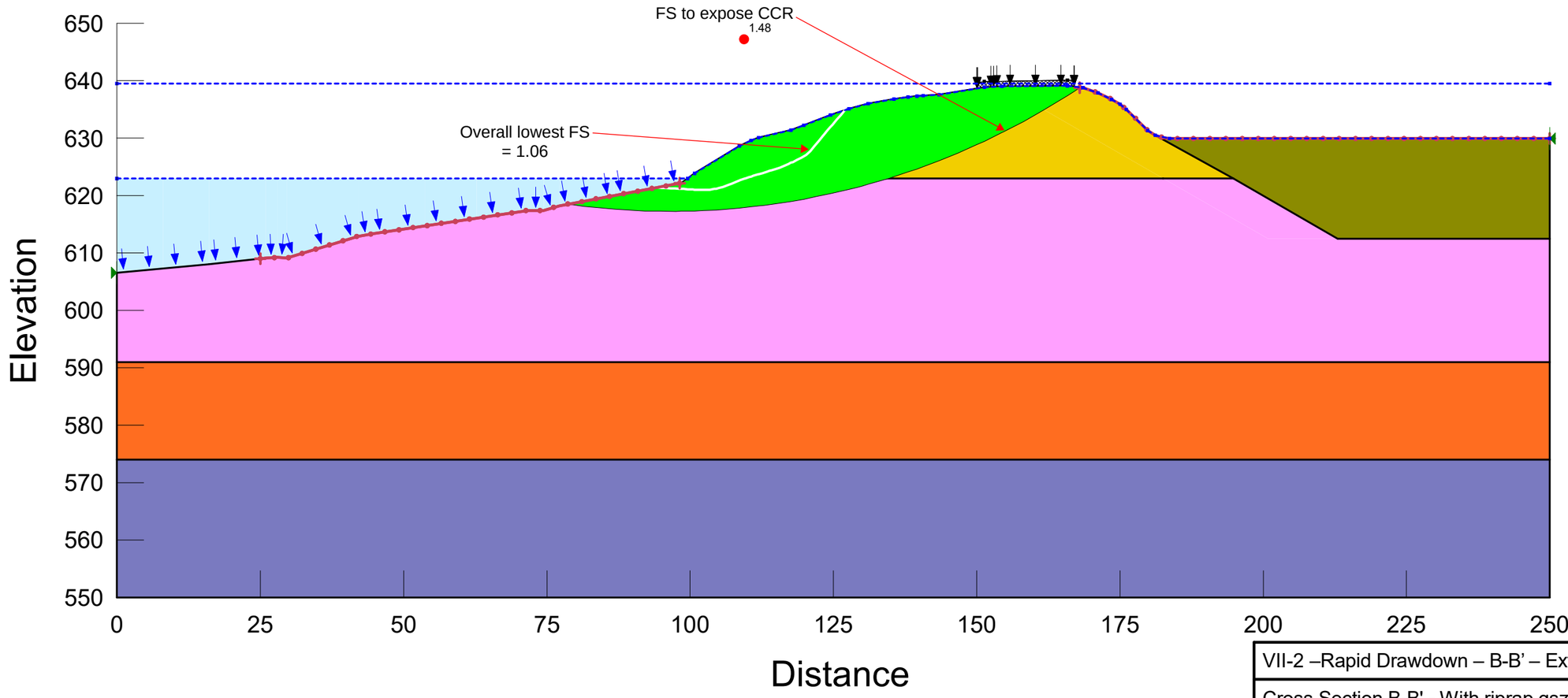


VII-1 –Rapid Drawdown – A-A' –Exterior

Cross Section A-A.gsz

12/2025 1:250

Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Cohesion R (psf)	Phi R (°)	Piezometric Surface	Piezometric Surface After Drawdown
	CCR	Mohr-Coulomb	90	0	24	100	0	1	2
	1966 Dike Fill	Mohr-Coulomb	124	50	32	100	21	1	2
	Lower Alluvium	Mohr-Coulomb	130	0	33	0	33	1	2
	Riprap	Mohr-Coulomb	150	0	38	0	38	1	2
	Rock	Mohr-Coulomb	140	10,000	0	10,000	0	1	2
	Upper Alluvium	Mohr-Coulomb	129	50	31	400	15	1	2



VII-2 –Rapid Drawdown – B-B’ – Exterior

Cross Section B-B' - With riprap.gsz

12/2025 1:250