HISTORY OF CONSTRUCTION

40 CFR 257.73(c)

East Fly Ash Pond

Kanawha River Site

Glasgow, West Virginia

February 2026

Prepared for: Appalachian Power Company

Prepared by: American Electric Power Service Corporation

1 Riverside Plaza

Columbus, OH 43215

Kanawha River Plant- East Fly Ash Pond

Legacy CCR Surface Impoundment

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APPROVED BY David Anthony Miller DATE 02.02.2026

David Anthony Miller, P.E.
Director – Ash Management Services



I certify to the best of my knowledge, information, and belief the information contained in this report meets the requirements of 40 CFR § 257.73(c).

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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 a history of construction document for each legacy CCR surface impoundment at the facility.

The East Fly Ash Pond at the Kanawha River Site is subjected to this rule.

2.0 DESCRIPTION OF CCR THE IMPOUNDMENT

The Kanawha River Site is located approximately 0.5 miles southeast of Glasgow, West Virginia. The latitude/longitude of the East Fly Ash Pond is: 38° 12' 16" N / 81°24' 47" W. Construction of the Kanawha River Plant began in October of 1950 and the plant reached commercial operation in August of 1953. The Kanawha River Plant ceased operating in May 2015.

American Gas and Electric Corporation designed the East Ash Pond in the 1950's. The East Fly Ash Pond is located on the eastern side of the plant property and encompasses roughly 22 acres. The East Fly Ash Pond is contained by a 2000-foot-long earthen dike along the Kanawha River.

3.0 SUMMARY OF OWNERSHIP 275.73(c)(1)(i)

[The name and address of the person(s) owning or operating the CCR unit: the name associated with the CCR unit: and the identification number of the CCR unit if one has been assigned by the state.]

The name associated with the CCR unit is East Fly Ash Pond. Appalachian Power Company is the owner of the East Fly Ash Pond at the Kanawha River Site. The East Fly Ash Pond has been assigned permit number: WV0001066

Appalachian Power Company
Attn: Gary Spitznogle
1 Riverside Plaza
Columbus, OH 43215
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4.0 LOCATION OF THE CCR UNIT 275.73 (c)(1)(ii)

[The location of the CCR unit identified on the most recent U.S. Geological Survey (USGS) 7 ½ minute or 15-minute topographic quadrangle map, or a topographic map of equivalent scale if a USGS map is not available.]

A location map is included in Attachment A.

5.0 STATEMENT OF PURPOSE 275.73 (c)(1)(iii)

[A statement of the purpose for which the CCR unit is being used.]

When the Kanawha River Plant was operational, the East Fly Ash Pond was a surface impoundment and landfill for settling and storing coal ash.

6.0 NAME AND SIZE OF WATERSHED THE CCR UNIT IS LOCATED 275.73 (c)(1)(iv)

[The name and size in acres of the watershed within which the CCR unit is located.]

The East Fly Ash Pond is located within the Region 5 - Ohio Region Watershed and is part of the subgroup Hydrologic Unit Code = 050500060306 Hughes Creek-Kanawha River watershed area. The East Fly Ash Pond does not have ponded water. The drainage area is equal to the pond footprint itself.

7.0 DESCRIPTION OF THE FOUNDATION AND ABUTMENT MATERIALS 275.73(c)(1)(v)

[A description of the physical and engineering properties of the foundation and abutment materials on which the CCR unit is located.]

Refer to the geotechnical data report included in Attachment B for additional information.

Earth fill was placed above the original grades to raise the perimeter dike to the current elevation. The dike was built with earth fill taken from within the pond footprint. The earth fill is predominantly classified as silty clay, and silty sand. Field SPT N-values in this material ranged from 4 to 26 blows per foot (bpf), with most of the values ranging between 10 and 25 bpf, indicating loose to compact relative density. The average of SPT-N values for this material was 15 bpf. Laboratory tests indicated the in-situ moisture contents ranged from 11.7% to 14.4%. Gradation tests performed on three samples showed 34% to 57% of the material passing the No. 200 sieve.

8.0 DESCRIPTION OF EACH CONSTRUCTED ZONE OR STAGE OF THE CCR UNIT 275.73 (C)(1)(VI)

[A statement of the type, size, range, and physical and engineering properties of the materials used in constructing each zone or stage of the CCR unit; and the approximate dates of construction of each successive stage of construction of the CCR unit.]

The East Fly Ash Pond functioned as a surface impoundment for fly ash storage beginning around 1953. The crest of the dike was originally set to elevation 625 ft-msl. The original design embankment geometry included downstream slopes of 2.5H:1V, 10-foot-wide crest and an interior slope of 1.75 H: 1 V.

Sometime around 1960, the crest of dikes was raised vertically 25 feet to elevation 650 ft-msl to provide additional ash storage capacity. The embankment was raised with fly ash harvested from the pond and the exterior slope of the raised cross section received earth cover. It is believed ash storage ceased in the East Fly Ash Pond in the late 1970s when the facility reached capacity.

The East Fly Ash Pond was capped and closed by November 2017 under West Virginia Class F Industrial Landfill Permit WV0001066. During closure, the perimeter dikes were lowered back down to elevation 625 ft-msl and the site was graded in a configuration that does not retain ponded water. Stormwater structures and spillways were demolished or abandoned in place via grout placement. The cap consists of a 40-mil textured LLDPE geomembrane, geocomposite drainage layer, geotextile cushion layer and 2 feet of protective crushed stone cover.

Two sections of the exterior slope were repaired by construction of a riprap revetment in 2020 and similarly four sections of the exterior slope were repaired by construction of a riprap revetment in 2025.

9.0 ENGINEERING STRUCTURES AND APPURTENANCES, 275.73 (C)(1)(VII)

[At a scale that details engineering structures and appurtenances relevant to the design, construction, operation, and maintenance of the CCR unit, detailed dimensional drawings of the CCR unit, including a plan view and cross sections of the length and width of the CCR unit, showing all zones, foundation improvements, drainage provisions, spillways, diversion ditches, outlets, instrument locations, and slope protection…]

AEP performed an extensive review to locate historical files, drawings and other information for the East Fly Ash Pond. All readily available drawings are included in Attachment C.

10.0 SUMMARY OF POOL SURFACE ELEVATIONS, AND MAXIMUM DEPTH OF CCR, 275.73 (c)(1)(vii)

[…in addition to the normal operating pool surface elevation and the maximum pool elevation following peak discharge from the inflow design flood, the expected maximum depth of CCR within the CCR surface impoundment.]

The East Fly Ash Pond at the Kanawha River Plant does not retain ponded water and the water related parts of this section do not apply. There is a maximum depth of CCR of roughly 60 feet at the East Fly Ash Pond, which includes the landfilled CCR.

11.0 FEATURES THAT COULD ADVERSELY AFFECT OPERATION DUE TO MALFUNCTION OR MIS-OPERATION (275.73 (c)(1)(vii))

[…and any identifiable natural or manmade features that could adversely affect operations of the CCR unit due to malfunction or mis-operation]

All structures that could adversely affect the CCR unit have been abandoned in 2015. Two-30-inch-diameter storm drains that passed underneath the East Fly Ash Pond have been abandoned in place by grouting closed. The former decant structure on the east end of the East Fly Ash Pond has been partially demolished and partially abandoned in place by grout placement.

12.0 DESCRIPTION OF THE TYPE, PURPOSE, AND LOCATION OF EXISTING INSTRUMENTATION 275.73 (c)(1)(viii)

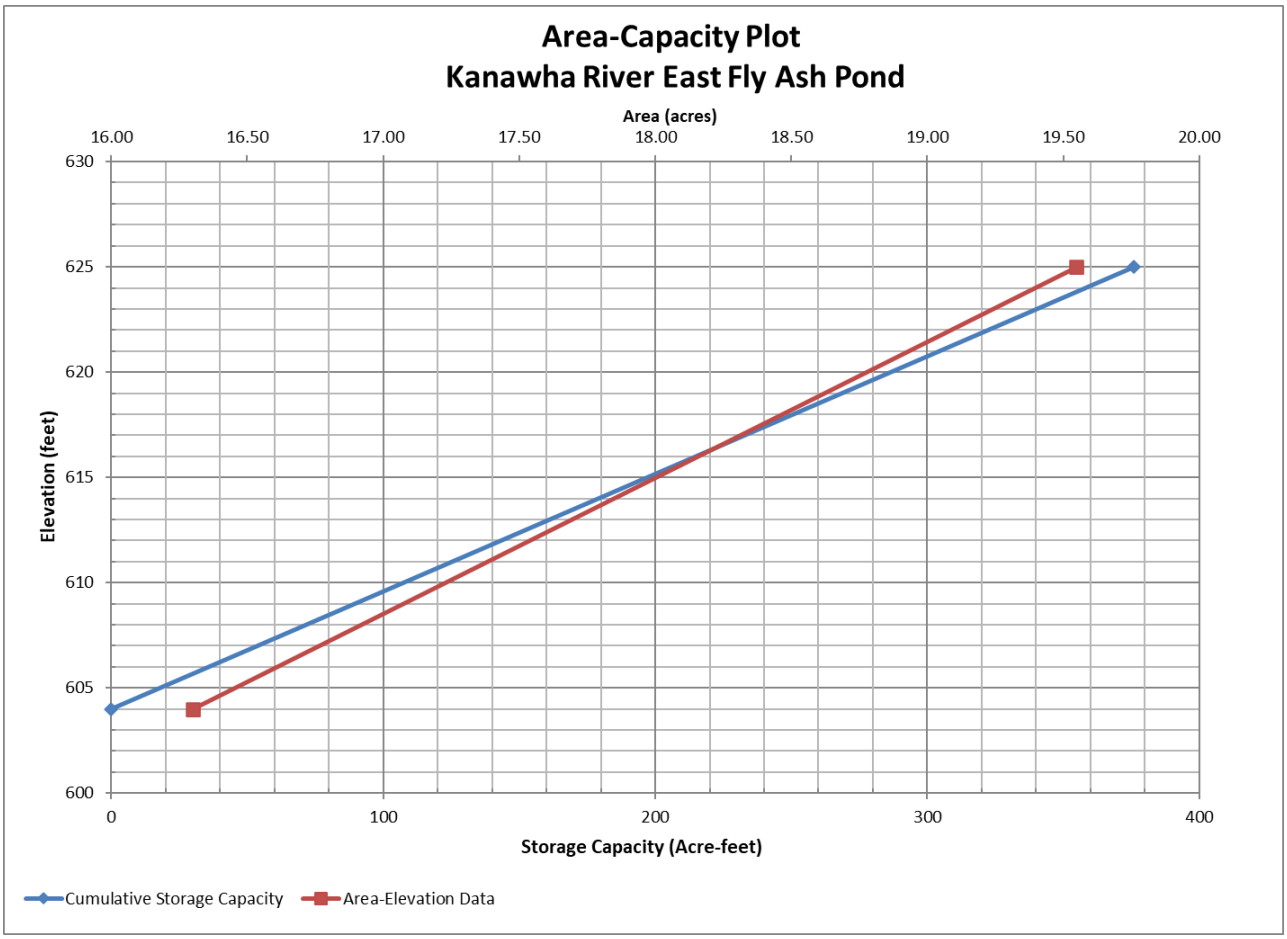
[A description of the type, purpose, and location of existing instrumentation.]

The East Fly Ash Pond at Kanawha River Plant does not have any instrumentation.

13.0 AREA – CAPACITY CURVES FOR THE CCR UNIT 275.73 (c)(1)(ix)

[Area-capacity curves for the CCR unit.]

The area-capacity curve shown below is based upon measurements taken from AEP drawing S-3344-3356-1. The area-capacity curves reflect conditions before landfill construction and closure. In total, there is approximately 1.3 M CY of CCR stored within the East Fly Ash Pond.



14.0 275.73 (c)(1)(x) DESCRIPTION OF EACH SPILLWAY AND DIVERSION

[A description of each spillway and diversion design features and capacities and calculations used in their determination.]

The East Fly Ash Pond does not have ponded water nor a functioning spillway. Therefore, this section is not applicable.

15.0 SUMMARY CONSTRUCTION SPECIFICATIONS AND PROVISIONS FOR SURVEILLANCE, MAINTENANCE AND REPAIR 275.73 (c)(1)(xi)

[The construction specifications and provisions for surveillance, maintenance, and repair of the CCR unit.]

There are no readily available portions of the original construction specifications.

As required by the CCR rules, the Kanawha River East Fly Ash Pond is inspected at least every 7 days by a qualified person. Also, as a requirement of the CCR rules the impoundment is also inspected annually by a qualified professional engineer.

If repairs are found to be necessary during any inspection they will be completed as soon as feasible.

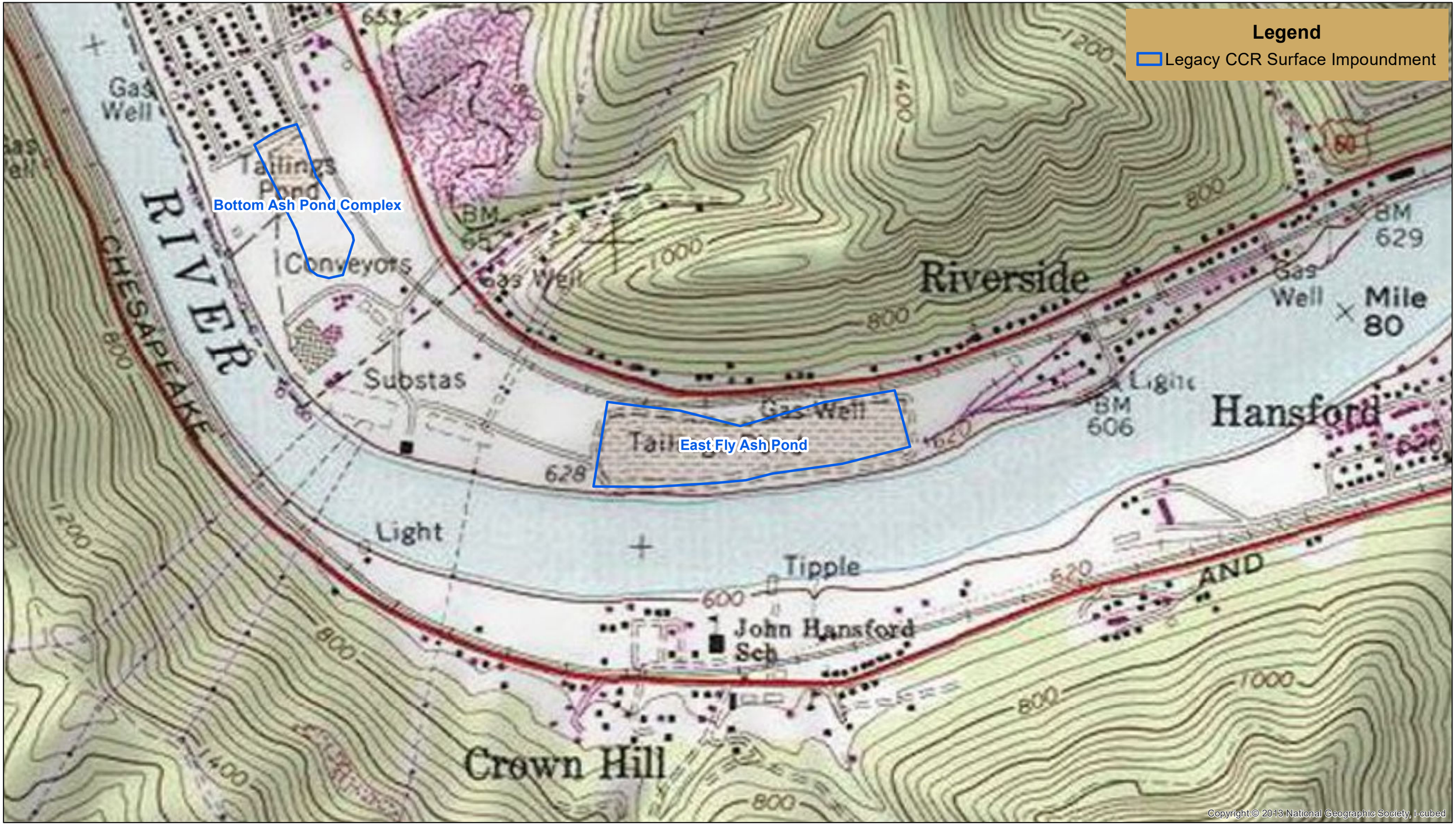
16.0 RECORD OR KNOWLEDGE OF STRUCTURAL INSTABILITY 275.73 (c)(1)(xii)

[Any record or knowledge of the structural instability of the CCR unit.]

To date there has been no known record of knowledge of the structural instability of the CCR unit.

ATTACHMENT A

LOCATION MAP



Attachment A
Site Map: Kanawha River Plant
Legacy CCR Surface Impoundments
Drawn By: Dan Murphy
Date: January 6, 2026

N
W E
S

0 500 1,000
Feet

AMERICAN ELECTRIC POWER

ATTACHMENT B

Geotechnical Data Report

REPORT

Geotechnical Data Report

Kanawha River Ash Ponds (BAP and EFA), Former Kanawha River Power Plant, Glasgow, West Virginia

Submitted to:

Mr. Daniel Murphy

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January 28, 2026

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Table 3: Summary of Engineering Material Properties

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APPENDIX B
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Geotechnical Laboratory Test Reports

1 INTRODUCTION

WSP USA Inc. (WSP) was retained by Appalachian Power Company, a subsidiary to American Electric Power Company, Inc., (AEP) to provide Coal Combustion Residual (CCR) Legacy Unit Engineering Support for AEP's two ash pond sites: the Eastern Fly Ash (EFA) Pond and the Bottom Ash Pond (BAP) located at the former Kanawha River Power Plant in Glasgow, West Virginia (Site), as shown in **Figure 1**. These sites are legacy CCR surface impoundments located in Glasgow, Kanawha County, adjacent to the Kanawha River, and are subject to the requirements of the Federal CCR Rule (40 Code of Federal Regulations (CFR) Part 257, Subpart D).

The purpose of this Geotechnical Data Report (GDR) is to compile and summarize historic geotechnical data for both sites and incorporate laboratory testing performed by WSP on select samples to support engineering evaluations required under the Federal CCR rule. In compiling this report, WSP reviewed available historic geotechnical explorations, including previous subsurface investigations, laboratory testing, and historic permit drawings to characterize the subsurface stratigraphy, soil material properties, and groundwater conditions at the sites. In addition, WSP performed laboratory tests on five soil samples collected by AEP's subconsultant, EHS Support (EHS), during the installation of monitoring wells at the EFA Pond.

This GDR presents a summary of the available data collected from these previous investigations and documents the subsurface conditions and geotechnical material properties based on the information compiled. WSP performed no new field exploration as part of this scope. This following sections of this GDR include descriptions of previous field explorations, laboratory testing, site geology, subsurface conditions, and engineering properties derived from available data and supplemental testing.

2 SITE VISIT

WSP visited both the BAP and EFA Pond sites on July 15, 2025, to observe current site conditions. Mr. Steven Moeller and Mr. Naveen Kumar Ganji conducted the site visit on behalf of WSP. WSP personnel performed the following at both sites:

- Observed site conditions related to the structural stability of the impoundments, including berms, dikes, erosion protection, vegetation, slopes, stormwater drainage features, etc.
- Photographed site features for documentation in the GDR (**APPENDIX A**)

During the site reconnaissance, the site observations were limited to features and structures that could be visually observed at the ground surface, and did not include invasive inspection, investigation, or exploration of the sites, embankments, or structures. WSP noted the following observations at the sites:

EFA Pond

- The cover material (general soil and vegetative fill) shown in the closure design drawings on top of the former impoundment was replaced with crushed limestone
- The entire impoundment area above the perimeter berm is cleared, well-maintained, and covered with 3-6-inch surge stone
- The perimeter berm along the northern side is mostly covered with riprap
- The southern slope of the ash pond along the Kanawha River and the southeastern slope are heavily wooded with trees and vegetation, making it difficult to inspect

- It appears that the replacement of the general fill soil with surge stone has caused excess run-off of stormwater at higher velocities onto the perimeter dike slope causing significant areas of erosion. While on site, AEP was repairing the damaged areas
- Significant areas of erosion were noted on the southern slope of the perimeter dike adjacent to the Kanawha River – AEP was working on the erosion repairs by removing disturbed soil from the erosion area and backfilling the area using geotextile and riprap
- Due to the heavy vegetation observed on some of the exterior dike slopes, not all areas were clearly observed

BAP Pond

- The majority of the BAP complex (North, South, and Clear Water Ponds) is incised and not constructed using perimeter dikes or embankments. The only section of the BAP with a perimeter dike is on the north side of the Clear Water Pond, which has a dike approximately 8 feet in height
- The north dike of the Clear Water Pond is well-maintained and doesn't have excessive vegetative growth
- There is a hydraulic system that underlies the BAP complex. It includes two stormwater pipes that enter into the North Pond and Clear Water Pond from east of the railroad tracks conveying water from upgradient of the ponds. These pipes connect to hydraulic structures MH-1 and MH-2. From these structures, the off-site stormwater is conveyed to MH-3, where it is piped and discharged into the Kanawha River

3 FIELD EXPLORATIONS AND LABORATORY TESTING PROGRAM

3.1 Field Explorations

Subsurface investigations at the EFA Pond and BAP sites have been conducted over multiple phases to characterize site conditions and support closure planning. The following sections discuss the historic explorations and lab testing conducted for each site.

EFA Pond

Previous geotechnical investigations were completed by AEP in the late 1980s and 2005, consisting of a total of 18 soil borings (FA-B-1 through FA-B-18) drilled in and around the impoundment (**Figure 2**). Shelby tube samples were collected and subjected to laboratory testing, including consolidated-undrained triaxial compression, unit weight, moisture content, and Atterberg limits analyses.

An additional limited geotechnical investigation consisting of three soil borings (B-14-01 through B-14-03) was performed by AEP in November 2014 as part of a project to relocate a stormwater conveyance pipe to the west of the EFA Pond (**Figure 2**).

AEP performed five soil borings with Standard Penetration Testing (SPT) and installed five monitoring wells (MW-1601 through MW-1605) in 2016 (**Figure 2**) at the EFA Pond. These wells were constructed to monitor groundwater quality and hydraulic conditions at the Site. Each well was drilled to a specified depth and screened across targeted intervals to capture groundwater flow representative of site conditions.

EHS installed several additional monitoring wells in 2025 in compliance with the Federal CCR Rule. As part of this investigation, EHS collected five Shelby tube samples — three from the dike material and two from the underlying

alluvial soils – are submitted the samples to WSP for laboratory testing. The samples were collected from two monitoring well locations, MW-2505D and MW-2511D, in the southern dike of EFA Pond (**Figure 2**).

BAP

A review of the 1989 landfill permit drawings (never constructed) for the Dry Fly Ash Disposal Site (a proposed single landfill for EFA Pond and BAP) indicated several borings, including FR-B-1 through FA-B-9, B-1 through B-20, and MW-1 through MW-17, performed adjacent to the BAP(**Figure 2**). The MW borings were installed between the late 1980s and mid-1990s; the timelines of the FR-B and B boring series are unavailable.

The pertinent historic boring location plans and available logs are presented in **APPENDIX B.** A summary of historic borehole locations is presented in Table 1.

3.2 Laboratory Testing Program

During the 2025 monitoring well installation program at EFA Pond, as discussed in Section 3.1, five Shelby tube samples — three from the dike material and two from the underlying alluvial soils - were collected from the southern dike of EFA Pond and submitted to WSP for laboratory testing. The purpose of the testing was to determine index and strength properties required for geotechnical characterization and engineering analysis of the embankment materials and the underlying native soils.

Testing was performed by a certified geotechnical laboratory in accordance with applicable ASTM standards. Laboratory tests included:

- Index Properties:
  - Moisture Content (ASTM D2216)
  - Atterberg Limits (ASTM D4318)
  - Particle Size Distribution (ASTM D6913)
  - Specific Gravity (ASTM D854)
- Unit weight Determination (ASTM D7263)
- Direct Shear (ASTM D3080)
- Consolidated-Undrained Triaxial Shear with Pore Pressure Measurements (CU, ASTM D4767)

Sample selection for testing was based on historical boring logs, visual classification/ field logs, and sample recovery, with a focus on identifying critical layers (embankment materials and foundation soils) in the subsurface.

Boring logs and available laboratory data sheets are included in **APPENDIX C** and **APPENDIX D**, respectively. The boring logs for the 2025 monitoring wells installed by EHS are still in development at the time this report was prepared.

4 SITE GEOLOGY

The project sites lie centrally within the Alleghany Plateau of West Virginia, a more specific region of the larger Appalachian Plateau. The terrain in the area is characterized by numerous steep hills and valleys, with ridges consistently near 1400 feet above mean sea level (MSL) and valleys ranging from 600 feet to 800 feet MSL. The physical geography of the area is most influenced by dendritic drainage and erosion towards the Kanawha River.

Geologic mapping within the county (Windolph 1987) has provided detailed descriptions for subsurface lithology within the area, which is characterized by Pennsylvanian-aged siliclastic and mudrock strata with subdued folding and faulting. The sites sit between the Warfield anticline and Handley syncline that, along with the sedimentary strata, exhibits a general northeast–southwest strike, with very gentle southeast dips.

The most prevalent formations are middle to upper Pennsylvanian sedimentary formations, described below from oldest to youngest:

- Kanawha Formation (Middle Pennsylvanian) - Sandstone, light gray, fine to coarse-grained quartz rich; Siltstone, thin-bedded, gray to black, carbonaceous; Coal, bright to dull, medium cleated; Chert, gray to black, conchoidal fractured.
- Charleston Sandstone (Middle Pennsylvanian) - Sandstone, light gray, very fine to coarse-grained, well-rounded conglomerates; Shale and Siltstone, gray to black, poorly bedded; Coal, bright to dull, coarsely cleated.
- Conemaugh Formation (Upper Pennsylvanian) - Sandstone, medium gray, very fine to coarse-grained, locally conglomeratic with subangular limestone and shale fragments; Siltstone and Shale, medium gray to green, some red, includes hematite nodules; Coal, dull and impure; Limestone, gray to brown, nodular, mudstone to packstone.

The sites are located in the Kanawha River Valley, situated within the Appalachian Plateau, characterised by gently folded sedimentary rocks of Pennsylvanian and Mississippian age. The geologic stratigraphy in this area typically consists of sequences of sandstone, shale, siltstone, claystone, and coal beds. The bedrock is overlain by unconsolidated alluvial deposits, especially along the river floodplain, which include silty sands, gravels, and clayey silts deposited by fluvial processes.

5 SUBSURFACE CONDITIONS

Subsurface conditions at the EFA Pond and BAP sites were characterized based on multiple phases of historic and recent investigations, including soil borings, monitoring well installations, and laboratory testing. The stratigraphy at both sites generally consists of engineered fill, coal combustion residuals (CCR), alluvial deposits, and underlying bedrock.

5.1 Fill and Embankment Materials

The EFA Pond is enclosed by an earthen dike with a crest elevation near 625 feet MSL. Historical drawings indicate that the original site grades ranged from 605 to 625 feet MSL. The interior of the basin was excavated to approximately 605 feet MSL and sloped toward an outfall structure located to the southwest, which discharged decant water to the Kanawha River during overflow conditions. Additional fill material (identified as “Earthfill” in this GDR) was placed above the original grades to raise the perimeter earthen dike to the current elevation of approximately 628 feet MSL.

Earthfill used to extend the perimeter berms was identified in boreholes MW-1601 through MW-1605 and in MW-2505D and MW-2511D, and was visually classified as silt clay, and silty sand. Field SPT N-values in this material ranged from 4 to 26 blows per foot (bpf) with most of the values ranging between 10 and 25 bpf, indicating loose to compact relative density. The average of SPT-N values for this material was 15 bpf. Laboratory tests indicated the in-situ moisture content of this material ranged from 11.7% to 14.4%. Gradation tests performed on three samples showed 34% to 57% of the material passing the No. 200 sieve.

The BAP complex is located northwest of the EFA Pond and consists of the North BAP, the South BAP, and the Clearwater Pond. It is bounded by the former coal storage yard on the west and the railroad EFA Pond on the east. The BAP is primarily a below-grade facility (incised), with only the northern portion of the Clearwater Pond retained by a dike. The north dike of the Clearwater Pond extends about 230 feet, features a top elevation of 623 feet MSL, and appears to have been built using cohesive materials from the original plant excavations.

5.2 Coal Combustion Residuals

CCRs, including fly ash and bottom ash, are byproducts of coal-fired power generation. At the EFA Pond, CCR materials were sluiced into the impoundment from an approximate elevation of 605 feet MSL to 625 feet MSL. Above this elevation, it appears CCR materials were hauled and placed into the EFA Pond to an elevation of up to 668 feet MSL.

CCR materials were identified in all boreholes inside the EFA Pond perimeter dike extending at depth to an approximate elevation of 605 feet MSL. Field SPT N-values recorded in this material ranged from 10 to 53 bpf, with most of the values ranging between 6 and 10 bpf, indicating loose to compact relative density. The average of SPT-N values for this material was 10 bpf. Laboratory tests indicated the in-situ moisture contents ranged from 9% to 39%. Gradation tests performed on three samples showed 42% to 93% of the material passing the No. 200 sieve.

5.3 Alluvium

Alluvial soils deposited by the Kanawha River were encountered in the borings either beneath the Earthfill within the embankment or beneath the CCR materials within the ash pond. Generally, the alluvial soils at the Site were encountered below the CCR materials or the Earthfill and extended to an approximate elevation of 570 feet MSL.

Based on a review of the SPT N-values, the alluvium at the EFA Pond and BAP sites can be divided into two layers – Alluvium-1 and Alluvium-2.

- Alluvium-1: Predominantly silty clay and silty sands. Field SPT N-values ranged from “weight of hammer” (WOH) over 18 inches to 24 bpf, with most values between 6 and 10 bpf, indicating loose to compact relative densities. This material lies below the CCR materials or the Earthfill and extends to an elevation of approximately 590 feet MSL.
- Alluvium-2: Predominantly sands and gravel. Field SPT N-values ranged from 2 to >100 bpf, with most values between 27 and 48 bpf, indicating compact to dense relative densities. This material lies below Alluvium-1 and extends to an elevation of approximately 570 feet MSL.

Laboratory tests on alluvial soils indicated the in-situ moisture contents ranged from 15% to 30%. Atterberg limits for these soils ranged from non-plastic (NP) to a liquid limit of 37% and a plasticity index up to 14%. Gradation tests showed 19% to 91% of the material passing the No. 200 sieve.

Representative subsurface stratigraphy cross-sections at the Site are provided in **APPENDIX B**.

5.4 Bedrock

Bedrock was encountered beneath the alluvial deposits at an approximate elevation of 570 feet MSL. The bedrock in this region consists primarily of Pennsylvanian-age sedimentary rocks, including sandstone, siltstone, shale, and coal beds, as described in Section 4 (Site Geology).

5.5 Groundwater

Groundwater conditions at the EFA Pond and BAP have been characterized through historic monitoring well installations and subsurface investigations. Based on a review of previous investigations and reports from the Site, WSP has assumed that the water level in the area is similar to the ordinary high water mark (OHWM) in the Kanawha River, which is elevation 594 feet MSL. Historic Groundwater levels collected by AEP are provided in Table 4 and a potentiometric map developed by AEP is provided in **APPENDIX B.**

6 GEOTECHNICAL MATERIAL PROPERTIES

Consolidated-undrained triaxial tests were performed on representative samples collected from the EFA Pond to determine shear strength parameters under controlled conditions. The results provide insight into the material behavior under both drained and undrained loading scenarios, which is critical for stability analyses and closure design.

SPT Correlation and Strength Parameters: SPT values were correlated with shear strength parameters using established empirical relationships commonly applied in geotechnical engineering practice. These correlations consider soil type, relative density, and consistency, and were used to estimate cohesion (c) and friction angle (φ). The calculations followed procedures outlined in ASTM D1586 and supplemented by published correlations (Peck, Hanson & Thornburn, 1974). A summary table of SPT-based correlations and corresponding strength parameters is presented in Table 3.

7 LIMITATIONS

The information, data, and interpretations presented in this GDR are based on the conditions encountered at the specific locations and depths of the subsurface explorations performed for this project. Subsurface conditions can vary significantly between and beyond these exploration points. No warranty is expressed or implied regarding the continuity of soil, rock, or groundwater conditions across the Site.

This report is intended solely to document factual subsurface data obtained during the field and laboratory investigations. It does not provide engineering analyses, design recommendations, or opinions regarding the suitability of the Site for any specific purpose. Any use of this report for purposes other than its intended scope is at the discretion and risk of the user.

Groundwater levels reported herein represent conditions observed at the time of exploration and may fluctuate seasonally or due to construction activities. The data should not be interpreted as absolute or permanent groundwater conditions.

The findings in this report should be considered in conjunction with the limitations inherent in geotechnical investigations, including variability of natural materials and the restricted number of sampling locations. Additional investigations may be warranted if significant changes in Site conditions occur or if the proposed development differs from the assumptions made during this study.

8 REFERENCES

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Signature Page

We appreciate the opportunity to provide CCR Legacy Unit Engineering Support for AEP's Kanawha River Ash Ponds. If you have questions regarding our report, please contact the undersigned.

Sincerely,

WSP USA Inc.





Naveen Kumar Ganji, PE (GA, TN, TX, VA)
Senior Consultant

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PG/NG/SM/ng

https://wsponlinenam.sharepoint.com/sites/us-aep-efa-kanawha-r/shared documents/5 technical work/gdr/gdr_kanawha_river_ccr_engsupport.docx

Tables

Table 1: Summary of Subsurface Exploration

Boring ID	Date	Ground Surface Elevation (feel MSL)	Borehole Depth (feet-bgs)	Groundwater Elevation (feet MSL)	Bottom of Ash Elevation (feet MSL)	Location Notes
FA-B-1	7/19/1988	640.9	76	640.9	607.7	EFA or just west of EFA
FA-B-2	7/25/1988	638.2	88.1	638.2	611.2	
FA-B-3	8/1/1988	643.2	78.8	643.2	600.9	
FA-B-4	8/9/1988	646.4	81.6	646.4	604.4	
FA-B-5	8/3/1988	647.7	78.4	647.7	609.4	
FA-B-6	8/18/1988	626.6	65.5	626.6	Not Applicable	
FA-B-7	8/11/1988	626.8	73.5	626.8	Not Applicable	
FA-B-8	9/8/1988	640	75.6	640	602.7	
FA-B-9	9/13/1988	642.4	87.8	642.4	604.2	
FA-B-10	8/30/1988	645.2	70.7	645.2	603.2	
FA-B-11	9/7/1988	650.7	74.4	650.7	603.2	
FA-B-12	7/18/1988	629.6	64.1	629.6	611.8	
FA-B-13	8/31/1988	649	74.8	649	595.5	
FA-B-14	8/17/1988	645.5	DCP	NA	NA	
FA-B-15	6/1/1989	640	-	642.3	NA	
FA-B-16	6/2/1989	648.4	-	643.4	NM	
FA-B-17	4/19/2005	647.9	79.8	647.9	603.5	
FA-B-18	4/19/2005	642.5	78.9	642.5	600.5	
B-14-01	11/11/2014	629.8	60.5	629.8	599.3	
B-14-02	11/12/2014	629.9	58	629.9	615.9	
B-14-03	11/12/2014	631.8	60.5	631.8	620.3	
MW-1601	9/7/2016	627.8	64.7	627.8	NA	
MW-1602	9/8/2016	627.5	63	627.5	NA	
MW-1603	9/13/2016	628	58	628	NA	
MW-1604	9/20/2016	628	61.5	628	NA	
MW-1605	9/19/2016	628	53	628	NA	
MW-2505 D	NA	628	NA	628	NA	
MW-2511 D	NA	628	NA	628	NA	
FR-B-1	UNK	632.5	NA	NA	NA	North of and outside BAP
FR-B-2	UNK	622.7	NA	NA	NA	
FR-B-3	UNK	625.7	NA	NA	NA	
FR-B-4	UNK	629.9	NA	NA	NA	
FR-B-5	UNK	629.4	NA	NA	NA	
FR-B-6	UNK	626.2	NA	NA	NA	
FR-B-7	UNK	625.3	NA	NA	NA	
FR-B-8	UNK	623.4	NA	NA	NA	
FR-B-9	UNK	646.3	NA	NA	NA	
B-1	UNK	625.3	64.3	NA	NA	South or southeast of and outside BAP
B-2	UNK	623.1	58.8	NA	NA	
B-3	UNK	622.1	54.3	NA	NA	
B-4	UNK	628	60.1	NA	NA	
B-5	UNK	627.5	63.3	NA	NA	
B-6	UNK	628.1	66.3	NA	NA	
B-7	UNK	627.8	64.9	NA	NA	
B-8	UNK	625.7	63.6	NA	NA	

Table 1: Summary of Subsurface Exploration

Boring ID	Date	Ground Surface Elevation (feel MSL)	Borehole Depth (feet-bgs)	Groundwater Elevation (feet MSL)	Bottom of Ash Elevation (feet MSL)	Location Notes
B-9	UNK	624.7	61.3	NA	NA	South or southeast of and outside BAP
B-10	UNK	618.3	55.1	NA	NA	
B-11	UNK	613.6	50.1	NA	NA	
B-12	UNK	609.3	46.6	NA	NA	
B-13	UNK	594.5	78.5	NA	NA	
B-14	UNK	609.6	26.1	NA	NA	
B-15	UNK	624.8	63.6	NA	NA	
B-16	UNK	628.8	67.5	NA	NA	
B-17	UNK	626.8	63.3	NA	NA	
B-18	UNK	622.4	57.5	NA	NA	
B-19	UNK	626	64.0	NA	NA	
B-20	UNK	621.3	54.8	NA	NA	
MW-1	7/20/88	640.9	NA	NA	NA	Historic MW Borings
MW-2	7/22/88	638.2	NA	NA	NA	
MW-3	8/02/88	643.2	NA	NA	NA	
MW-4	8/10/88	646.4	NA	NA	NA	
MW-5	8/08/88	647.7	NA	NA	NA	
MW-6	8/29/88	626.8	NA	NA	NA	
MW-7	8/16/88	626.8	NA	NA	NA	
MW-8	2/27/89	629	NA	NA	NA	
MW-9	3/02/89	624.2	NA	NA	NA	
MW-10	3/02/89	625.2	NA	NA	NA	
MW-11	2/10/89	623.1	NA	NA	NA	
MW-12	7/18/89	646.2	NA	NA	NA	
MW-13	8/08/95	620.6	NA	NA	NA	
MW-14	8/08/95	620.6	NA	NA	NA	
MW-15	8/07/95	630.2	NA	NA	NA	
MW-17	8/01/95	620.6	NA	NA	NA	

Notes:

1.NA = Not Available, NM= Not Measured, UNK= Unknown,MSL = Mean Sea Level, DCP= Dutch Cone Penetrometer or Cone Penetration Test (CPT)

Table 2: Summary of Geotechnical Laboratory Test Results

S. No.	Boring ID	Type[1]	Material Type (Simplified Delineation)[2]	Depth (feet below ground surface)		Ground Surface Elevation (feet Mean Sea Level)	Depth to Water (DTW) at the time of drilling (feet bgs)[3]	Blow Count (SPT-N)	Moisture Content (ASTM D2216)	Atterberg Limits (ASTM D4318)			Particle Size Distribution (ASTM D6913/D7928)		Specific Gravity (ASTM D854)	Permeability ASTM 5084/2434	Unit Weight (ASTM D7263/D2435)			Triaxial CU (ASTM D4767)				Direct Shear ASTM D3080				Peck, Hanson, and Thornburn (1974)
				from	to			N	%	LL	PL	PI	% Finer No.4	% Finer No.200		cm/sec	Bulk Density (pcf)	Moisture (%)	Dry Density (pcf)	c (psf)	φ (°)	c' (psf)	φ' (°)	c' (psf), peak	φ' (°), peak	c' (psf), post peak	φ' (°), post peak	φ (°) - from SPT - N
1	FA-B-1	SPT	CCR-Impounded	2.0	3.5	640.9	18.0	7																				29.17
2	FA-B-1	SPT	CCR-Impounded	7.0	8.5	640.9	18.0	27																				34.81
3	FA-B-1	SPT	CCR-Impounded	12.0	13.5	640.9	18.0	7																				29.17
4	FA-B-1	SPT	CCR-Impounded	17.0	18.5	640.9	18.0	5																				28.59
5	FA-B-1	SPT	CCR-Impounded	22.0	23.5	640.9	18.0	0																				27.1
6	FA-B-1	SPT	CCR-Impounded	27.0	28.5	640.9	18.0	0																				27.1
7	FA-B-1	SPT	CCR-Impounded	32.0	33.5	640.9	18.0	6																				28.88
8	FA-B-1	SPT	Alluvium-1	39.5	41.0	640.9	18.0	8																				29.47
9	FA-B-1	SPT	Alluvium-1	44.5	46.0	640.9	18.0	11																				30.33
10	FA-B-1	SPT	Alluvium-1	49.5	51.0	640.9	18.0	6																				28.88
11	FA-B-1	SPT	Alluvium-1	54.5	56.0	640.9	18.0	5																				28.59
12	FA-B-1	SPT	Alluvium-1	59.5	61.0	640.9	18.0	7																				29.17
13	FA-B-1	SPT	Alluvium-2	64.5	66.0	640.9	18.0	58																				42.68
14	FA-B-1	SPT	Alluvium-2	69.5	71.0	640.9	18.0	76																				46.78
15	FA-B-1	SPT	PWR	74.5	76.0	640.9	18.0	100																				51.7
16	FA-B-2	SPT	CCR-Impounded	2.0	3.5	638.2	33.0	11																				30.33
17	FA-B-2	SPT	CCR-Impounded	7.0	8.5	638.2	33.0	11																				30.33
18	FA-B-2	SPT	CCR-Impounded	12.0	13.5	638.2	33.0	6																				28.88
19	FA-B-2	SPT	CCR-Impounded	17.0	18.5	638.2	33.0	3																				28
20	FA-B-2	SPT	CCR-Impounded	22.0	23.5	638.2	33.0	3																				28
21	FA-B-2	SPT	Alluvium-1	27.0	28.5	638.2	33.0	6																				28.88
22	FA-B-2	SPT	Alluvium-1	34.5	36.0	638.2	33.0	3																				28
23	FA-B-2	ST	Alluvium-1	39.5	41.0	638.2	33.0																					-
24	FA-B-2	SPT	Alluvium-1	44.5	46.0	638.2	33.0	5																				28.59
25	FA-B-2	ST	Alluvium-1	49.5	51.0	638.2	33.0																					-
26	FA-B-2	SPT	Alluvium-1	54.5	56.0	638.2	33.0	8																				29.47
27	FA-B-2	SPT	Alluvium-2	59.5	61.0	638.2	33.0	50																				40.75
28	FA-B-2	SPT	Alluvium-2	64.5	66.0	638.2	33.0	100																				51.7
29	FA-B-2	ST	Alluvium-2	67.5	69.5	638.2	33.0																					-
30	FA-B-2	SPT	Alluvium-2	69.5	71.0	638.2	33.0	7																				29.17
31	FA-B-2	SPT	Alluvium-2	74.5	76.0	638.2	33.0	66																				44.55
32	FA-B-2	SPT	PWR	76.0	76.2	638.2	33.0	100																				51.7
33	FA-B-2	CORE	Rock	78.1	88.1	638.2	33.0																					-
34	FA-B-3	SPT	CCR-Impounded	2.0	3.5	643.2	22.5	7																				29.17
35	FA-B-3	SPT	CCR-Impounded	7.0	8.5	643.2	22.5	2																				27.7
36	FA-B-3	SPT	CCR-Impounded	12.0	13.5	643.2	22.5	10																				30.05
37	FA-B-3	SPT	CCR-Impounded	17.0	18.5	643.2	22.5	8																				29.47
38	FA-B-3	SPT	CCR-Impounded	22.0	23.5	643.2	22.5	4																				28.29
39	FA-B-3	SPT	CCR-Impounded	27.0	28.5	643.2	22.5	6																				28.88
40	FA-B-3	SPT	CCR-Impounded	32.0	33.5	643.2	22.5	4																				28.29
41	FA-B-3	SPT	CCR-Impounded	37.0	38.5	643.2	22.5	2																				27.7
42	FA-B-3	SPT	CCR-Impounded	42.0	43.5	643.2	22.5	5																				28.59
43	FA-B-3	SPT	Alluvium-1	47.0	48.5	643.2	22.5	3																				28
44	FA-B-3	SPT	Alluvium-1	50.0	51.5	643.2	22.5	13																				30.91
45	FA-B-3	SPT	Alluvium-2	55.0	56.5	643.2	22.5	12																				30.62
46	FA-B-3	SPT	Alluvium-2	60.0	61.5	643.2	22.5	100																				51.7
47	FA-B-3	SPT	Alluvium-2	65.0	66.5	643.2	22.5	36																				37.2
48	FA-B-3	SPT	Alluvium-2	70.0	71.5	643.2	22.5	23																				33.71
49	FA-B-3	SPT	Alluvium-2	75.0	76.5	643.2	22.5	56																				42.21
50	FA-B-3	SPT	PWR	78.3	78.8	643.2	22.5	100																				51.7
51	FA-B-4	SPT	CCR-Impounded	1.5	3.0	646.4	31.9	30																				35.61
52	FA-B-4	SPT	CCR-Impounded	6.5	8.0	646.4	31.9	6																				28.88
53	FA-B-4	SPT	CCR-Impounded	11.5	13.0	646.4	31.9	7																				29.17
54	FA-B-4	SPT	CCR-Impounded	16.5	18.0	646.4	31.9	5																				28.59
55	FA-B-4	SPT	CCR-Impounded	21.5	23.0	646.4	31.9	19																				32.61
56	FA-B-4	SPT	CCR-Impounded	26.5	28.0	646.4	31.9	7																				29.17
57	FA-B-4	SPT	CCR-Impounded	31.5	33.0	646.4	31.9	3																				28
58	FA-B-4	SPT	CCR-Impounded	36.5	38.0	646.4	31.9	5																				28.59
59	FA-B-4	SPT	CCR-Impounded	41.5	43.0	646.4	31.9	13																				30.91
60	FA-B-4	ST	Alluvium-1	43.0	45.0	646.4	31.9																					-
61	FA-B-4	SPT	Alluvium-1	49.5	51.0	646.4	31.9	9																				29.76
62	FA-B-4	SPT	Alluvium-1	54.5	56.0	646.4	31.9	9																				29.76
63	FA-B-4	SPT	Alluvium-1	59.5	61.0	646.4	31.9	0																				27.1
64	FA-B-4	SPT	Alluvium-2	64.5	66.0	646.4	31.9	7																				29.17
65	FA-B-4	SPT	Alluvium-2	69.5	71.0	646.4	31.9	13																				30.91
66	FA-B-4	SPT	Alluvium-2	74.5	76.0	646.4	31.9	23																				33.71
67	FA-B-4	SPT	Alluvium-2	79.5	81.3	646.4	31.9	29																				35.35
68	FA-B-5	SPT	CCR-Impounded	2.5	4.0	647.7	32.9	18																				32.33
69	FA-B-5	SPT	CCR-Impounded	7.5	9.0	647.7	32.9	7																				29.17
70	FA-B-5	SPT	CCR-Impounded	12.5	14.0	647.7	32.9	22																				33.44
71	FA-B-5	SPT	CCR-Impounded	17.5	19.0	647.7	32.9	3																				28
72	FA-B-5	SPT	CCR-Impounded	22.5	24.0	647.7	32.9	10																				30.05
73	FA-B-5	SPT	CCR-Impounded	27.5	29.0	647.7	32.9	6																				28.88
74	FA-B-5	SPT	CCR-Impounded	32.5	34.0	647.7	32.9	12																				30.62
75	FA-B-5	SPT	CCR-Impounded	37.5	39.0	647.7	32.9	9																				29.76
76	FA-B-5	ST	Alluvium-1	39.0	41.0	647.7	32.9																					-
77	FA-B-5	SPT	Alluvium-1	45.0	46.5	647.7	32.9	8																				29.47
78	FA-B-5	SPT	Alluvium-1	50.0	51.5	647.7	32.9	6																				28.88
79	FA-B-5	SPT	Alluvium-1	55.0	56.5	647.7	32.9	9																				29.76
80	FA-B-5	SPT	Alluvium-1	60.0	61.5	647.7	32.9	9																				29.76
81	FA-B-5	SPT	Alluvium-1	65.0	66.5	647.7	32.9	10																				30.05
82	FA-B-5	SPT	Alluvium-2	70.0	71.5	647.7	32.9	52																				41.24
83	FA-B-5	SPT	Alluvium-2	75.0	76.5	647.7	32.9	51																				41
84	FA-B-6	SPT	Alluvium-1	4.5	6.0	626.6	33.0	30																				35.61
85	FA-B-6	SPT	Alluvium-1	9.5	11.0	626.6	33.0	5																				28.59
86	FA-B-6	SPT	Alluvium-1	14.5	16.0	626.6	33.0	11																				30.33
87	FA-B-6	SPT	Alluvium-1	19.5	21.0	626.6	33.0	7																				29.17
88	FA-B-6	SPT	Alluvium-1	24.5	26.0	626.6	33.0	14																				31.19
89	FA-B-6	SPT	Alluvium-1	29.5	31.0	626.6	33.0	7																				29.17
90	FA-B-6	SPT	Alluvium-1	34.5	36.0	626.6	33.0	6																				28.88
91	FA-B-6	SPT	Alluvium-1	39.5	41.0	626.6	33.0	8																				29.47
92	FA-B-6	SPT	Alluvium-2	44.5	46.0	626.6	33.0	25																				34.26

Table 2: Summary of Geotechnical Laboratory Test Results

S. No.	Boring ID	Type[1]	Material Type (Simplified Delineation)[2]	Depth (feet below ground surface)		Ground Surface Elevation (feet Mean Sea Level)	Depth to Water (DTW) at the time of drilling (feet bgs)[3]	Blow Count (SPT-N)	Moisture Content (ASTM D2216)	Atterberg Limits (ASTM D4318)			Particle Size Distribution (ASTM D6913/D7928)		Specific Gravity (ASTM D854)	Permeability ASTM 5084/2434	Unit Weight (ASTM D7263/D2435)			Triaxial CU (ASTM D4767)				Direct Shear ASTM D3080				Peck, Hanson, and Thornburn (1974)
				from	to			N	%	LL	PL	PI	% Finer No.4	% Finer No.200		cm/sec	Bulk Density (pcf)	Moisture (%)	Dry Density (pcf)	c (psf)	φ (°)	c' (psf)	φ' (°)	c' (psf), peak	φ' (°), peak	c' (psf), post peak	φ' (°), post peak	φ (°) - from SPT - N
93	FA-B-6	SPT	Alluvium-2	49.5	51.0	626.6	33.0	100																			51.7
94	FA-B-6	SPT	Alluvium-2	54.5	56.0	626.6	33.0	66																			44.55
95	FA-B-6	SPT	PWR	59.5	61.0	626.6	33.0	100																			51.7
96	FA-B-6	CORE	Rock	60.5	65.5	626.6	33.0																				-
97	FA-B-7	SPT	Alluvium-1	2.0	3.5	626.8	30.0	24																			33.99
98	FA-B-7	SPT	Alluvium-1	7.0	8.5	626.8	30.0	14																			31.19
99	FA-B-7	SPT	Alluvium-1	12.0	13.5	626.8	30.0	4																			28.29
100	FA-B-7	ST	Alluvium-1	19.0	21.0	626.8	30.0																				-
101	FA-B-7	ST	Alluvium-1	21.0	23.0	626.8	30.0																				-
102	FA-B-7	SPT	Alluvium-1	24.0	25.5	626.8	30.0	6																			28.88
103	FA-B-7	ST	Alluvium-1	29.0	31.0	626.8	30.0																				-
104	FA-B-7	ST	Alluvium-1	31.0	33.0	626.8	30.0																				-
105	FA-B-7	SPT	Alluvium-1	34.0	35.5	626.8	30.0	5																			28.59
106	FA-B-7	SPT	Alluvium-1	39.0	40.5	626.8	30.0	6																			28.88
107	FA-B-7	SPT	Alluvium-2	44.0	45.5	626.8	30.0	7																			29.17
108	FA-B-7	SPT	Alluvium-2	45.0	46.5	626.8	30.0	56																			42.21
109	FA-B-7	SPT	PWR	54.0	55.5	626.8	30.0	100																			51.7
110	FA-B-7	SPT	PWR	59.0	60.5	626.8	30.0	100																			51.7
111	FA-B-7	CORE	Rock	63.5	73.5	626.8	30.0																				-
112	FA-B-8	SPT	CCR-Impounded	2.0	3.5	640	32.0	13																			30.91
113	FA-B-8	SPT	CCR-Impounded	7.0	8.5	640	32.0	5																			28.59
114	FA-B-8	SPT	CCR-Impounded	12.0	13.5	640	32.0	8																			29.47
115	FA-B-8	SPT	CCR-Impounded	17.0	18.5	640	32.0	6																			28.88
116	FA-B-8	SPT	CCR-Impounded	22.0	23.5	640	32.0	5																			28.59
117	FA-B-8	SPT	CCR-Impounded	27.0	28.5	640	32.0	6																			28.88
118	FA-B-8	SPT	CCR-Impounded	32.0	33.5	640	32.0	2																			27.7
119	FA-B-8	SPT	CCR-Impounded	37.0	38.5	640	32.0	6																			28.88
120	FA-B-8	SPT	Alluvium-1	44.0	45.5	640	32.0	2																			27.7
121	FA-B-8	SPT	Alluvium-1	49.0	50.5	640	32.0	7																			29.17
122	FA-B-8	SPT	Alluvium-1	54.0	55.5	640	32.0	14																			31.19
123	FA-B-8	SPT	PWR	59.0	60.5	640	32.0	100																			51.7
124	FA-B-8	SPT	PWR	64.0	65.5	640	32.0	100																			51.7
125	FA-B-8	SPT	PWR	69.0	70.5	640	32.0	23																			33.71
126	FA-B-8	SPT	PWR	74.0	75.5	640	32.0	100																			51.7
127	FA-B-9	SPT	CCR-Impounded	2.0	3.5	642.4	43.0	16																			31.76
128	FA-B-9	SPT	CCR-Impounded	7.0	8.5	642.4	43.0	8																			29.47
129	FA-B-9	SPT	CCR-Impounded	12.0	13.5	642.4	43.0	9																			29.76
130	FA-B-9	SPT	CCR-Impounded	17.0	18.5	642.4	43.0	7																			29.17
131	FA-B-9	SPT	CCR-Impounded	22.0	23.5	642.4	43.0	5																			28.59
132	FA-B-9	SPT	CCR-Impounded	27.0	28.5	642.4	43.0	5																			28.59
133	FA-B-9	SPT	CCR-Impounded	32.0	33.5	642.4	43.0	3																			28
134	FA-B-9	SPT	CCR-Impounded	37.0	38.5	642.4	43.0	7																			29.17
135	FA-B-9	ST	Alluvium-1	39.0	41.0	642.4	43.0																				-
136	FA-B-9	SPT	Alluvium-1	44.0	45.5	642.4	43.0	0																			27.1
137	FA-B-9	ST	Alluvium-1	49.0	51.0	642.4	43.0																				-
138	FA-B-9	SPT	Alluvium-1	54.0	55.5	642.4	43.0	2																			27.7
139	FA-B-9	SPT	Alluvium-1	59.0	60.5	642.4	43.0	6																			28.88
140	FA-B-9	SPT	Alluvium-2	64.0	65.5	642.4	43.0	37																			37.46
141	FA-B-9	SPT	Alluvium-2	69.0	70.5	642.4	43.0	37																			37.46
142	FA-B-9	SPT	Alluvium-2	74.0	75.5	642.4	43.0	32																			36.15
143	FA-B-9	CORE	Rock	77.8	87.8	642.4	43.0																				-
144	FA-B-10	SPT	CCR-Impounded	2.0	3.5	645.2	33.0	18																			32.33
145	FA-B-10	SPT	CCR-Impounded	7.0	8.5	645.2	33.0	20																			32.88
146	FA-B-10	SPT	CCR-Impounded	12.0	13.5	645.2	33.0	33																			36.41
147	FA-B-10	SPT	CCR-Impounded	17.0	18.5	645.2	33.0	11																			30.33
148	FA-B-10	SPT	CCR-Impounded	22.0	23.5	645.2	33.0	11																			30.33
149	FA-B-10	SPT	CCR-Impounded	27.0	28.5	645.2	33.0	24																			33.99
150	FA-B-10	SPT	CCR-Impounded	32.0	33.5	645.2	33.0	13																			30.91
151	FA-B-10	SPT	CCR-Impounded	37.0	38.5	645.2	33.0	5																			28.59
152	FA-B-10	SPT	Alluvium-1	42.0	43.5	645.2	33.0	19																			32.61
153	FA-B-10	SPT	Alluvium-1	48.5	50.0	645.2	33.0	7																			29.17
154	FA-B-10	SPT	Alluvium-1	53.5	55.0	645.2	33.0	10																			30.05
155	FA-B-10	SPT	Alluvium-1	58.5	60.0	645.2	33.0	7																			29.17
156	FA-B-10	SPT	Alluvium-2	63.5	65.0	645.2	33.0	79																			47.43
157	FA-B-10	SPT	PWR	68.5	70.0	645.2	33.0	100																			51.7
158	FA-B-11	SPT	CCR-Impounded	2.0	3.5	650.7	33.4	26																			34.53
159	FA-B-11	SPT	CCR-Impounded	7.0	8.5	650.7	33.4	6																			28.88
160	FA-B-11	SPT	CCR-Impounded	12.0	13.5	650.7	33.4	2																			27.7
161	FA-B-11	SPT	CCR-Impounded	17.0	18.5	650.7	33.4	2																			27.7
162	FA-B-11	SPT	CCR-Impounded	22.0	23.5	650.7	33.4	11																			30.33
163	FA-B-11	SPT	CCR-Impounded	27.0	28.5	650.7	33.4	10																			30.05
164	FA-B-11	SPT	CCR-Impounded	32.0	33.5	650.7	33.4	9																			29.76
165	FA-B-11	SPT	CCR-Impounded	37.0	38.5	650.7	33.4	12																			30.62
166	FA-B-11	SPT	CCR-Impounded	42.0	43.5	650.7	33.4	17																			32.04
167	FA-B-11	SPT	Alluvium-1	47.0	48.5	650.7	33.4	20																			32.88
168	FA-B-11	ST	Alluvium-1	49.0	51.0	650.7	33.4																				-
169	FA-B-11	ST	Alluvium-1	51.0	53.0	650.7	33.4																				-
170	FA-B-11	SPT	Alluvium-1	54.0	55.5	650.7	33.4	11																			30.33
171	FA-B-11	SPT	Alluvium-1	59.0	60.5	650.7	33.4	21																			33.16
172	FA-B-11	SPT	Alluvium-1	64.0	65.5	650.7	33.4	6																			28.88
173	FA-B-11	SPT	Alluvium-1	69.0	70.5	650.7	33.4	14																			31.19
174	FA-B-11	SPT	PWR	74.0	74.4	650.7	33.4	100																			51.7
175	FA-B-12	SPT	CCR-Impounded	2.5	4.0	629.6	17.5	24																			33.99
176	FA-B-12	SPT	CCR-Impounded	7.5	9.0	629.6	17.5	5																			28.59
177	FA-B-12	SPT	CCR-Impounded	12.5	14.0	629.6	17.5	3																			28
178	FA-B-12	SPT	CCR-Impounded	17.5	19.0	629.6	17.5	2																			27.7
179	FA-B-12	SPT	Alluvium-1	22.5	24.0	629.6	17.5	2																			27.7
180	FA-B-12	SPT	Alluvium-1	27.5	29.0	629.6	17.5	2																			27.7
181	FA-B-12	SPT	Alluvium-1	32.5	34.0	629.6	17.5	3																			28
182	FA-B-12	SPT	Alluvium-1	37.5	39.0	629.6	17.5	2																			27.7
183	FA-B-12	SPT	Alluvium-1	42.5	44.0	629.6	17.5	2																			27.7
184	FA-B-12	SPT	Alluvium-1	47.5	49.0	629.6	17.5	3																			28

Table 2: Summary of Geotechnical Laboratory Test Results

S. No.	Boring ID	Type[1]	Material Type (Simplified Delineation)[2]	Depth (feet below ground surface)		Ground Surface Elevation (feet Mean Sea Level)	Depth to Water (DTW) at the time of drilling (feet bgs)[3]	Blow Count (SPT-N)	Moisture Content (ASTM D2216)	Atterberg Limits (ASTM D4318)			Particle Size Distribution (ASTM D6913/D7928)		Specific Gravity (ASTM D854)	Permeability ASTM 5084/2434	Unit Weight (ASTM D7263/D2435)			Triaxial CU (ASTM D4767)				Direct Shear ASTM D3080				Peck, Hanson, and Thornburn (1974)
				from	to			N	%	LL	PL	PI	% Finer No.4	% Finer No.200		cm/sec	Bulk Density (pcf)	Moisture (%)	Dry Density (pcf)	c (psf)	φ (°)	c' (psf)	φ' (°)	c' (psf), peak	φ' (°), peak	c' (psf), post peak	φ' (°), post peak	φ (°) - from SPT - N
185	FA-B-12	SPT	Alluvium-2	52.5	54.0	629.6	17.5	56																				42.21
186	FA-B-12	SPT	Alluvium-2	57.5	59.0	629.6	17.5	44																				39.25
187	FA-B-12	SPT	Alluvium-2	62.5	64.0	629.6	17.5	63																				43.86
188	FA-B-12	SPT	PWR	64.0	64.1	629.6	17.5	100																				51.7
189	FA-B-13	SPT	CCR-Impounded	2.0	3.5	649	32.4	27																				34.81
190	FA-B-13	SPT	CCR-Impounded	7.0	8.5	649	32.4	28																				35.08
191	FA-B-13	SPT	CCR-Impounded	12.0	13.5	649	32.4	36																				37.2
192	FA-B-13	SPT	CCR-Impounded	17.0	18.5	649	32.4	8																				29.47
193	FA-B-13	SPT	CCR-Impounded	22.0	23.5	649	32.4	8																				29.47
194	FA-B-13	SPT	CCR-Impounded	27.0	28.5	649	32.4	9																				29.76
195	FA-B-13	SPT	CCR-Impounded	32.0	33.5	649	32.4	3																				28
196	FA-B-13	SPT	CCR-Impounded	37.0	38.5	649	32.4	27																				34.81
197	FA-B-13	SPT	CCR-Impounded	42.0	43.5	649	32.4	6																				28.88
198	FA-B-13	SPT	CCR-Impounded	47.0	48.5	649	32.4	12																				30.62
199	FA-B-13	SPT	Alluvium-1	53.5	55.0	649	32.4	14																				31.19
200	FA-B-13	SPT	Alluvium-1	58.5	60.0	649	32.4	18																				32.33
201	FA-B-13	SPT	Alluvium-1	63.5	65.0	649	32.4	8																				29.47
202	FA-B-13	SPT	Alluvium-2	68.5	70.0	649	32.4	88																				49.32
203	FA-B-13	SPT	Alluvium-2	73.5	74.8	649	32.4	81																				47.86
205	FA-B-15	NS	CCR-Impounded	0.0	35.6	642.3	NA																					-
206	FA-B-15	ST	CCR-Impounded	33.6	35.6	642.3	NA		39	NP	NP						108.4	39	78.0			0	30.5					-
207	FA-B-15	ST	Alluvium-1	41.6	43.6	642.3	NA		27	41	25						120.0	25	96.0									-
208	FA-B-15	ST	Alluvium-1	44.6	46.6	642.3	NA		27	32	21						121.9	27	96.0									-
209	FA-B-15	ST	Alluvium-1	48.6	50.6	642.3	NA		30	39	22						119.6	30	92.0	600	7.6	0	20					-
210	FA-B-15	ST	Alluvium-2	51.6	53.6	642.3	NA		28	28	19						121.6	28	95.0	700	10	0	25					-
211	FA-B-15	ST	Alluvium-2	53.6	55.6	642.3	NA		36	34	24						115.6	36	85.0									-
212	FA-B-15	ST	Alluvium-2	56.6	58.6	642.3	NA		46	83	40						105.1	46	72.0									-
213	FA-B-16	NS	CCR-Impounded	0.0	10.0	643.4	NM																					-
214	FA-B-16	ST	CCR-Impounded	10.0	12.0	643.4	NM		14	NP	NP						70.7	14	62.0									-
215	FA-B-16	ST	CCR-Impounded	25.0	27.0	643.4	NM		20	27	19						123.6	20	103.0									-
216	FA-B-16	ST	Alluvium-1	27.0	29.0	643.4	NM																					-
217	FA-B-16	ST	Alluvium-1	30.0	32.0	643.4	NM		23	33	22						123.5	30	95.0									-
218	FA-B-16	ST	Alluvium-1	38.0	40.0	643.4	NM		30	34	21																	-
219	FA-B-16	ST	Alluvium-1	41.0	43.0	643.4	NM		27	32	23																	-
220	FA-B-16	ST	Alluvium-1	45.0	47.0	643.4	NM		28	30	21						122.9	28	96.0	600	10	0	26.5					-
221	FA-B-16	ST	Alluvium-1	48.0	50.0	643.4	NM		27	27	21						123.2	27	97.0	400	11	0	27					-
222	FA-B-16	ST	Alluvium-1	48.0	50.0	643.4	NM		27	27	21						123.2	27	97.0	400	11	0	17					-
223	FA-B-16	ST	Alluvium-1	50.0	52.0	643.4	NM		25	30	24						122.5	25	98.0									-
224	FA-B-16	ST	Alluvium-1	53.0	55.0	643.4	NM		24	30	20						121.5	24	98.0									-
225	FA-B-17	SPT	CCR-Impounded	1.9	3.4	647.9	48.7	5																				28.59
226	FA-B-17	SPT	CCR-Impounded	6.9	8.4	647.9	48.7	7																				29.17
227	FA-B-17	SPT	CCR-Impounded	11.9	13.4	647.9	48.7	5																				28.59
228	FA-B-17	SPT	CCR-Impounded	16.9	18.4	647.9	48.7	7																				29.17
229	FA-B-17	SPT	CCR-Impounded	21.9	23.4	647.9	48.7	8																				29.47
230	FA-B-17	SPT	CCR-Impounded	26.9	28.4	647.9	48.7	5																				28.59
231	FA-B-17	SPT	CCR-Impounded	31.9	33.4	647.9	48.7	17																				32.04
232	FA-B-17	ST	CCR-Impounded	36.9	38.4	647.9	48.7	6																				28.88
233	FA-B-17	SPT	CCR-Impounded	41.9	43.4	647.9	48.7	2		NP	NP	NP	100	92.7	2.34													27.7
234	FA-B-17	ST	CCR-Impounded	41.9	43.9	647.9	48.7									1.13E-05	110.6	33	83.2	2840	32.6	0	32.8					-
235	FA-B-17	SPT	CCR-Impounded	46.9	48.4	647.9	48.7	7																				29.17
236	FA-B-17	SPT	Alluvium-1	51.9	53.4	647.9	48.7	5																				28.59
237	FA-B-17	ST	Alluvium-1	56.9	58.4	647.9	48.7	4		32.5	20.7	11.8	100	88.9	2.68		123.8	30	95.0	930	13.8	100	36.4					28.29
238	FA-B-17	SPT	Alluvium-1	61.9	63.4	647.9	48.7	7																				29.17
239	FA-B-17	ST	Alluvium-1	66.9	68.4	647.9	48.7	10		35.3	21.3	14	100	91	2.67	5.18E-09	121.1	32	91.9	1040	12.1	460	32					30.05
240	FA-B-17	SPT	Alluvium-2	71.9	73.4	647.9	48.7	24																				33.99
241	FA-B-17	SPT	Alluvium-2	76.9	78.4	647.9	48.7	22																				33.44
242	FA-B-17	SPT	Rock	79.8	79.8	647.9	48.7	100																				51.7
243	FA-B-18	SPT	CCR-Impounded	2.0	3.5	642.5	67.0	30																				35.61
244	FA-B-18	SPT	CCR-Impounded	7.0	8.5	642.5	67.0	5																				28.59
245	FA-B-18	SPT	CCR-Impounded	12.0	13.5	642.5	67.0	11																				30.33
246	FA-B-18	SPT	CCR-Impounded	17.0	18.5	642.5	67.0	6																				28.88
247	FA-B-18	SPT	CCR-Impounded	22.0	23.5	642.5	67.0	9																				29.76
248	FA-B-18	SPT	CCR-Impounded	27.0	28.5	642.5	67.0	6																				28.88
249	FA-B-18	ST	CCR-Impounded	32.0	33.5	642.5	67.0	3					100	91	2.32	2.60E-05	107.4	43	75.3	3070	20.9	270	31.2					28
250	FA-B-18	SPT	CCR-Impounded	37.0	38.5	642.5	67.0	3																				28
251	FA-B-18	SPT	Alluvium-1	42.0	43.5	642.5	67.0	6																				28.88
252	FA-B-18	SPT	Alluvium-1	47.0	48.5	642.5	67.0	5																				28.59
253	FA-B-18	ST	Alluvium-1	52.0	53.5	642.5	67.0	5		36.7	22.3	14.3	100	90.4	2.64	6.61E-09	118.7	35	88.1	650	14.6	460	32.8					28.59
254	FA-B-18	SPT	Alluvium-1	57.0	58.5	642.5	67.0	7																				29.17
255	FA-B-18	SPT	Alluvium-1	62.0	63.5	642.5	67.0	15																				31.48
256	FA-B-18	SPT	Alluvium-2	67.0	68.5	642.5	67.0	43																				39
257	FA-B-18	SPT	Alluvium-2	72.0	73.5	642.5	67.0	31																				35.88
258	FA-B-18	SPT	PWR	77.0	77.6	642.5	67.0	100																				51.7
259	B-14-01	SPT	CCR-Impounded	1.5	3.0	629.8	NA	29																				35.35
260	B-14-01	SPT	CCR-Impounded	4.0	5.5	629.8	NA	32																				36.15
261	B-14-01	SPT	CCR-Impounded	6.5	8.0	629.8	NA	22																				33.44
262	B-14-01	SPT	CCR-Impounded	9.0	10.5	629.8	NA	11																				30.33
263	B-14-01	SPT	CCR-Impounded	11.5	13.0	629.8	NA	7																				29.17
264	B-14-01	SPT	CCR-Impounded	14.0	15.5	629.8	NA	7	16.5				100	45.2														29.17
265	B-14-01	SPT	CCR-Impounded	16.5	18.0	629.8	NA	5	21.9	28	23.1	4.9	100	63.3														28.59
266	B-14-01	SPT	CCR-Impounded	19.0	20.5	629.8	NA	6																				28.88
267	B-14-01	SPT	CCR-Impounded	21.5	23.0	629.8	NA	5																				28.59
268	B-14-01	SPT	CCR-Impounded	24.0	25.5	629.8	NA	6																				28.88
269	B-14-01	SPT	CCR-Impounded	26.5	28.0	629.8	NA	2																				27.7
270	B-14-01	SPT	CCR-Impounded	29.0	30.5	629.8	NA	0																				27.1
271	B-14-01	SPT	Alluvium-1	31.5	33.0	629.8	NA	5																				28.59
272	B-14-01	SPT	Alluvium-1	34.0	35.5	629.8	NA	4	30	NP	NP	NP	100	70.6														28.29
273	B-14-01	SPT	Alluvium-1	36.5	38.0	629.8	NA	0																				27.1
274	B-14-01	SPT	Alluvium-1	39.0	40.5	629.8	NA	2																				27.7
275	B-14-01	SPT	Alluvium-1	41.5	43.0	629.8	NA	0																				27.1
276	B-14-01	SPT	Alluvium-1	44.0	45.5	629.8	NA	0																				27.1
277	B-14-01	SPT	Alluvium-1	46.5	48.0	629.8	NA	12																				30.62

Table 2: Summary of Geotechnical Laboratory Test Results

S. No.	Boring ID	Type[1]	Material Type (Simplified Delineation)[2]	Depth (feet below ground surface)		Ground Surface Elevation (feet Mean Sea Level)	Depth to Water (DTW) at the time of drilling (feet bgs)[3]	Blow Count (SPT-N)	Moisture Content (ASTM D2216)	Atterberg Limits (ASTM D4318)			Particle Size Distribution (ASTM D6913/D7928)		Specific Gravity (ASTM D854)	Permeability ASTM 5084/2434	Unit Weight (ASTM D7263/D2435)			Triaxial CU (ASTM D4767)				Direct Shear ASTM D3080				Peck, Hanson, and Thornburn (1974)
				from	to			N	%	LL	PL	PI	% Finer No.4	% Finer No.200		cm/sec	Bulk Density (pcf)	Moisture (%)	Dry Density (pcf)	c (psf)	φ (°)	c' (psf)	φ' (°)	c' (psf), peak	φ' (°), peak	c' (psf), post peak	φ' (°), post peak	φ (°) - from SPT - N
278	B-14-01	SPT	Alluvium-1	49.0	50.5	629.8	NA	6	26.6	NP	NP	NP	100	33.7													28.88
279	B-14-01	SPT	Alluvium-2	51.5	53.0	629.8	NA	34																			36.68
280	B-14-01	SPT	Alluvium-2	54.0	55.5	629.8	NA	37																			37.46
281	B-14-01	SPT	Alluvium-2	56.5	58.0	629.8	NA	37																			37.46
282	B-14-01	SPT	Alluvium-2	59.0	60.5	629.8	NA	16																			31.76
283	B-14-02	SPT	CCR-Impounded	1.5	3.0	629.9	NA	17																			32.04
284	B-14-02	SPT	CCR-Impounded	4.0	5.5	629.9	NA	17																			32.04
285	B-14-02	ST	CCR-Impounded	6.5	8.5	629.9	NA																				-
286	B-14-02	SPT	CCR-Impounded	9.0	10.5	629.9	NA	16	13.8				100	50.6													31.76
287	B-14-02	SPT	CCR-Impounded	11.5	13.0	629.9	NA	11	15.7	21.5	19.7	1.8	100	51.2													30.33
288	B-14-02	SPT	Alluvium-1	14.0	15.5	629.9	NA	10	15.2	21.6	19.8	1.8	100	53													30.05
289	B-14-02	ST	Alluvium-1	16.5	18.5	629.9	NA																				-
290	B-14-02	SPT	Alluvium-1	19.0	20.5	629.9	NA	9																			29.76
291	B-14-02	ST	Alluvium-1	21.5	23.5	629.9	NA																				-
292	B-14-02	SPT	Alluvium-1	24.0	25.5	629.9	NA	7																			29.17
293	B-14-02	SPT	Alluvium-1	26.5	28.0	629.9	NA	5																			28.59
294	B-14-02	SPT	Alluvium-1	29.0	30.5	629.9	NA	6																			28.88
295	B-14-02	ST	Alluvium-1	31.5	33.5	629.9	NA		14.87								110.5	18	94.0	90	18.2	740	33.9				-
296	B-14-02	SPT	Alluvium-1	34.0	35.5	629.9	NA	7	17	NP	NP	NP	100	41.3													29.17
297	B-14-02	SPT	Alluvium-1	36.5	38.0	629.9	NA	3	26.8	NP	NP	NP	100	32.3													28
298	B-14-02	SPT	Alluvium-1	39.0	40.5	629.9	NA	0																			27.1
299	B-14-02	ST	Alluvium-1	41.5	43.5	629.9	NA																				-
300	B-14-02	SPT	Alluvium-1	44.0	45.5	629.9	NA	0																			27.1
301	B-14-02	SPT	Alluvium-2	46.5	48.0	629.9	NA	6																			28.88
302	B-14-02	SPT	Alluvium-2	49.0	50.5	629.9	NA	5																			28.59
303	B-14-02	ST	Alluvium-2	51.5	53.5	629.9	NA																				-
304	B-14-02	SPT	Alluvium-2	54.0	55.5	629.9	NA	41																			38.49
305	B-14-03	SPT	CCR-Impounded	1.5	3.0	631.8	NA	34																			36.68
306	B-14-03	SPT	CCR-Impounded	4.0	5.5	631.8	NA	30																			35.61
307	B-14-03	SPT	CCR-Impounded	6.5	8.5	631.8	NA	22																			33.44
308	B-14-03	SPT	CCR-Impounded	9.0	10.5	631.8	NA	53	8.8				100	41.8													41.48
309	B-14-03	SPT	Earthfill-SWP	11.5	13.0	631.8	NA	12																			30.62
310	B-14-03	SPT	Earthfill-SWP	14.0	15.5	631.8	NA	6																			28.88
311	B-14-03	SPT	Earthfill-SWP	16.5	18.5	631.8	NA	6	10.9	NP	NP	NP	100	32.4													28.88
312	B-14-03	SPT	Alluvium-1	19.0	20.5	631.8	NA	5																			28.59
313	B-14-03	SPT	Alluvium-1	21.5	23.5	631.8	NA	4																			28.29
314	B-14-03	SPT	Alluvium-1	24.0	25.5	631.8	NA	2	26	NP	NP	NP	100	42.2													27.7
315	B-14-03	SPT	Alluvium-1	26.5	28.0	631.8	NA	0																			27.1
316	B-14-03	SPT	Alluvium-1	29.0	30.5	631.8	NA	4																			28.29
317	B-14-03	SPT	Alluvium-1	31.5	33.5	631.8	NA	2																			27.7
318	B-14-03	SPT	Alluvium-1	34.0	35.5	631.8	NA	0	30	NP	NP	NP	100	19.4													27.1
319	B-14-03	SPT	Alluvium-1	36.5	38.0	631.8	NA	3																			28
320	B-14-03	SPT	Alluvium-2	39.0	40.5	631.8	NA	3																			28
321	B-14-03	SPT	Alluvium-2	41.5	43.5	631.8	NA	3																			28
322	B-14-03	SPT	Alluvium-2	44.0	45.5	631.8	NA	2																			27.7
323	B-14-03	SPT	Alluvium-2	46.5	48.0	631.8	NA	6																			28.88
324	B-14-03	SPT	Alluvium-2	49.0	50.5	631.8	NA	7																			29.17
325	B-14-03	SPT	Alluvium-2	51.5	53.5	631.8	NA	10																			30.05
326	B-14-03	SPT	Alluvium-2	54.0	55.5	631.8	NA	34																			36.68
327	B-14-03	SPT	Alluvium-2	56.5	58.0	631.8	NA	38																			37.72
328	B-14-03	SPT	Alluvium-2	59.0	60.5	631.8	NA	47																			40.01
329	MW-1601	SPT	Earthfill	0.0	1.5	627.8	NA	10																			30.05
330	MW-1601	SPT	Earthfill	6.5	8	627.8	NA	12																			30.62
331	MW-1601	SPT	Earthfill	11.5	13	627.8	NA	4																			28.29
332	MW-1601	SPT	Alluvium-1	16.5	18	627.8	NA	8																			29.47
333	MW-1601	SPT	Alluvium-1	21.5	23	627.8	NA	6																			28.88
334	MW-1601	SPT	Alluvium-1	26.5	28	627.8	NA	4																			28.29
335	MW-1601	SPT	Alluvium-1	31.5	33	627.8	NA	3																			28
336	MW-1601	SPT	Alluvium-1	36.5	38	627.8	NA	4																			28.29
337	MW-1601	SPT	Alluvium-2	41.5	43	627.8	NA	43																			39
338	MW-1601	SPT	PWR	46.5	47.2	627.8	NA	100																			51.7
339	MW-1602	SPT	Earthfill	1.5	3	627.5	NA	8																			29.47
340	MW-1602	SPT	Earthfill	6.5	8	627.5	NA	14																			31.19
341	MW-1602	SPT	Alluvium-1	11.5	13	627.5	NA	11																			30.33
342	MW-1602	SPT	Alluvium-1	16.5	18	627.5	NA	6																			28.88
343	MW-1602	SPT	Alluvium-1	21.5	23	627.5	NA	4																			28.29
344	MW-1602	SPT	Alluvium-1	26.5	28	627.5	NA	3																			28
345	MW-1602	SPT	Alluvium-1	31.5	33	627.5	NA	7																			29.17
346	MW-1602	SPT	Alluvium-1	36.5	38	627.5	NA	3																			28
347	MW-1602	SPT	Alluvium-1	41.5	43	627.5	NA	8																			29.47
348	MW-1602	SPT	Alluvium-2	46.5	48	627.5	NA	42																			38.75
349	MW-1602	SPT	Alluvium-2	51.5	53	627.5	NA	51																			41
350	MW-1602	SPT	Alluvium-2	56.5	58	627.5	NA	28																			35.08
351	MW-1602	ST	PWR	61.5	63	627.5	NA	100																			51.7
352	MW-1603	SPT	Earthfill	1.5	3	628	NA	20																			32.88
353	MW-1603	SPT	Earthfill	6.5	8	628	NA	26																			34.53
354	MW-1603	SPT	Earthfill	11.5	13	628	NA	23																			33.71
355	MW-1603	SPT	Alluvium-1	16.5	18	628	NA	10																			30.05
356	MW-1603	SPT	Alluvium-1	21.5	23	628	NA																				-
357	MW-1603	SPT	Alluvium-1	26.5	28	628	NA																				-
358	MW-1603	SPT	Alluvium-1	31.5	33	628	NA	7																			29.17
359	MW-1603	SPT	Alluvium-1	36.5	38	628	NA	5																			28.59
360	MW-1603	SPT	Alluvium-2	41.5	43	628	NA	5																			28.59
361	MW-1603	SPT	Alluvium-2	46.5	48	628	NA	7																			29.17
362	MW-1603	SPT	Alluvium-2	51.5	53	628	NA	33																			36.41
363	MW-1603	SPT	Alluvium-2	56.5	58	628	NA	36																			37.2
364	MW-1604	SPT	Earthfill	1	2.5	628	NA	10																			30.05
365	MW-1604	SPT	Earthfill	6.5	8	628	NA	26																			34.53
366	MW-1604	SPT	Alluvium-1	11.5	13	628	NA	8																			29.47
367	MW-1604	SPT	Alluvium-1	16.5	18	628	NA	7																			29.17
368	MW-1604	SPT	Alluvium-1	21.5	23	628	NA	4																			28.29
369	MW-1604	SPT	Alluvium-1	26.5	28	628	NA	5																			28.59

Table 2: Summary of Geotechnical Laboratory Test Results

S. No.	Boring ID	Type[1]	Material Type (Simplified Delineation)[2]	Depth (feet below ground surface)		Ground Surface Elevation (feet Mean Sea Level)	Depth to Water (DTW) at the time of drilling (feet bgs)[3]	Blow Count (SPT-N)	Moisture Content (ASTM D2216)	Atterberg Limits (ASTM D4318)			Particle Size Distribution (ASTM D6913/D7928)		Specific Gravity (ASTM D854)	Permeability ASTM 5084/2434	Unit Weight (ASTM D7263/D2435)			Triaxial CU (ASTM D4767)				Direct Shear ASTM D3080				Peck, Hanson, and Thornburn (1974)
				from	to			N	%	LL	PL	PI	% Finer No.4	% Finer No.200		cm/sec	Bulk Density (pcf)	Moisture (%)	Dry Density (pcf)	c (psf)	φ (°)	c' (psf)	φ' (°)	c' (psf), peak	φ' (°), peak	c' (psf), post peak	φ' (°), post peak	φ (°) - from SPT - N
370	MW-1604	SPT	Alluvium-1	31.5	33	628	NA	4																				28.29
371	MW-1604	SPT	Alluvium-1	36.5	38	628	NA	6																				28.88
372	MW-1604	SPT	Alluvium-2	41.5	43	628	NA	42																				38.75
373	MW-1604	SPT	Alluvium-2	46.5	48	628	NA	48																				40.26
374	MW-1604	SPT	Alluvium-2	51.5	53	628	NA	56																				42.21
375	MW-1604	SPT	Alluvium-2	56.5	58	628	NA	79																				47.43
376	MW-1604	ST	PWR	60	61.5	628	NA	100																				51.7
377	MW-1605	SPT	Earthfill	1.5	3	628	NA	9																				29.76
378	MW-1605	SPT	Earthfill	6.5	8	628	NA	22																				33.44
379	MW-1605	SPT	Earthfill	11.5	13	628	NA	22																				33.44
380	MW-1605	SPT	Earthfill	16.5	18	628	NA	11																				30.33
381	MW-1605	SPT	Alluvium-1	21.5	23	628	NA	16																				31.76
382	MW-1605	SPT	Alluvium-1	26.5	28	628	NA	9																				29.76
383	MW-1605	SPT	Alluvium-1	31.5	33	628	NA	8																				29.47
384	MW-1605	SPT	Alluvium-1	36.5	38	628	NA	3																				28
385	MW-1605	SPT	Alluvium-1	41.5	43	628	NA	7																				29.17
386	MW-1605	SPT	Alluvium-1	46.5	48	628	NA	14																				31.19
387	MW-1605	SPT	Alluvium-2	51.5	53	628	NA	25																				34.26
388	MW-2505 D	ST	Earthfill	5.5	7.5	628			14.4	22	13	9	97.9	56.9	2.72					0	34.7	0	36.8					-
389	MW-2505 D	ST	Earthfill	10	12	628			11.9	NP	NP	NP	100	36.2	2.69		127.5	13	112.8	0	52.3	0	41.2					-
390	MW-2505 D	ST	Alluvium-1	34	36	628			15	NP	NP	NP	100	28	2.66		117.5	15	102.2					558	34.2	686	32.5	-
391	MW-2511 D	ST	Earthfill	14	16	628			11.7	NP	NP	NP	100	34	2.7		126.0	13	111.6	0	42.8	0	36					-
392	MW-2511 D	ST	Alluvium-1	26	28	628			18.2	NP	NP	NP	98.5	53.1	2.71		123.9	18	104.8	0	31	0	38					-
393	B-16	SPT	Alluvium-1	2	3	628.9	22.1	5																				28.59
394	B-16	SPT	Alluvium-1	5	6	628.9	22.1	7																				29.17
395	B-16	SPT	Alluvium-1	10	11	628.9	22.1	3																				28
396	B-16	SPT	Alluvium-1	15	16	628.9	22.1	3																				28
397	B-16	SPT	Alluvium-1	20	21	628.9	22.1	3																				28
398	B-16	SPT	Alluvium-1	25	26	628.9	22.1	2																				27.7
399	B-16	SPT	Alluvium-1	30	31	628.9	22.1	2																				27.7
400	B-16	SPT	Alluvium-1	35	36	628.9	22.1	3																				28
401	B-16	SPT	Alluvium-1	40	41	628.9	22.1	2																				27.7
402	B-16	SPT	Alluvium-1	45	46	628.9	22.1	3																				28
403	B-16	SPT	Alluvium-1	50	51	628.9	22.1	14																				31.19
404	B-16	SPT	Alluvium-1	55	56	628.9	22.1	20																				32.88
405	B-16	SPT	Alluvium-2	60	61	628.9	22.1	28																				35.08
406	B-16	SPT	Alluvium-2	65	66	628.9	22.1	73																				46.12
407	B-16	SPT	PWR	67.4	67.5	628.9	22.1	100																				51.7
408	B-17	SPT	Alluvium-1	2	3	626.8	24.5	4																				28.29
409	B-17	SPT	Alluvium-1	5	6	626.8	24.5	7																				29.17
410	B-17	SPT	Alluvium-1	10	11	626.8	24.5	3																				28
411	B-17	SPT	Alluvium-1	15	16	626.8	24.5	3																				28
412	B-17	SPT	Alluvium-1	20	21	626.8	24.5	3																				28
413	B-17	SPT	Alluvium-1	25	26	626.8	24.5	3																				28
414	B-17	SPT	Alluvium-1	30	31	626.8	24.5	2																				27.7
415	B-17	SPT	Alluvium-1	35	36	626.8	24.5	2																				27.7
416	B-17	SPT	Alluvium-1	40	41	626.8	24.5	2																				27.7
417	B-17	SPT	Alluvium-2	45	46	626.8	24.5	12																				30.62
418	B-17	SPT	Alluvium-2	50	51	626.8	24.5	23																				33.71
419	B-17	SPT	Alluvium-2	55	56	626.8	24.5	33																				36.41
420	B-17	SPT	Alluvium-2	60	61	626.8	24.5	77																				47
421	B-17	SPT	PWR	63	63.25	626.8	24.5	100																				51.7
422	B-18	SPT	Alluvium-1	2	3	622.4	23.1	5																				28.59
423	B-18	SPT	Alluvium-1	5	6	622.4	23.1	7																				29.17
424	B-18	SPT	Alluvium-1	10	11	622.4	23.1	4																				28.29
425	B-18	SPT	Alluvium-1	15	16	622.4	23.1	3																				28
426	B-18	SPT	Alluvium-1	20	21	622.4	23.1	3																				28
427	B-18	SPT	Alluvium-1	25	26	622.4	23.1	3																				28
428	B-18	SPT	Alluvium-1	30	31	622.4	23.1	3																				28
429	B-18	SPT	Alluvium-1	35	36	622.4	23.1	6																				28.88
430	B-18	SPT	Alluvium-1	40	41	622.4	23.1	7																				29.17
431	B-18	SPT	Alluvium-2	45	46	622.4	23.1	20																				32.88
432	B-18	SPT	Alluvium-2	50	51	622.4	23.1	57																				42.45
433	B-18	SPT	Alluvium-2	55	56	622.4	23.1	60																				43.16
434	B-18	SPT	PWR	57.33	57.5	622.4	23.1	100																				51.7
435	B-19	SPT	Alluvium-1	2	3	626	23	5																				28.59
436	B-19	SPT	Alluvium-1	5	6	626	23	10																				30.05
437	B-19	SPT	Alluvium-1	10	11	626	23	3																				28
438	B-19	SPT	Alluvium-1	15	16	626	23	3																				28
439	B-19	SPT	Alluvium-1	20	21	626	23	4																				28.29
440	B-19	SPT	Alluvium-1	25	26	626	23	3																				28
441	B-19	SPT	Alluvium-1	30	31	626	23	3																				28
442	B-19	SPT	Alluvium-1	35	36	626	23	3																				28
443	B-19	SPT	Alluvium-1	40	41	626	23	2																				27.7
444	B-19	SPT	Alluvium-1	45	46	626	23	2																				27.7
445	B-19	SPT	Alluvium-1	50	51	626	23	11																				30.33
446	B-19	SPT	Alluvium-2	55	56	626	23	27																				34.81
447	B-19	SPT	Alluvium-2	60	61	626	23	57																				42.45
448	B-19	SPT	PWR	63.9	64	626	23	100																				51.7
449	B-20	SPT	Alluvium-1	2	3	621.25	20	4																				28.29
450	B-20	SPT	Alluvium-1	5	6	621.25	20	5																				28.59
451	B-20	SPT	Alluvium-1	10	11	621.25	20	4																				28.29
452	B-20	SPT	Alluvium-1	15	16	621.25	20	3																				28
453	B-20	SPT	Alluvium-1	20	21	621.25	20	3																				28
454	B-20	SPT	Alluvium-1	25	26	621.25	20	8																				29.47
455	B-20	SPT	Alluvium-1	30	31	621.25	20	12																				30.62
456	B-20	SPT	Alluvium-1	35	36	621.25	20	8																				29.47
457	B-20	SPT	Alluvium-1	40	41	621.25	20	5																				28.59
458	B-20	SPT	Alluvium-1	45	46	621.25	20	8																				29.47
459	B-20	SPT	Alluvium-2	50	51	621.25	20	37																				37.46

Table 2: Summary of Geotechnical Laboratory Test Results

S. No.	Boring ID	Type[1]	Material Type (Simplified Delineation)[2]	Depth (feet below ground surface)		Ground Surface Elevation (feet Mean Sea Level)	Depth to Water (DTW) at the time of drilling (feet bgs)[3]	Blow Count (SPT-N)	Moisture Content (ASTM D2216)	Atterberg Limits (ASTM D4318)			Particle Size Distribution (ASTM D6913/D7928)		Specific Gravity (ASTM D854)	Permeability ASTM 5084/2434	Unit Weight (ASTM D7263/D2435)			Triaxial CU (ASTM D4767)				Direct Shear ASTM D3080				Peck, Hanson, and Thornburn (1974)
				from	to			N	%	LL	PL	PI	% Finer No.4	% Finer No.200		cm/sec	Bulk Density (pcf)	Moisture (%)	Dry Density (pcf)	c (psf)	φ (°)	c' (psf)	φ' (°)	c' (psf), peak	φ' (°), peak	c' (psf), post peak	φ' (°), post peak	φ (°) - from SPT - N
460	B-20	SPT	Alluvium-2	53	54	621.25	20	67																				44.78
461	B-20	SPT	PWR	54.7	54.8	621.25	20	100																				51.7

Notes:

1.NS= Not Sampled.
2. PWR = Partially Weathered Rock.
3.NA = Not Available, could not be measured due to the drilling method. NE = Not Encountered
4. The EFA samples collected from the 1980s exploration were tested nearly a year after they were collected; the lower shear strength results for these tests could be attributed to some type of sample disturbance. These values were deemed non-representative and should not be used for design purposes.

Table 3: Summary of Geotechnical Material Properties

Material	Unit Weight (pcf)	Drained Strength		Undrained Strength	
		Effective Internal Friction φ' (°)	Effective Cohesion c' (psf)	Total Internal Friction φ (°)	Total Cohesion c (psf)
Embankment Materials					
Earthfill	125	32	100	-	-
Coal Combustion Residuals					
CCR-Impounded	85-100	28	0	-	-
Alluvium					
Alluvium-1	120	32	100	0	26
Alluvium-2	115	32	0	0	26

Table 4: Summary of Historic Groundwater Elevations

Well ID	TOC[1] Elevation (feet)	Depth to Water below TOC (feet)								
		Sept 2021	Mar 2022	Sep 2022	Mar 2023	Sep 2023	Mar 2024	Sep 2024	May 2025	Sep 2025
MW-1601	631.02	41.22	40.62	41.2	40.16	41.2	38.98	41.23	40.81	41.29
MW-1602	630.78	41.36	40.87	41.42	40.26	41.32	39.06	41.21	41.1	41.22
MW-1603	631.17	41.41	41.06	41.46	40.5	41.6	38.47	41.4	41.3	41.35
MW-1604	631.18	40.22	39.74	40.14	39.29	40.51	38.25	40.53	40	40.35
MW-1605	631.26	41.4	40.87	41.52	40.41	41.71	39.63	41.62	41.35	41.45
Well ID	**TOC Elevation (feet)**	**Water Elevation AMSL[2] (feet)**								
		Sept 2021	Mar 2022	Sep 2022	Mar 2023	Sep 2023	Mar 2024	Sep 2024	May 2025	Sep 2025
MW-1601	631.02	589.8	590.4	589.82	590.86	589.82	592.04	589.79	590.21	589.73
MW-1602	630.78	589.42	589.91	589.36	590.52	589.46	591.72	589.57	589.68	589.56
MW-1603	631.17	589.76	590.11	589.71	590.67	589.57	592.7	589.77	589.87	589.82
MW-1604	631.18	590.96	591.44	591.04	591.89	590.67	592.93	590.65	591.18	590.83
MW-1605	631.26	589.86	590.39	589.74	590.85	589.55	591.63	589.64	589.91	589.81

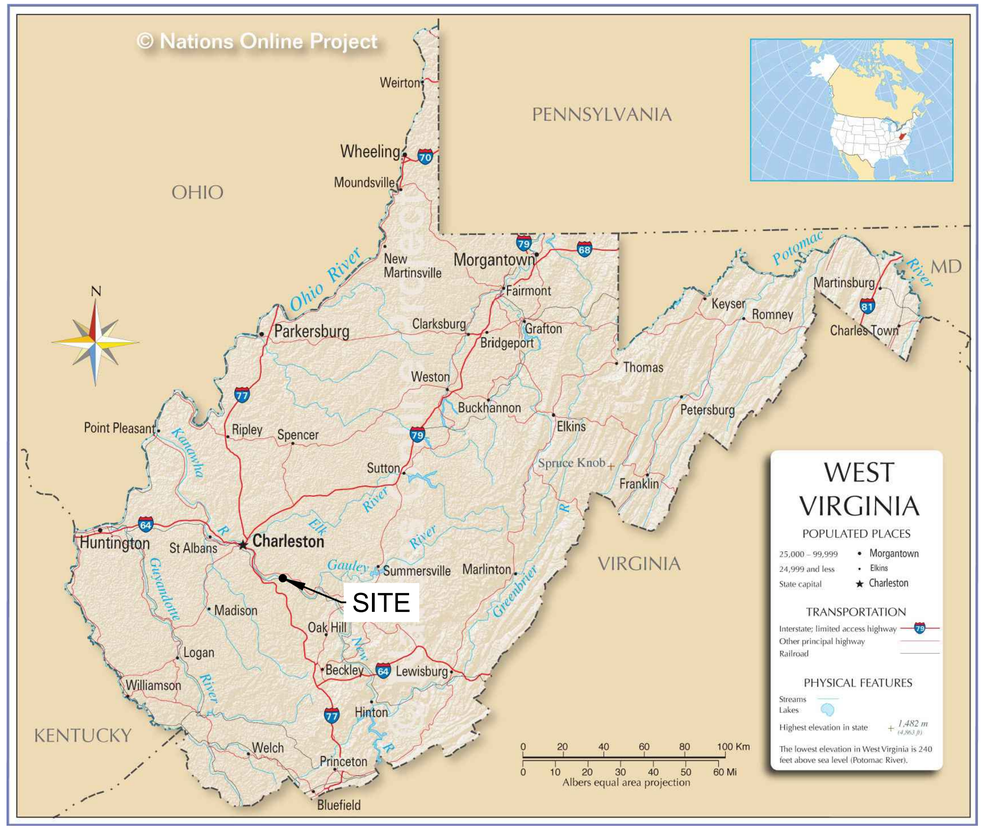
Notes:

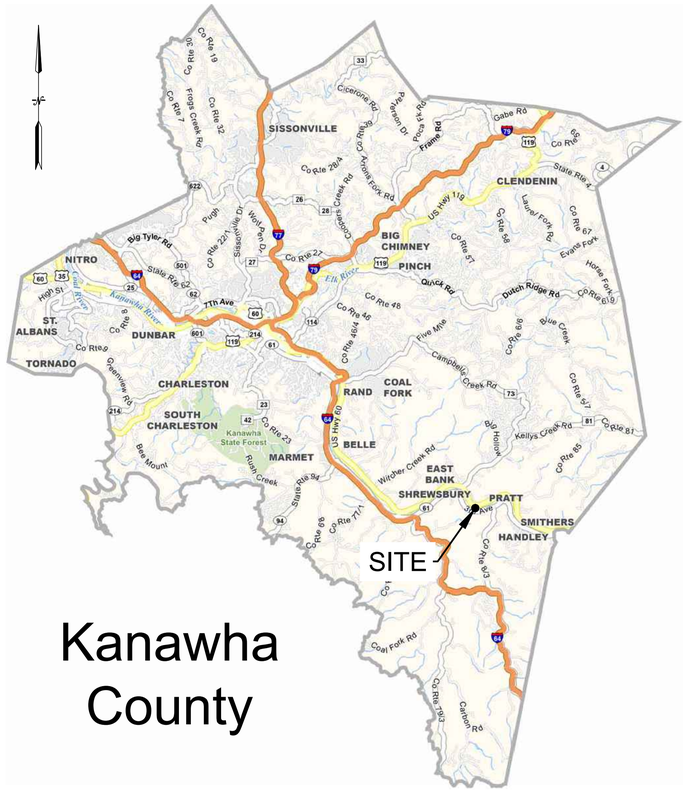
1.TOC = Top of Casing

2. AMSL = Above Mean Sea Level

Figures

DRAWING NUMBER: 1 OF 2





DRAWING NUMBER: 2 OF 2



LEGEND

- EXISTING CONTOURS
- EXISTING ROADS
- EXISTING TREE LINE
- APPROXIMATE BOTTOM ASH POND BOUNDARY
- APPROXIMATE EAST FLY ASH POND BOUNDARY
- AEP MONITORING WELL (MW-XX), 1988,1989,1995
- AEP MONITORING WELL (MW-16XX), 2016
- EHS MONITORING WELL (MW-25XX), 2025
- AEP BORING (FA-B-XX), 1988/1989
- AEP BORING (FA-B-XX), 2005
- AEP BORING (B-14-XX), 2014
- AEP BORING (B-XX)
- AEP BORING (FR-B-XX)
- AEP CPT SOUNDING (FA-B-14), 2014

200 0 200 400 FT

NOTES

1. SOME OF THE MONITORING WELLS (FROM 1988/1989/1995) MAY HAVE BEEN ABANDONED.

REFERENCES

1. EXISTING TOPOGRAPHY FOR THE EAST FLY ASH POND PROVIDED BY AMERICAN ELECTRIC POWER. ADDITIONAL TOPO OUTSIDE OF THE EAST FLY ASH POND IS 2018 USGS TOPO.
2. BOREHOLE LOCATIONS ARE EITHER PROVIDED BY AEP OR INFERRED FROM THE DRAWINGS SUPPLIED BY AEP.
3. SITE BOUNDARIES ARE APPROXIMATE.

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

THIS DRAWING IS CLASSIFIED AS:

REFERENCE AEP's CORPORATE INFORMATION SECURITY POLICY

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APPALACHIAN POWER COMPANY

KANAWHA RIVER ASH PONDS (BAP AND EFA)
FORMER KANAWHA RIVER POWER PLANT

GLASGOW WEST VIRGINIA

GEOTECHNICAL EXPLORATION LOCATIONS PLAN

UNIT:	DRAWING NUMBER:	REV:
FEET	2 OF 2	-

SCALE: 1" = 200'
DR: CCP
CH: NG
SUP: NG
ENG: SJM
DATE: 12/18/2025
APPROVED BY

wsp
3348 Peachtree Road NE
Suite 1100
Atlanta, GA 30326

AEP AMERICAN ELECTRIC POWER

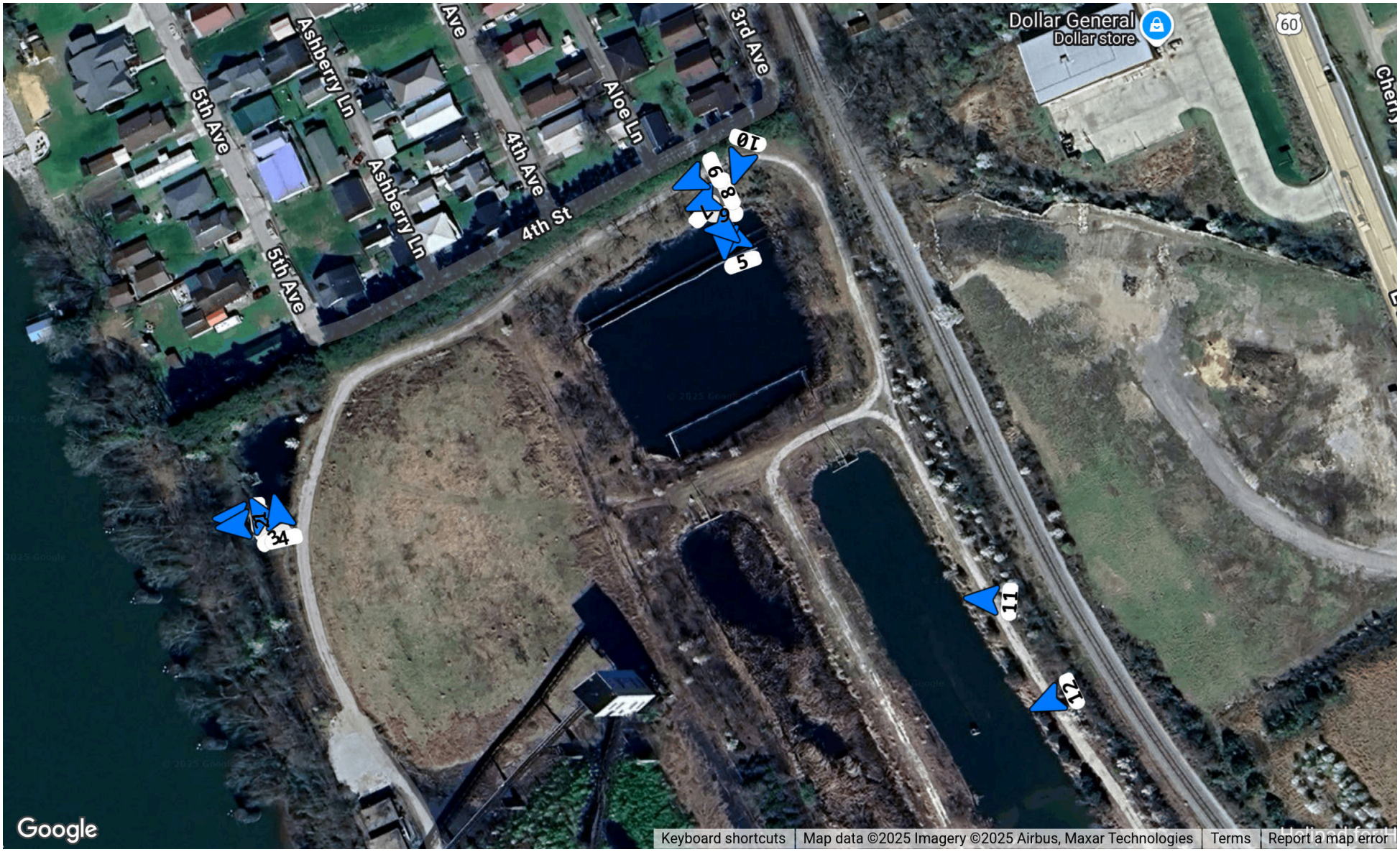
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

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G:\American Electric Power\Kanawha River Site\Geotech Data Report\Production\2 - Geotechnical Exploration Locations Plan.dwg LAYOUT: 2 SAVED: 12/17/2025 11:34 AM PAGESETUP: ---- PLOTTED: 12/17/2025 POWELL, CHRIS

APPENDIX A

Site Reconnaissance Photo Log



wsp	Project Name: AEP Kanawha River (BAP)	
	Project Location: BAP, Former Kanawha Power Plant, Cabin Creek, WV	
	Client: AEP	Project Code: US0041868.3860
	Preparer: Naveen Kumar Ganji	Reviewer: Steven Moeller
	Report Date: 2025-12-22	Page Number: 1 of 7



Media 1: Outfall - 36" RC Pipe looking west

Latitude: 38.2095
Longitude: -81.4260
Bearing: W

Weather: Cloudy
Date Taken: 07/15/2025
Taken By: Naveen Kumar Ganji

Tags: NA



Media 2: Heavily vegetated slope adjacent to Kanawha River

Latitude: 38.2095
Longitude: -81.4260
Bearing: W

Weather: Cloudy
Date Taken: 07/15/2025
Taken By: Naveen Kumar Ganji

Tags: NA

Project Name: AEP Kanawha River (BAP)	
Project Location: BAP, Former Kanawha Power Plant, Cabin Creek, WV	
Client: AEP	Project Code: US0041868.3860
Preparer: Naveen Kumar Ganji	Reviewer: Steven Moeller
Report Date: 2025-12-22	Page Number: 2 of 7



Media 3: Discharge pipe for the detention pond of the Coal Storage Area

Latitude: 38.2095	Weather: Cloudy
Longitude: -81.4259	Date Taken: 07/15/2025
Bearing: N	Taken By: Naveen Kumar Ganji

Tags: NA



Media 4: Detention Pond for the Coal Storage Area

Latitude: 38.2095	Weather: Cloudy
Longitude: -81.4258	Date Taken: 07/15/2025
Bearing: N	Taken By: Naveen Kumar Ganji

Tags: NA

Project Name: AEP Kanawha River (BAP)	
Project Location: BAP, Former Kanawha Power Plant, Cabin Creek, WV	
Client: AEP	Project Code: US0041868.3860
Preparer: Naveen Kumar Ganji	Reviewer: Steven Moeller
Report Date: 2025-12-22	Page Number: 3 of 7



Media 5: Looking inside MH-1

Latitude: 38.2103	Weather: Cloudy
Longitude: -81.4241	Date Taken: 07/15/2025
Bearing: SE	Taken By: Naveen Kumar Ganji

Tags: NA



Media 6: Skimmer in the clear water pond - looking south

Latitude: 38.2104	Weather: Cloudy
Longitude: -81.4242	Date Taken: 07/15/2025
Bearing: S	Taken By: Naveen Kumar Ganji

Tags: NA

Project Name: AEP Kanawha River (BAP)	
Project Location: BAP, Former Kanawha Power Plant, Cabin Creek, WV	
Client: AEP	Project Code: US0041868.3860
Preparer: Naveen Kumar Ganji	Reviewer: Steven Moeller
Report Date: 2025-12-22	Page Number: 4 of 7



Media 7: MH-1 riser structure in the clear water pond

Latitude: 38.2104	Weather: Cloudy
Longitude: -81.4242	Date Taken: 07/15/2025
Bearing: SW	Taken By: Naveen Kumar Ganji

Tags: NA

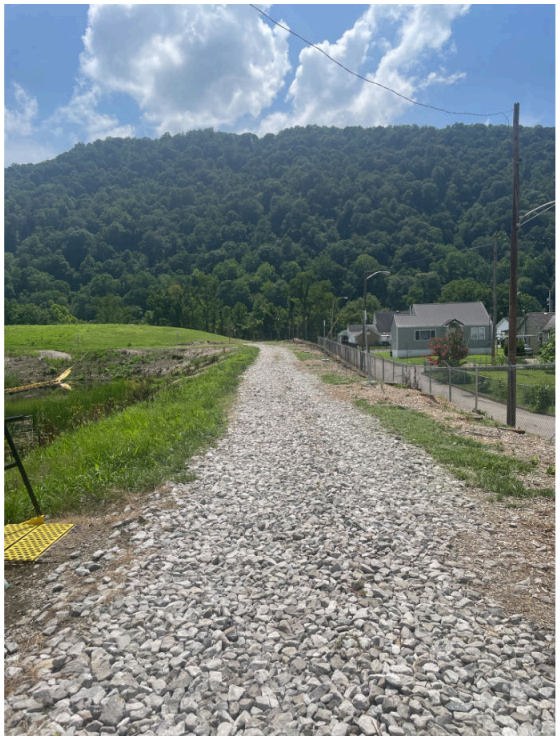


Media 8: Northwestern corner of the clear water pond looking southwest along dike slope

Latitude: 38.2105	Weather: Cloudy
Longitude: -81.4242	Date Taken: 07/15/2025
Bearing: SW	Taken By: Naveen Kumar Ganji

Tags: NA

Project Name: AEP Kanawha River (BAP)	
Project Location: BAP, Former Kanawha Power Plant, Cabin Creek, WV	
Client: AEP	Project Code: US0041868.3860
Preparer: Naveen Kumar Ganji	Reviewer: Steven Moeller
Report Date: 2025-12-22	Page Number: 5 of 7



Media 9: Crest of the northern dike of the clear water pond, looking southwest along top of dike



Media 10: Clear Water Pond looking south

Latitude: 38.2105 Longitude: -81.4243 Bearing: SW	Weather: Cloudy Date Taken: 07/15/2025 Taken By: Naveen Kumar Ganji	Latitude: 38.2106 Longitude: -81.4241 Bearing: S	Weather: Cloudy Date Taken: 07/15/2025 Taken By: Naveen Kumar Ganji
Tags: NA		Tags: NA	

Project Name: AEP Kanawha River (BAP)		
Project Location: BAP, Former Kanawha Power Plant, Cabin Creek, WV		
Client: AEP	Project Code: US0041868.3860	
Preparer: Naveen Kumar Ganji	Reviewer: Steven Moeller	
Report Date: 2025-12-22	Page Number: 6 of 7	



Media 11: North Pond looking west

Latitude: 38.2093
Longitude: -81.4232
Bearing: W

Weather: Cloudy
Date Taken: 07/15/2025
Taken By: Naveen Kumar Ganji

Tags: NA



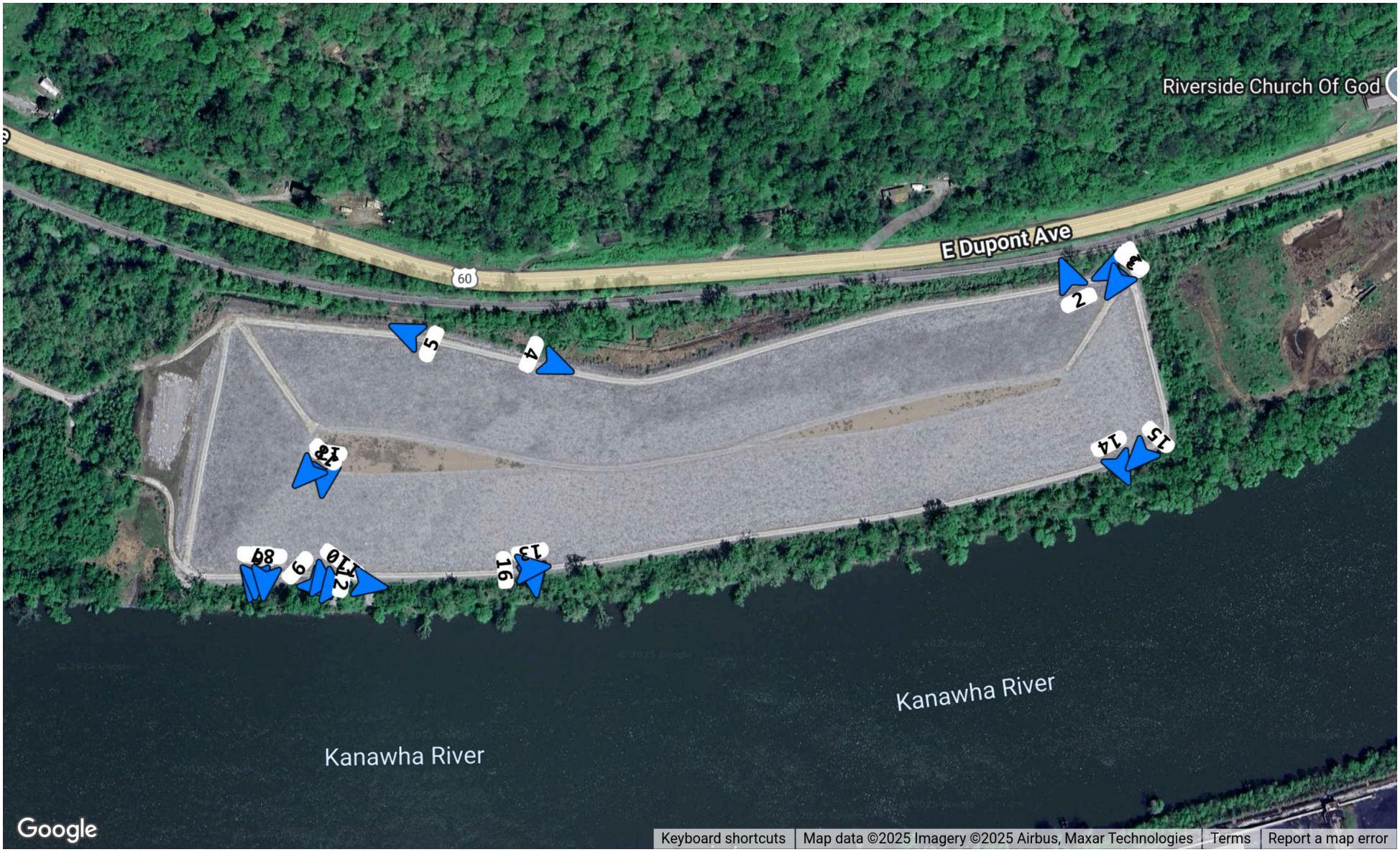
Media 12: MH-2 in the North Pond looking west

Latitude: 38.2090
Longitude: -81.4229
Bearing: SW

Weather: Cloudy
Date Taken: 07/15/2025
Taken By: Naveen Kumar Ganji

Tags: NA

Project Name: AEP Kanawha River (BAP)	
Project Location: BAP, Former Kanawha Power Plant, Cabin Creek, WV	
Client: AEP	Project Code: US0041868.3860
Preparer: Naveen Kumar Ganji	Reviewer: Steven Moeller
Report Date: 2025-12-22	Page Number: 7 of 7



	Project Name: AEP Kanawha River (EFA)	
	Project Location: EFA, Former Kanawha Power Plant, Cabin Creek, WV	
	Client: AEP	Project Code: US0041868.3860
	Preparer: Naveen Kumar Ganji	Reviewer: Steven Moeller
	Report Date: 2025-12-18	Page Number: 1 of 10



Media 1: Northeastern slope on EFA looking west

Latitude: 38.2056	Weather: Cloudy
Longitude: -81.4098	Date Taken: 07/15/2025
Bearing: W	Taken By: Naveen Kumar Ganji

Tags: NA



Media 2: Northeastern slope on EFA showing the fence looking north

Latitude: 38.2055	Weather: Cloudy
Longitude: -81.4101	Date Taken: 07/15/2025
Bearing: N	Taken By: Naveen Kumar Ganji

Tags: NA

Project Name: AEP Kanawha River (EFA)	
Project Location: EFA, Former Kanawha Power Plant, Cabin Creek, WV	
Client: AEP	Project Code: US0041868.3860
Preparer: Naveen Kumar Ganji	Reviewer: Steven Moeller
Report Date: 2025-12-18	Page Number: 2 of 10



Media 3: existing stone riprap cover and path towards the eastern portion of EFA

Latitude: 38.2056
Longitude: -81.4097
Bearing: SW

Weather: Cloudy
Date Taken: 07/15/2025
Taken By: Naveen Kumar Ganji

Tags: NA



Media 4: Northern slope of EFA looking west shows riprap armoring on slope

Latitude: 38.2051
Longitude: -81.4140
Bearing: E

Weather: Cloudy
Date Taken: 07/15/2025
Taken By: Naveen Kumar Ganji

Tags: NA

Project Name: AEP Kanawha River (EFA)	
Project Location: EFA, Former Kanawha Power Plant, Cabin Creek, WV	
Client: AEP	Project Code: US0041868.3860
Preparer: Naveen Kumar Ganji	Reviewer: Steven Moeller
Report Date: 2025-12-18	Page Number: 3 of 10



Media 5: Northern slope of the EFA looking west. Showing riprap armoring on the slope

Latitude: 38.2052
Longitude: -81.4150
Bearing: NW

Weather: Cloudy
Date Taken: 07/15/2025
Taken By: Naveen Kumar Ganji

Tags: NA



Media 6: Southern slope of EFA looking towards the Kanawha River. Showing erosion repairs on steeper dike slopes

Latitude: 38.2038
Longitude: -81.4162
Bearing: S

Weather: Cloudy
Date Taken: 07/15/2025
Taken By: Naveen Kumar Ganji

Tags: NA

Project Name: AEP Kanawha River (EFA)

Project Location: EFA, Former Kanawha Power Plant, Cabin Creek, WV

Client: AEP

Project Code: US0041868.3860

Preparer: Naveen Kumar Ganji

Reviewer: Steven Moeller

Report Date: 2025-12-18



Media 7: Southern slope of EFA looking towards the Kanawha River showing riprap repair section on dike and soil/vegetative slope below

Latitude: 38.2038
Longitude: -81.4162
Bearing: S

Weather: Cloudy
Date Taken: 07/15/2025
Taken By: Naveen Kumar Ganji

Tags: NA



Media 8: Southern slope of EFA showing erosion damage on perimeter dike adjacent to the Kanawha River

Latitude: 38.2038
Longitude: -81.4161
Bearing: S

Weather: Cloudy
Date Taken: 07/15/2025
Taken By: Naveen Kumar Ganji

Tags: NA

Project Name: AEP Kanawha River (EFA)

Project Location: EFA, Former Kanawha Power Plant, Cabin Creek, WV

Client: AEP

Project Code: US0041868.3860

Preparer: Naveen Kumar Ganji

Reviewer: Steven Moeller

Report Date: 2025-12-18



Media 9: Southern slope of EFA showing repaired erosion area along the Kanawha River

Latitude: 38.2038
Longitude: -81.4158
Bearing: SE

Weather: Cloudy
Date Taken: 07/15/2025
Taken By: Naveen Kumar Ganji

Tags: NA



Media 10: Southern slope of EFA showing repaired erosion area along the Kanawha River

Latitude: 38.2038
Longitude: -81.4157
Bearing: SW

Weather: Cloudy
Date Taken: 07/15/2025
Taken By: Naveen Kumar Ganji

Tags: NA

Project Name: AEP Kanawha River (EFA)

Project Location: EFA, Former Kanawha Power Plant, Cabin Creek, WV

Client: AEP

Project Code: US0041868.3860

Preparer: Naveen Kumar Ganji

Reviewer: Steven Moeller

Report Date: 2025-12-18



Media 11: Southern slope of EFA showing repaired erosion area along the Kanawha River. Repairs extend to the water level



Media 12: Southern slope of EFA along the Kanawha River showing erosion repair that was backfilled with geotextile and riprap

Latitude: 38.2038 Longitude: -81.4156 Bearing: SW	Weather: Cloudy Date Taken: 07/15/2025 Taken By: Naveen Kumar Ganji	Latitude: 38.2038 Longitude: -81.4154 Bearing: E	Weather: Cloudy Date Taken: 07/15/2025 Taken By: Naveen Kumar Ganji
Tags: NA		Tags: NA	

	Project Name: AEP Kanawha River (EFA)	
	Project Location: EFA, Former Kanawha Power Plant, Cabin Creek, WV	
	Client: AEP	Project Code: US0041868.3860
	Preparer: Naveen Kumar Ganji	Reviewer: Steven Moeller
	Report Date: 2025-12-18	Page Number: 7 of 10



Media 13: Southern slope of EFA along the Kanawha River showing erosion repair that was backfilled with geotextile and riprap

Latitude: 38.2038
Longitude: -81.4141
Bearing: S

Weather: Cloudy
Date Taken: 07/15/2025
Taken By: Naveen Kumar Ganji

Tags: NA



Media 14: Southeast corner of EFA from top of access road (top of dike) looking towards the Kanawha River

Latitude: 38.2045
Longitude: -81.4098
Bearing: SE

Weather: Cloudy
Date Taken: 07/15/2025
Taken By: Naveen Kumar Ganji

Tags: NA

Project Name: AEP Kanawha River (EFA)	
Project Location: EFA, Former Kanawha Power Plant, Cabin Creek, WV	
Client: AEP	Project Code: US0041868.3860
Preparer: Naveen Kumar Ganji	Reviewer: Steven Moeller
Report Date: 2025-12-18	Page Number: 8 of 10



Media 15: Southeast corner of EFA from top of access road (top of dike) looking west at crest of dike

Latitude: 38.2045
Longitude: -81.4096
Bearing: SW

Weather: Cloudy
Date Taken: 07/15/2025
Taken By: Naveen Kumar Ganji

Tags: NA



Media 16: Southern slope of EFA along dike crest showing stone base for access road and heavily vegetated area on slope

Latitude: 38.2039
Longitude: -81.4142
Bearing: E

Weather: Cloudy
Date Taken: 07/15/2025
Taken By: Naveen Kumar Ganji

Tags: NA

Project Name: AEP Kanawha River (EFA)	
Project Location: EFA, Former Kanawha Power Plant, Cabin Creek, WV	
Client: AEP	Project Code: US0041868.3860
Preparer: Naveen Kumar Ganji	Reviewer: Steven Moeller
Report Date: 2025-12-18	Page Number: 9 of 10



Media 17: Top of EFA cover looking south towards the Kanawha River. Showing surge stone on top of the geosynthetic cover system

Latitude: 38.2044	Weather: Cloudy
Longitude: -81.4157	Date Taken: 07/15/2025
Bearing: S	Taken By: Naveen Kumar Ganji

Tags: NA



Media 18: Top of EFA looking southwest towards the Kanawha River (surge stone cover material)

Latitude: 38.2044	Weather: Cloudy
Longitude: -81.4158	Date Taken: 07/15/2025
Bearing: SW	Taken By: Naveen Kumar Ganji

Tags: NA

Project Name: AEP Kanawha River (EFA)	
Project Location: EFA, Former Kanawha Power Plant, Cabin Creek, WV	
Client: AEP	Project Code: US0041868.3860
Preparer: Naveen Kumar Ganji	Reviewer: Steven Moeller
Report Date: 2025-12-18	Page Number: 10 of 10

APPENDIX B

Previous Geotechnical Investigations

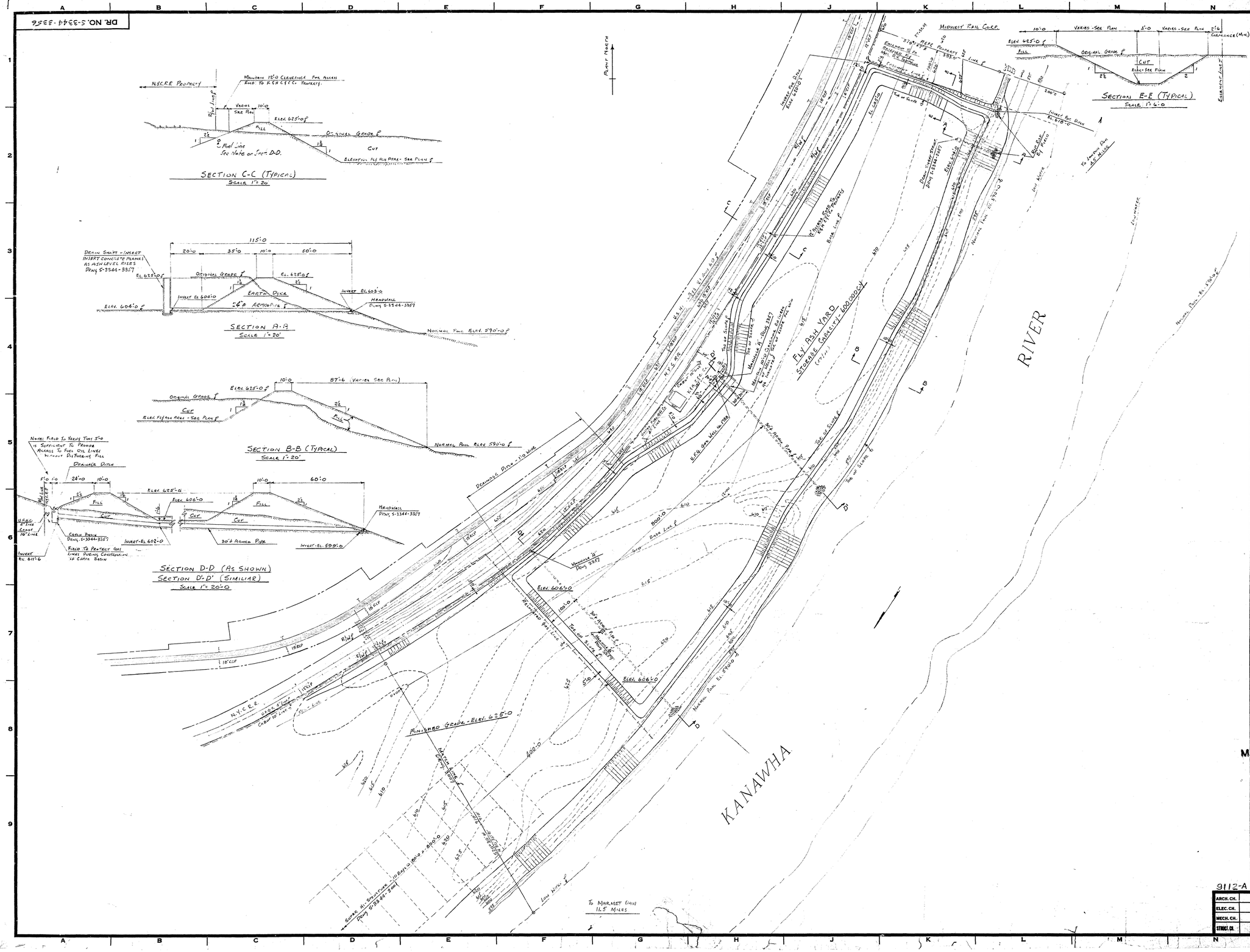
DR. NO. S-3344-3356

SECTION C-C (TYPICAL)
SCALE 1"=20'

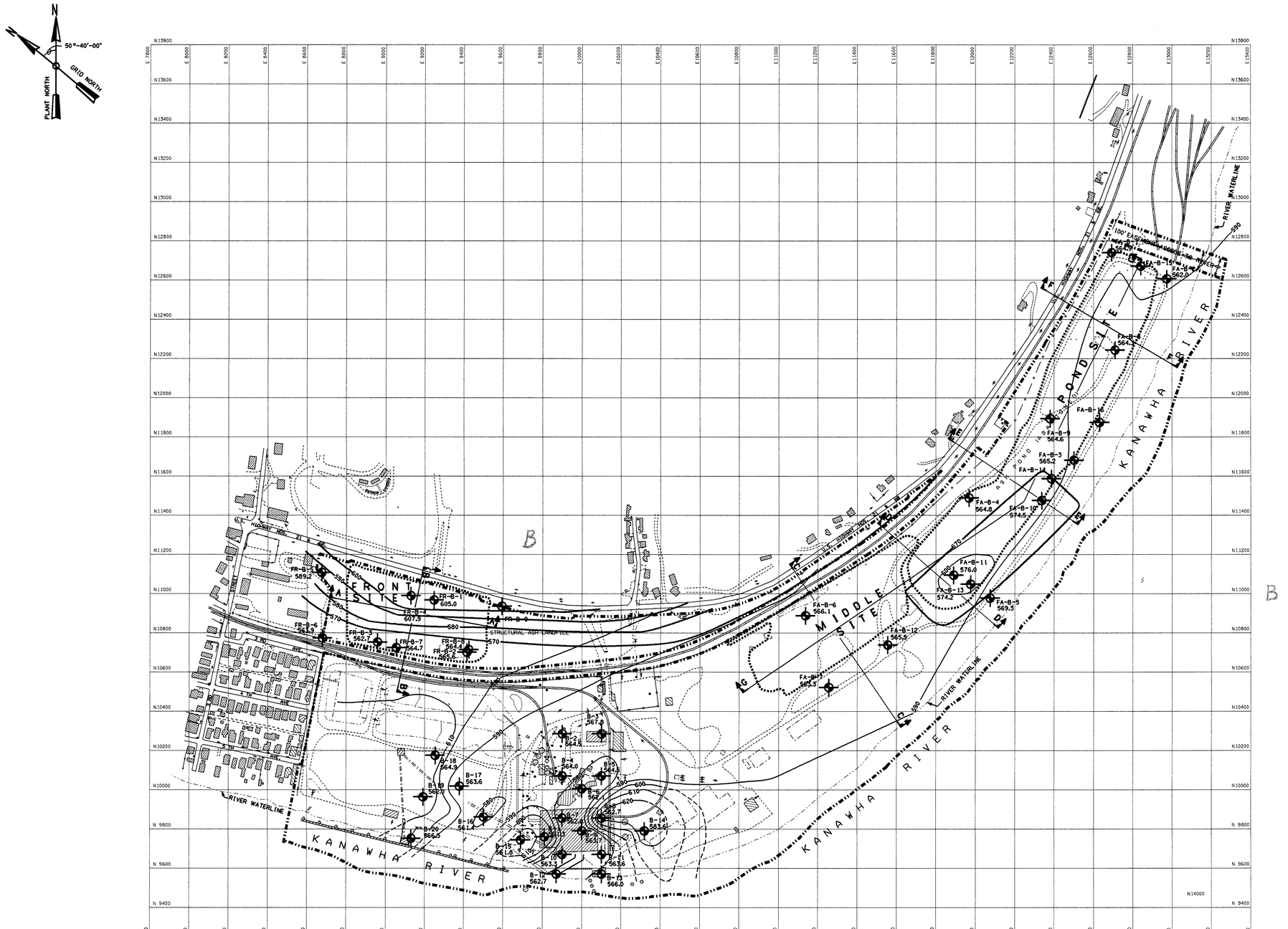
SECTION A-A
SCALE 1"=20'

SECTION B-B (TYPICAL)
SCALE 1"=20'

SECTION D-D (AS SHOWN)
SECTION D'-D' (SIMILIAR)
SCALE 1"=20'-0


Plant North
Midwest Rail Corp.
Varies See Plan
Elev. 625'-0 f
Original Grade
Cut
Fill
Elev. See Plan
Clearance (Min.)
Section E-E (Typical)
Scale 1"=6'-0
Intercept Ditch Elev. 620'-0
Elev. 625'-0
Top of Slope
Ditch
Relocated Rail Line
Relocated By Armco
To Marmet Dam 10.5 Miles
Elev. 625'-0
Property Line
Dominion Post Storage Dwg S-3344-3357
Elev. 640'-0
Top of Slope
Manhole 'A' Dwg S-3357
Manhole 'B' Dwg S-3357
Fly Ash Yard
Storage Capacity 600,000 C.Y.
(177 Ac.)
Elev. 625'-0
Top of Slope
Manhole 'A' Dwg S-3357
Manhole 'B' Dwg S-3357
Top of Slope
Elev. 625'-0
Top of Slope
Elev. 625'-0
Top of Slope
Elev. 625'-0

DRG. NO. 12-3954



Contour Interval = 2 feet
Scale in Feet
200 150 100 50 0 100 200 400
Graphic Scale 1"=200'
Ratio Scale 1 : 2400

BORING LOCATIONS & ELEVATIONS

BORING NO	ELEVATION	COORDINATES (PLANT) NORTH	EAST
FA-B-1	640.9 GRD	12740.6	12692.0
FA-B-2	638.2 GRD	12607.2	12974.0
FA-B-3	643.2 GRD	11662.0	12500.9
FA-B-4	646.4 GRD	11469.4	11967.6
FA-B-5	647.7 GRD	10978.6	12074.6
FA-B-6	626.6 GRD	10888.8	11137.6
FA-B-7	626.8 GRD	10522.7	11255.7
FA-B-8	640.0 GRD	12243.3	12709.7
FA-B-9	642.4 GRD	11893.7	12381.2
FA-B-10	645.2 GRD	11476.0	12336.9
FA-B-11	650.7 GRD	11095.1	11890.4
FA-B-12	629.6 GRD	10739.4	11555.8
FA-B-13	649.0 GRD	11049.4	11975.6
FA-B-14	645.4 GRD	11587.6	12386.8
FA-B-15	642.3 GRD	12671.5	12843.5
FA-B-16	643.4 GRD	11874.25	12633.26
FR-B-1	632.5 GRD	10968.7	9248.5
FR-B-2	622.7 GRD	10702.0	9416.6
FR-B-3	625.7 GRD	10753.8	8958.9
FR-B-4	629.9 GRD	10990.3	9129.9
FR-B-5	629.4 GRD	11108.7	8679.2
FR-B-6	626.2 GRD	10774.6	8682.7
FR-B-7	625.3 GRD	10725.8	9057.6
FR-B-8	623.4 GRD	10715.7	9428.7
FR-B-9	646.8 GRD	10939.7	9593.8
B-1	625.3 GRD	9761.0	9810.0
B-2	623.1 GRD	10286.0	9900.0
B-3	622.1 GRD	10286.0	10100.0
B-4	628.0 GRD	10071.0	9900.0
B-5	627.5 GRD	10071.0	10100.0
B-6	628.1 GRD	10006.0	10000.0
B-7	627.8 GRD	9856.0	9900.0
B-8	625.7 GRD	9856.0	10100.0
B-9	624.7 GRD	9791.0	10000.0
B-10	618.3 GRD	9671.0	9900.0
B-11	613.6 GRD	9671.0	10100.0
B-12	609.3 GRD	9571.0	9870.0
B-13	594.5 GRD	9571.0	10100.0
B-14	609.6 GRD	9791.0	10320.0
B-15	624.8 GRD	9745.3	9689.2
B-16	628.9 GRD	9861.9	9502.6
B-17	626.8 GRD	10018.9	9378.8
B-18	622.4 GRD	10176.0	9255.0
B-19	626.0 GRD	9964.8	9193.4
B-20	621.3 GRD	9753.6	9131.9

NOTE
STRUCTURE MAP OF SAND AND GRAVEL ALLUVIAL DEPOSIT ORIGINAL (PRECONSTRUCTION OF PLANT & FACILITIES) SITE CONDITIONS.

LEGEND

- BUILDING, STRUCTURE & TANK
- PRIMARY/SECONDARY AND IMPROVED ROAD
- UNIMPROVED ROAD AND YARD AREAS
- RAILROAD TRACK
- POLES
- RIVER CELLS AND DOCK
- FENCE
- WATERLINE
- SURVEY CONTROL
- PLANT PROPERTY LINE
- BORING WITH BEDROCK ELEV.
- BEDROCK CONTOUR LINES
- TOP OF SAND & GRAVEL ALLUVIUM (10'CONTOUR INTERVALS)
- DISPOSAL SITE BOUNDARY

REFERENCE DRAWING

12-3956 PROPOSED ASH LANDFILL HYDROGEOLOGIC CROSS SECTION

DATE	NO.	DESCRIPTION	APPD.
	B	ADDED 200' GRID TO REPLACE THE EXISTING 500' GRID. ADDED BORING No. FR-B-9 TO PLAN AND TABLE E6	
5/4/81	A	ISSUED FOR PERMIT	

REVISIONS

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APPALACHIAN POWER COMPANY

KANAWHA RIVER PLANT

PROPOSED ASH LANDFILL STRUCTURE MAP OF SAND & GRAVEL ALLUVIAL DEPOSITS

DRG. NO. 12-3954-B

ARCH. — ELEC. — MECH. — STR. G S

SCALE: 1:200

DRN SLP
CHK JMM
SO. LDR: RMS
DATE:

ENGINEERING DIVISION
ORIGINAL SIGNED BY/ B.N. BENNETT / PMA — H J

DESIGN DIVISION
ORIGINAL SIGNED BY/ T. A. LEPORE / P. S. VAN PELT JR — WPM

RDR-KR-00-3488

AMERICAN ELECTRIC POWER SERVICE CORP.

IGS0288

21-MAY-1991

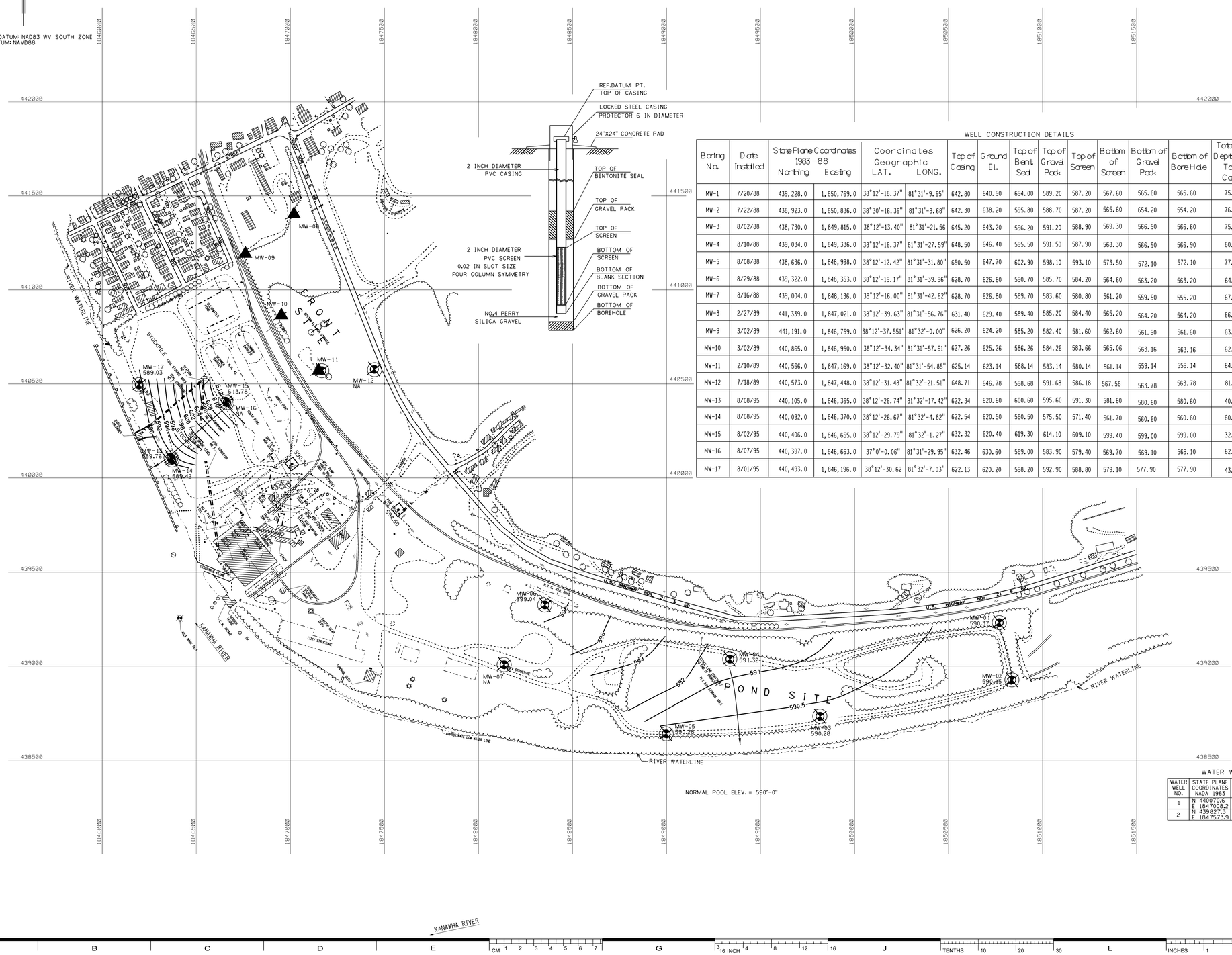
AEP Confidential - Moderate Risk - Approved - 3954 - 11/08/2005 - krp, 12.dwg, 3954_b.tif

DRAWING NUMBER
12-3955

CROSS REFS:

N
W E

HORIZONTAL DATUM: NAD83 WV SOUTH ZONE
VERTICAL DATUM: NAVD88



WELL CONSTRUCTION DETAILS

Boring No.	Date Installed	State Plane Coordinates 1983 - 88 Northing	Easting	Coordinates Geographic LAT.	LONG.	Top of Casing	Ground El.	Top of Bent. Seal	Top of Gravel Pack	Top of Screen	Bottom of Screen	Bottom of Gravel Pack	Bottom of Bore Hole	Total Well Depth From Top of Casing	Comments
MW-1	7/20/88	439,228.0	1,850,769.0	38°12'-18.37"	81°31'-9.65"	642.80	640.90	694.00	589.20	587.20	567.60	565.60	565.60	75.20	
MW-2	7/22/88	438,923.0	1,850,836.0	38°30'-16.36"	81°31'-8.68"	642.30	638.20	595.80	588.70	587.20	565.60	654.20	554.20	76.70	
MW-3	8/02/88	438,730.0	1,849,815.0	38°12'-13.40"	81°31'-21.56	645.20	643.20	596.20	591.20	588.90	569.30	566.90	566.60	75.90	
MW-4	8/10/88	439,034.0	1,849,336.0	38°12'-16.37"	81°31'-27.59"	648.50	646.40	595.50	591.50	587.90	568.30	566.90	566.90	80.20	
MW-5	8/08/88	438,636.0	1,848,998.0	38°12'-12.42"	81°31'-31.80"	650.50	647.70	602.90	598.10	593.10	573.50	572.10	572.10	77.00	
MW-6	8/29/88	439,322.0	1,848,353.0	38°12'-19.17"	81°31'-39.96"	628.70	626.60	590.70	585.70	584.20	564.60	563.20	563.20	64.10	
MW-7	8/16/88	439,004.0	1,848,136.0	38°12'-16.00"	81°31'-42.62"	628.70	626.80	589.70	583.60	580.80	561.20	559.90	555.20	67.50	
MW-8	2/27/89	441,339.0	1,847,021.0	38°12'-39.63"	81°31'-56.76"	631.40	629.40	589.40	585.20	584.40	565.20	564.20	564.20	66.20	CLOSED ON 1/16/12
MW-9	3/02/89	441,191.0	1,846,759.0	38°12'-37.551"	81°32'-0.00"	626.20	624.20	585.20	582.40	581.60	562.60	561.60	561.60	63.60	CLOSED ON 1/16/12
MW-10	3/02/89	440,865.0	1,846,950.0	38°12'-34.34"	81°31'-57.61"	627.26	625.26	586.26	584.26	583.66	565.06	563.16	563.16	62.20	CLOSED ON 1/16/12
MW-11	2/10/89	440,566.0	1,847,169.0	38°12'-32.40"	81°31'-54.85"	625.14	623.14	588.14	583.14	580.14	561.14	559.14	559.14	64.00	CLOSED ON 1/16/12
MW-12	7/18/89	440,573.0	1,847,448.0	38°12'-31.48"	81°32'-21.51"	648.71	646.78	598.68	591.68	586.18	567.58	563.78	563.78	81.13	
MW-13	8/08/95	440,105.0	1,846,365.0	38°12'-26.74"	81°32'-17.42"	622.34	620.60	600.60	595.60	591.30	581.60	580.60	580.60	40.74	
MW-14	8/08/95	440,092.0	1,846,370.0	38°12'-26.67"	81°32'-4.82"	622.54	620.50	580.50	575.50	571.40	561.70	560.60	560.60	60.84	
MW-15	8/02/95	440,406.0	1,846,655.0	38°12'-29.79"	81°32'-1.27"	632.32	620.40	619.30	614.10	609.10	599.40	599.00	599.00	32.92	
MW-16	8/07/95	440,397.0	1,846,663.0	37°0'-0.06"	81°31'-29.95"	632.46	630.60	589.00	583.90	579.40	569.70	569.10	569.10	62.76	
MW-17	8/01/95	440,493.0	1,846,196.0	38°12'-30.62	81°32'-7.03"	622.13	620.20	598.20	592.90	588.80	579.10	577.90	577.90	43.03	

WATER WELL LOCATIONS

WATER WELL NO.	STATE PLANE COORDINATES NADA 1983	LATITUDE LONGITUDE	PLANT COORDINATES	TOP OF CASING
1	N 440070.6 E 1847008.2	N 38°12'28" W 81°12'28"	N 12740.5 E 12692.0	618.0
2	N 439827.3 E 1847573.9	N 38°12'26 W 81°25'15"	N 12607.2 E 12974.0	621.7

LEGEND

- 620 — 10' CONTOUR LINE
- 2' CONTOUR LINE
- 650 — CONTOUR LINE OFF-SITE INTERVAL 10'
- × 625.8 SPOT ELEVATION
- TREELINE AND TREE
- BUILDING, STRUCTURE & TANK
- PRIMARY/SECONDARY AND IMPROVED ROAD
- UNIMPROVED ROAD AND YARD AREAS
- RAILROAD TRACK
- POLES
- RIVER CELLS AND DOCK
- FENCE
- WATERLINE
- EXISTING DRAINAGE PIPES & CULVERTS
- H-1 SURVEY CONTROL
- PLANT PROPERTY LINE
- DEPRESSION
- FA-B-14 BOREHOLES FOR OPEN STATIC WATER MEASUREMENT & DATE OF MEASUREMENT PRIOR TO GROUTING BOREHOLE
- MONITORING WELL
- CLOSED MONITORING WELL
- INACTIVE WATER SUPPLY WELL
- DIRECTION OF GROUND-WATER FLOW
- POTENTIOMETERIC CONTOUR

DATE	NO.	DESCRIPTION	APPD.
11/07/13	C	CHANGED MAPPING FROM PLANT COORDINATES TO STATE PLANE. ADDED MW-10, MW-11, MW-12 TO TABLE. ADDED GEOGRAPHIC COORDINATES & COMMENTS SECTION. CLOSED WELLS MW-8, MW-9, MW-10 & MW-11. SLP	JMN GFZ

REVISIONS

THIS DRAWING IS CLASSIFIED AS:

AEP PUBLIC

REFERENCE AEP's CORPORATE INFORMATION SECURITY POLICY

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APPALACHIAN POWER COMPANY

KANAWHA RIVER PLANT

GLASGOW WEST VIRGINIA

GEOTECHNICAL

PROPOSED ASH LANDFILL POTENTIOMETRIC MAP

UNIT:	DRAWING NUMBER:	REV:
12	3955	C

SCALE: 1"=200'
DR: SLP
CH: JMN
SUP:
ENG: RNS
DATE: SEE REV 0

CIVIL ENGINEERING

APPROVED BY:
ORIGINAL SIGNED BY: B.H.BENNETT / PHA — HJ
ORIGINAL SIGNED BY: V.A.LEPORE/ T.S. VAN PELT JR. — WPM

AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

POSTAGE: 3.20(PS)
PLOTTED: 11/07/2013
BY: RENEE SMITH

CROSS REFS:

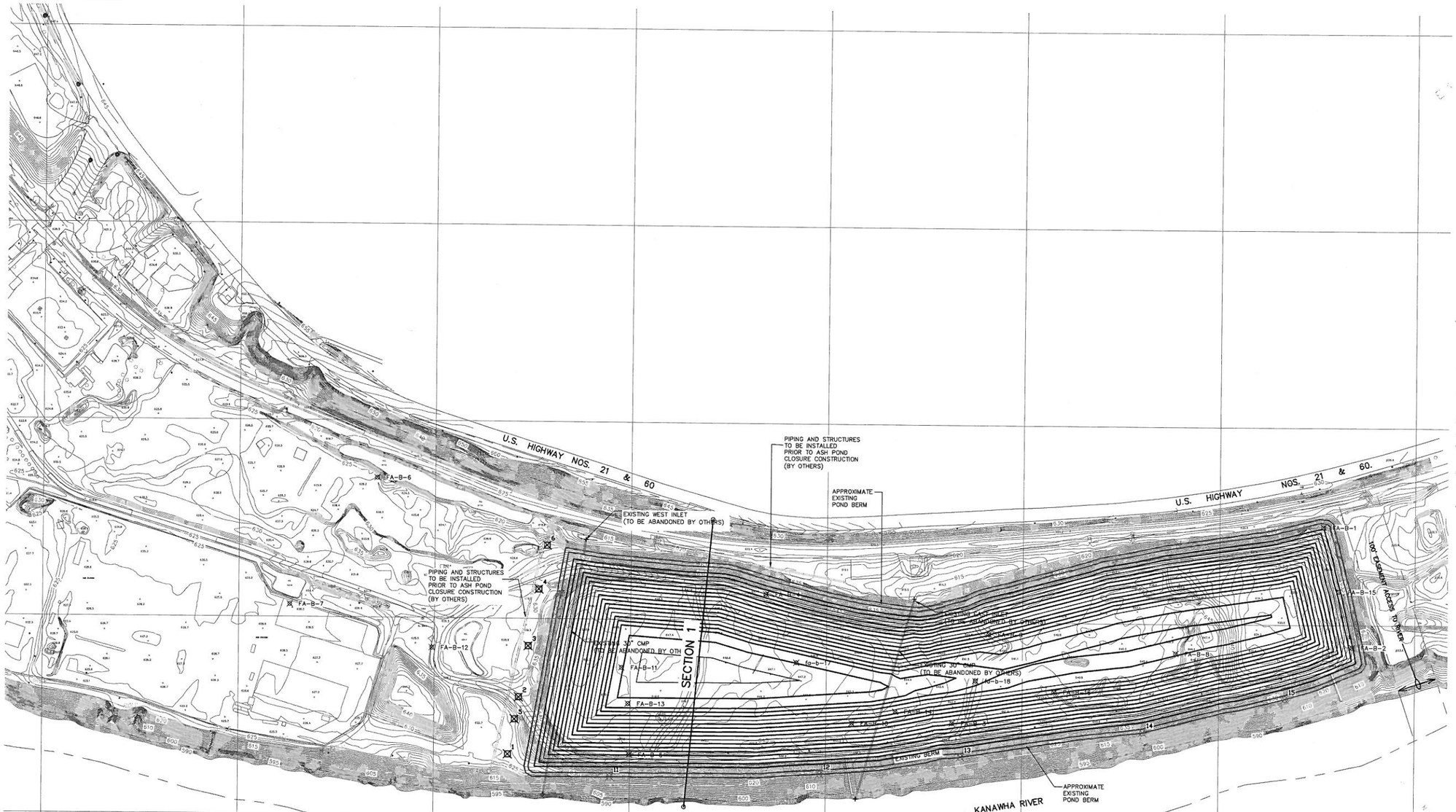
12-3955

AEP Confidential - Moderate Risk - Approved - 3955 - 11/07/2013 - krj, 12_dwg, 3955.c.tif

KANAWHA RIVER

G: (30" x 42")

DWG. NO. 12-30011-A



N

100' 0' 100' 200'
SCALE: 1"=100' CONTOUR INTERVAL: 2'

LEGEND

- EXISTING CONTOUR
- EXISTING SPOT ELEVATION
- EXISTING TREES
- EXISTING STREAM OR POND EDGE
- EXISTING OCCUPIED STRUCTURE
- EXISTING FENCE
- EXISTING UTILITY POLE
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING PROPERTY LINE
- EXISTING SOIL BORINGS
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN
- GEOPROBE BORING LOCATION
- EXISTING BERM

VERTICAL DATUM: NAVD88
HORIZONTAL DATUM: NAD83 WVA SOUTH

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

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APPALACHIAN POWER COMPANY

KANAWHA RIVER PLANT

GLASGOW WEST VIRGINIA

ASH POND CLOSURE BORING LOCATIONS AND SLOPE STABILITY PLAN VIEW

DWG. NO. FIGURE 1

SCALE:	CIVIL ENGINEERING DIVISION
DES. LHC	
CHK	
ENGR.	
PROJ. ENGR.	
DATE:	

APPROVED BY

AEP AMERICAN ELECTRIC POWER

1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

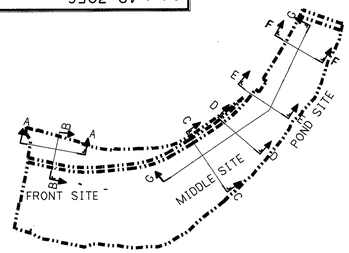
ARCADIS Project No. HA1002150.0000.00000	Professional Engineer's Name JOHN HOLM		
Date 7-8-2015	Professional Engineer's No.		
ARCADIS 4665 CORNELL ROAD SUITE 310 CINCINNATI, OHIO 45241 TEL. 513.860.8700	State	Date Signed	Project Mgr. RJK
	Designed by	Drawn by MJC	Checked by JWH

ARCADIS

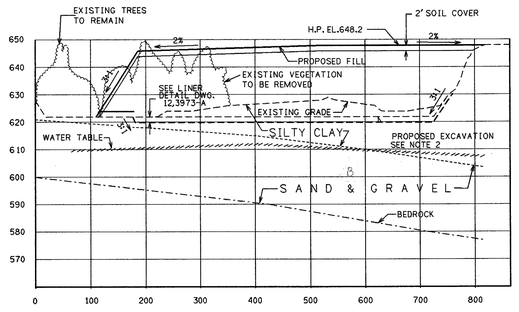
ARCADIS U.S., INC.

IGS1092

DWG. NO. 12-3956

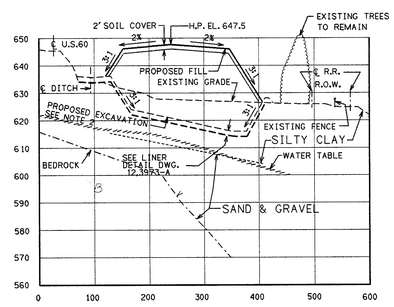


KEY PLAN



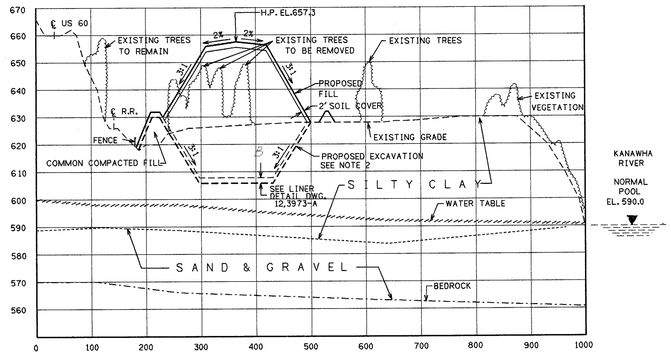
SECTION A-A

SCALE: VERT. 1" = 20'
HORZ. 1" = 100'



SECTION B-B

SCALE: VERT. 1" = 20'
HORZ. 1" = 100'



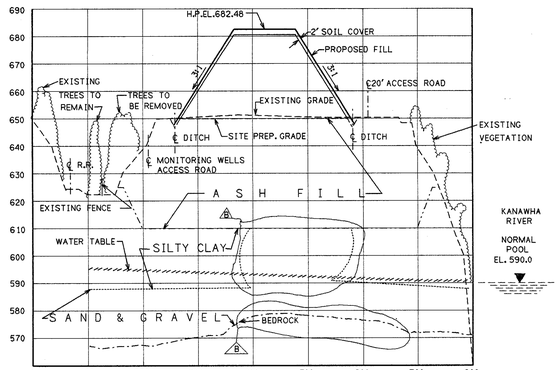
KANAWHA RIVER
NORMAL POOL EL. 590.0

SECTION C-C

SCALE: VERT. 1" = 20'
HORZ. 1" = 100'

FRONT SITE

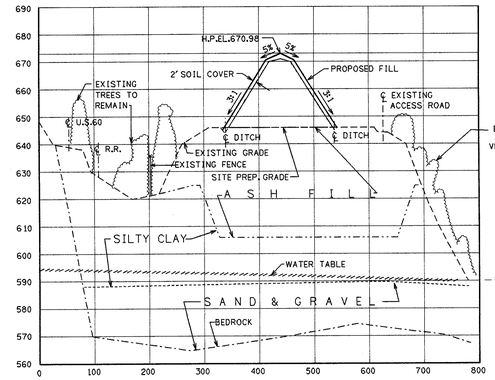
REF. DWG. 12-3954 & 12-3970



KANAWHA RIVER
NORMAL POOL EL. 590.0

SECTION D-D

SCALE: VERT. 1" = 20'
HORZ. 1" = 100'



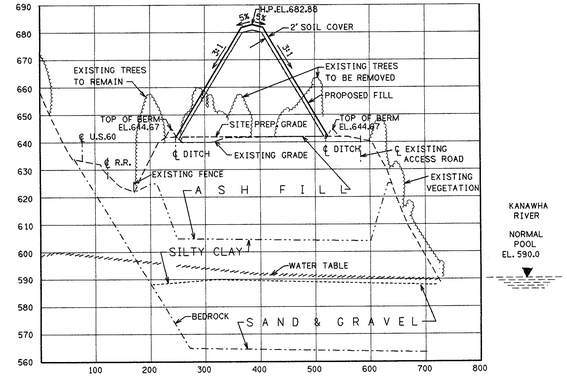
KANAWHA RIVER
NORMAL POOL EL. 590.0

SECTION E-E

SCALE: VERT. 1" = 20'
HORZ. 1" = 100'

MIDDLE SITE

REF. DWG. 12-3954 & 12-3972



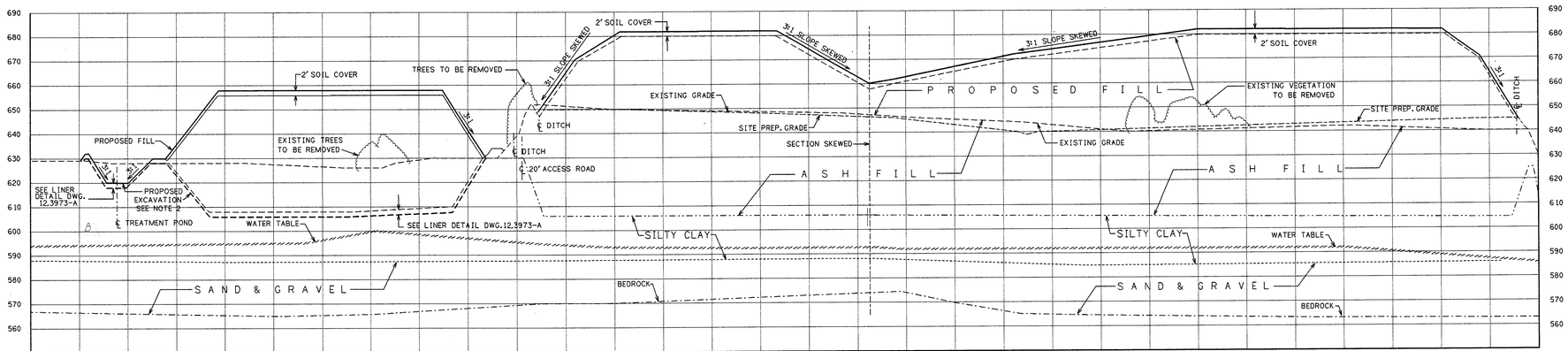
KANAWHA RIVER
NORMAL POOL EL. 590.0

SECTION F-F

SCALE: VERT. 1" = 20'
HORZ. 1" = 100'

POND SITE

REF. DWG. 12-3954 & 12-3972



SECTION G-G

SCALE: VERT. 1" = 20'
HORZ. 1" = 100'

POND SITE/MIDDLE SITE

REF. DWG. 12-3954 & 12-3972

REFERENCE DRAWINGS

12-3954 PROPOSED ASH LANDFILL-

12-3969 PROPOSED ASH LANDFILL-

12-3970 PROPOSED ASH LANDFILL- FRONT

12-3972 PROPOSED ASH LANDFILL-ASH POND (ABANDONED)-, AND MIDDLE SITES CLOSURE PLAN

NOTE:

1 FOR TOE OF SLOPE DETAIL REFER TO DWG. 12-3973.

2. PROPOSED EXCAVATION IS CLAY BORROW SOURCE.

DATE	NO.	DESCRIPTION	APPD.
	B	PROFILE SECT. D-D REVISE SAND & GRAVEL	
8/30/96	A	ISSUED FOR PERMIT	

REVISIONS

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APPLALACHIAN ELECTRIC POWER CO.

KANAWHA RIVER PLANT

PROPOSED ASH LANDFILL HYDROGEOLOGIC CROSS SECTIONS

DWG. NO. 12-3956-B

ARCH.	—	ELEC.	—	MECH.	—	STR.	G S
SCALE= AS SHOWN		ENGINEERING DIVISION ORIGINAL SIGNED BY: B.W. BENNETT / PHA					H J
DR= R M							
CH= JMN							
SG. LDR= RNS/RD		DESIGN DEPARTMENT ORIGINAL SIGNED BY: V. A. LEPORE / F. S. VAN PELT JR					WPM
DATE=							

APPROVED BY

RDR-KR-00-3488

AMERICAN ELECTRIC POWER SERVICE CORP.

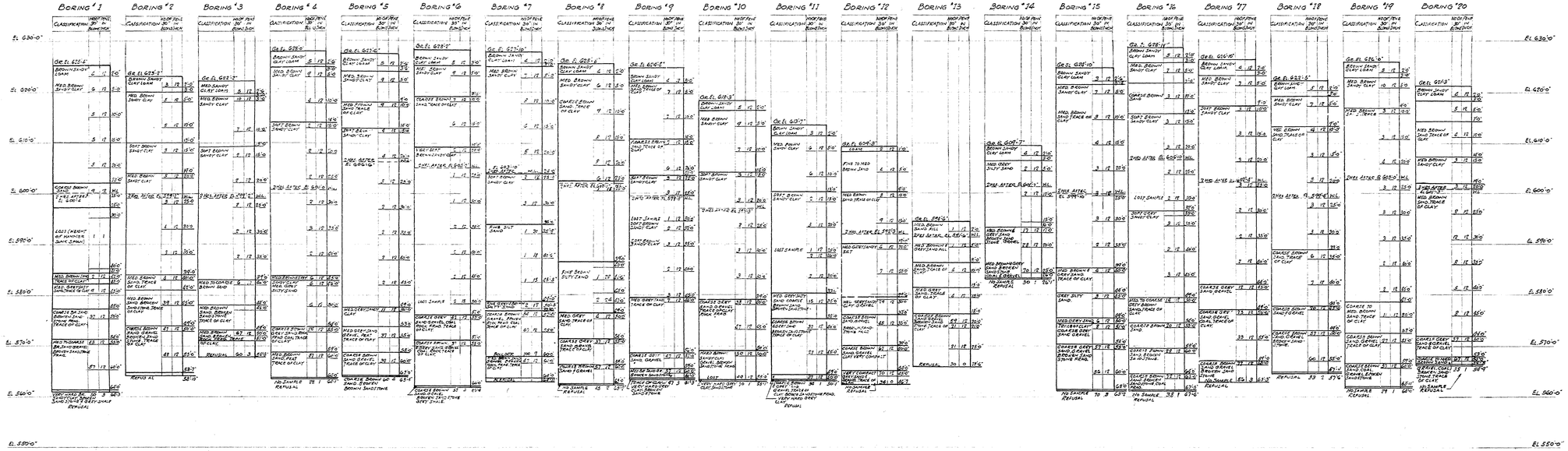
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IGS0189

DR. NO. S-3344-3003

CLASSIFICATION OF BORINGS - RAYMOND CONCRETE PILE CO.

VERTICAL SCALE 1"=10'



WORK THIS DWG. TOGETHER WITH DWG. S-3344-3004

DATE	No.	DESCRIPTION	APPD.

REVISIONS

AMERICAN GAS & ELECTRIC SERVICE CORPORATION
30 CHURCH STREET NEW YORK

LOGS OF BORINGS
BORINGS 1 TO 20 INCL

S-1 -2

APPALACHIAN ELECTRIC POWER CO.
KANAWHA RIVER PLANT
GLASGOW WEST VIRGINIA

SCALE 1"=10' DATE 11/1952

ARCH. CH.	DR. BY R.M.	APPROVED
ELEC. CH.	TR. BY	
MECH. CH.	CH. BY	
STRUCT. CH.		

DR. No. S-3344-3003

AEP Confidential - Moderate Risk - Approved: S-3344-3003 - 11/02/1950 - KY_1_IMG_S-3344-3003_0.tif

NOTE: BORING LOG FOR OBS. WELL NO 1

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING FA-B-1

Job No. _____
Company APCO
Project Kanawha River Plant Ash Area
Coordinates N-12740.6 E.12692.0

Location of Boring:	
Water Level	18.0
Time	in Ash
Date	

Boring No. 1 Date 7-19-88 Sheet 1 of 4
Type of Samples: SPT ✓ 3" Tube — Core —
Casing used ✓ Size _____ Drilling Mud used —
Boring Begun 7-19-88 Boring Completed 7-20-88
Ground Elevation [redacted] Referred to _____
640.9 Datum
Field Party Lambert - Daast Rig 75

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
1	2.0	3.5	2	4	3	11"					Gray Fly + Bottom ash mixture Dry	
2	7.0	8.5	10	12	15	14"		10			Same as 1	
3	12.0	13.5	3	4	3	16"					Same as 1	
4	17.0	18.5	3	3	2	17"					Fly Ash Saturated	
								20				

6" x 3.25 HSA ✓
HW Casing Advancer 4" ✓
NQ Core Rock
NW Casing 3"
SW Casing 6" ✓

Recorder _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Boring No. 1 Date _____ Sheet 2 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling Mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ referred to _____ Datum
Field Party _____ Rig _____

Location of Boring:	
Water Level	
Time	
Date	

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								20				
5	22.0	23.5	weight of 140 LB Hammer			18"					Fly Ash Saturated	
6	22.0	28.5	weight of 140 LB Hammer			18"					Same as 5	
								30			HW Casing 34.0 Water 11.0'	7-20-88
7	32.0	33.5	1	1	5	18"					Top 14" Same as 6	
										SM	Bottom - Silt - Br. moist w/ V-Fine Sand -	
8	39.5	41.0	3	4	4	15"					Clay - Br. wet - low to med. plasticity w/ trace of V-Fine Sand	
								40				

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock
NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 1 Date _____ Sheet 2 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling Mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ Referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								40				
9	44.5	46.0	1	5	6	15"				CL	Sandy clay- Br- wet to saturated-	
10	49.5	51.0	2	3	3	17"		50			Same as 9 Gray trace of organic	
11	54.5	56.0	2	1	4	17"					Silty Sand- Gray- wet to saturated - 100% V-Fine Grain	
12	59.5	61.0	2	3	4	18"					Same as 11	

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock

NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-5
REV. 1/67

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 1 Date _____ Sheet 4 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling Mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ Referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								60				
13	66.5	67.0	36	31	27	14"					Silty Sand & Gravel - Bc. wet - 3/4" max size - Gravel poorly cemented sand stone Angular	
										GM		
14	68.5	71.0	17	26	50	14"					Same as 13 1" max size	
								70				
15	71.5	76.0	26	43	50/.2	11"					Same as 13 1" max size	
	6" x 3.25 HSA HW Casing Advancer 4" NQ Core Rock											
	NW Casing 3" SW Casing 6"										Recorder _____	

NOTE: BORING LOG FOR OBS. WELL NO2

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING FA-8-2

Job No. _____

Company APCO - Kanawha River

Project Ash Storage Area

Coordinates N-12607.2 E 12974.0

Location of Boring:

Water Level	33.0	7-27-88
Time	in Soil	50.1'
Date	Casing	66.0

Boring No. 2 Date 7-25-88 Sheet 1 of 5

Type of Samples: SPT ✓ 3" Tube ✓ Core ✓

Casing used — Size — Drilling mud used —

Boring begun 7-25-88 Boring Completed 7-27-88

Ground Elevation 638.2 Referred to _____ Datum

Field Party Lambert - Darst Rig 75

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
1	2.0	3.5	3	5	6	12					Bottom + Fly Ash Mixture Dry.	
2	7.0	8.5	4	5	6	17"					Same as 1	
								10				
3	12.0	13.5	3	3	3	17					Same as 1	
4	17.0	18.5'	2	1	2	16					Same as 1	

6"x 3.25 HSA	✓
HW Casing Advancer 4"	✓
NQ Core Rock	✓
NW Casing 3"	
SW Casing 6"	✓

Recorder _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 2 Date _____ Sheet 2 of 5
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
5	22.0	23.5	2	1	2	17"		20			Top- 3" FLY + Bottom ASH MIXTURE Bottom 14" FLY ASH	
6	27.0	28.5	2	3	3	18"					SILTY Sand- BR- moist 100% Fine Grain	
										SM		
								30				
7	34.0	36.0	1	1	2	18"					Sandy Clay- BR- Saturated 100% V-Fine Grain	
										SC		
8	39.5	41.5									Push 2.0 BRWN SILTY SAND, Time 19 Sec. NON-PLASTIC, PSI 200 Rec. 2.0	
								40				

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock
NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-5
REV. 1/67

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 2 Date _____ Sheet 3 of 5
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								40				
9	44.5	46.0	1	3	2	16"					Sandy clay. Br. Saturated 100% V-Fine Grain	
										SC		
10	49.5	51.5									2.0 Push Brown Silty Clayey Sand 1.5 Sec. 200 PSI 2.0 Rec.	
								50				
11	54.5	56.0	2	3	5	18"					Silty Sand - Br. Saturated 100% V-Fine Grain	
										SM		
											Top-9" Same as 11	
12	59.5	61.0	19	24	26	12"					Bottom - Silty Sand & Gravel Br. - 1" max size - Angular @ Quartz & Black Chert	

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock

NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-5
REV. 1/67

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 2 Date _____ Sheet 4 of 5
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling Mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ Referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								60				
13	64.5	66.0	50/.1								Bolder	
											Cored bolder from 67.3 to 69.5	
14	69.5	71.0	3	3	4	0		70				
15	74.5	76.0	30	30	36	12"					Silt / Sand + Gravel - Gray Bed Saturated - Rayline 1" max size - Quartz + poorly cemented Sandstone	
16	76.0	76.2	50/2			2"					Gray clay Shale	
								80				

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock

NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 2 Date _____ Sheet 5 of 5
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ Referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"	Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
						80				
	78.1	88.1		9.2	63				78.2 - 79.0	
									Soft Clay Shale	
									79.0 - 81.0	
									Core 1 Core Lost ?	
									81.0 - 88.1	
									Gray Hard Fine Grain	
									Well Cemented Sand Stone	
						90			Stopped Hole 88.1	

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock

NW Casing 3"
SW Casing 6"

Recorder _____

NOTE: BORING LOG FOR OBS. WELL NO 3

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING FA-B-3

JOB NO. _____

COMPANY APCO Kanawha River

PROJECT Ash Storage Area

COORDINATES N-11682.0 - E 12500.9

BORING NO. 3 DATE 8-1-88 SHEET 1 OF 4

TYPE OF SAMPLES: SPT ✓ 3" TUBE _____ CORE _____

CASING USED ✓ SIZE _____ DRILLING MUD USED _____

BORING BEGUN 8-1-88 BORING COMPLETED 8-2-88

GROUND ELEVATION 643.2 REFERRED TO _____ DATUM

FIELD PARTY Lambert RIG _____

LOCATION OF BORING:		
WATER LEVEL	22.5	47.0
TIME	Trapped in ash in soil	
DATE	8-1-88	8-1-88

SAMPLE NUMBER	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOW / 6"			TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	USCS	SOIL / ROCK IDENTIFICATION	DRILLER'S NOTES
1	2.0	3.5	4	4	3	18"					Fly Ash - moist	
2	7.0	8.5	1	1	1	18"		10			Fly Ash - moist	
3	12.0	13.5	4	5	5	18"					Fly Ash - moist	
4	17.0	18.5	3	4	4	18"		20			Fly Ash - moist	

	6" x 3.25 HSA	✓
	HW Casing Advancer 4"	✓
	NQ Core Rock	
	NW Casing 3"	
	SW Casing 6"	✓

RECORDER _____

FORM CE-6
REV. 1/67

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 3 Date _____ Sheet 2 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								20				
5	23.0	23.5	2	2	2	16"					Fly ash- moist	
6	28.0	28.5	3	2	4	18"					Fly ash Saturated	
								30				
7	33.0	33.5	2	2	2	18"					Fly ash - Saturated	
8	38.0	38.5	1	1	1	18"					Fly ash - Saturated	
								40				

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock
NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

JOB NO. _____
COMPANY _____
PROJECT _____
COORDINATES _____

LOCATION OF BORING:	
WATER LEVEL	
TIME	
DATE	

BORING NO. 3 DATE _____ SHEET 3 OF 4
TYPE OF SAMPLES: SPT _____ 3" TUBE _____ CORE _____
CASING USED _____ SIZE _____ DRILLING MUD USED _____
BORING BEGUN _____ BORING COMPLETED _____
GROUND ELEVATION _____ REFERRED TO _____ DATUM
FIELD PARTY _____ RIG _____

SAMPLE NUMBER	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOW / 6"			TOTAL LENGTH RECOVERY	ROD %	DEPTH IN FEET	GRAPH LOG	USCS	SOIL / ROCK IDENTIFICATION	DRILLER'S NOTES
								40				
9	42.0	43.5	3	2	3	18"					TOP-3 FLY ASH - SATURATED	
											Bottom - 15"	
											Clay - Br - WET - Low TO	
											med plasticity	
										CL		
											TOP-7"	
10	47.0	48.5	2	1	2	18"					SILTY Sand - Br - SATURATED	
										SM	100% V-Fine Grain	
											Bottom - 11"	
											Sandy Clay - Br. WET TO	
											SATURATED - 100% V-Fine	
											Grain	
								50		SC		
11	50.0	51.5	3	5	8	19"					ORGANIC SILTY Sand - WET - GRAY	
											w/ LAYERS OF BLACK ORGANIC	
											MATERIAL -	
12	55.0	56.5	4	6	6	15"					TOP -	
											SILTY Sand - Br - SATURATED	
											100% Fine Grain	
										SM		
											ORGANIC SILTY Sand - GRAY	
											100% Fine Grain	

6" x 3.25 HSA
HW CASING ADVANCER 4"
NQ CORE ROCK

NW CASING 3"
SW CASING 6"

RECORDER _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 3 Date _____ Sheet 4 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ Referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								60				
13	60.0	61.5	37	50		6"					Sand & Gravel - Brn. Saturated Angular - Poorly Cemented Sandstone 1" max size w/ trace of Fines	
14	65.0	66.5	27	26	10	12"					Same as 13	
								10				
15	70.0	71.5	8	7	16	8"					Same as 13 w/ more Fines	
16	75.0	76.5	26	31	25	0						
17	78.3	78.8	50			5"					Same as 13.	
	6" x 3.25 HSA HW Casing Advancer 4" NQ Core Rock										Stopped Hole 78.8	
	NW Casing 3" SW Casing 6"											

Recorder _____

NOTE: BORING LOG FOR OBS. WELL NO 4

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING FA-8-4

JOB NO. _____

COMPANY APCO

PROJECT Kanawha River Plant ash area

COORDINATES N- 11489.4 - E. 11967.6

BORING NO. 4 DATE 8-9-88 SHEET 1 OF 4

TYPE OF SAMPLES: SPT ✓ 3" TUBE ✓ CORE _____

CASING USED ✓ SIZE HW DRILLING MUD USED _____

BORING BEGUN 8-9-88 BORING COMPLETED 8-10-88

GROUND ELEVATION 646.4 REFERRED TO _____ DATUM

FIELD PARTY Lambert - Darst RIG 75

LOCATION OF BORING:	
WATER LEVEL	21.9
TIME	
DATE	8-9-88

SAMPLE NUMBER	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOW / 6"			TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	USCS	SOIL / ROCK IDENTIFICATION	DRILLER'S NOTES
1	1.5	3.0	6	14	16	14"					FLY ASH moist	
2	6.5	8.0	3	3	3	17"		10			Same AS 1	
3	11.5	13.0	4	3	4	13"					Same AS 1	
4	16.5	18.0	4	3	2	17"					Same AS 1	
								20				

	6" x 3.25 HSA	✓
	HW CASING ADVANCER 4"	✓
	NQ CORE ROCK	
	NW CASING 3"	
	SW CASING 6"	✓

RECORDER _____

FORM CE-5
REV. 1/67

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 4 Date _____ Sheet 2 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling Mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ Referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								20				
5	21.5	23.0	7	7	12	14"					Fly ash moist	
6	26.5	28.0	3	3	4	18"		30			Same as 5	
7	31.5	33.0	3	1	2	18"					Fly ash saturated	
8	36.5	38.0	1	2	3	18"		40			Same as 7	

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock

NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-8
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 4 Date _____ Sheet 3 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ Referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								40				
											TOP 6" Fly Ash Saturated	
9	41.5	43.0	6	6	7	18"					Bottom 12" - Clayey Sand - Brown moist - 100% V-Fine Grain	
10	43.0	45.0								SC	Brown Say Clay	
11	49.5	56.0	4	4	5	18"					Clayey Sand - wet to Saturated - Brn - 100%	
								50		SC	V-Fine Grain	
12	54.5	56.0	4	4	5	18"					Same as 11	
13	59.5	61.0	weight of 140 LB. Hammer			18"					Sandy Clay - Gray - wet to Saturated. - 100% V-Fine Grain	
								60		CL		

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock

NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-8
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 4 Date _____ Sheet 4 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling Mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								60				
14	64.5	66.0	2	3	4	5"					Clayey Sand - GR. BR. WET TO SATURATED - 100% V-FINE GRAIN	
										SC		
15	69.5	71.0	12	7	6	5"		70			Clayey Sand & Gravel BR- SATURATED - 3/4" MAX SIZE - POORLY CEMENTED ANGULAR SAND STONE FRAG	
16	74.5	76.0	14	14	9	15"					SAME AS 15 1 3/4" MAX SIZE	
											BOTTOM OF SAMPLE WOOD	
17	79.5	81.3	13	16	13	10"					SAME AS 15 GRAY 1" MAX SIZE	
											REFUSAL 81.6	

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock

NW Casing 3"
SW Casing 6"

Recorder _____

NOTE: BORING LOG FOR OBS. WELL NO 5

FORM CE-5
REV. 1/67

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING PA-8-5

JOB NO. _____

COMPANY ACCO

PROJECT Kanawha River Ash Area

COORDINATES N-10978.6 - E. 12074.6

BORING NO. 5 DATE 8-3-88 SHEET 1 OF 4

TYPE OF SAMPLES: SPT ✓ 3" TUBE ✓ CORE _____

CASING USED _____ SIZE _____ DRILLING MUD USED _____

BORING BEGUN 8-3-88 BORING COMPLETED 8-8-88

GROUND ELEVATION 647.7 REFERRED TO _____ DATUM

FIELD PARTY Lambert - DANST RIG _____

LOCATION OF BORING:	
WATER LEVEL	22.9
TIME	
DATE	

SAMPLE NUMBER	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOW / 6"			TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	USCS	SOIL / ROCK IDENTIFICATION	DRILLER'S NOTES
1	2.5	4.0	7	7	11	16"					Fly Ash moist	
2	7.5	9.0	5	3	4	15		10			Same as 1	
3	12.5	14.0	6	11	11	17					Same as 1	
4	17.5	19.0	3	1	2	17		20			Same as 1	

	6" x 3.25 HSA	✓
	HW CASING ADVANCER 4"	✓
	NQ CORE ROCK	
	NW CASING 3"	
	SW CASING 6"	✓

RECORDER _____

FORM CE-8
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 5 Date _____ Sheet 2 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling Mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ Referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								20				
5	22.5	24.0	3	5	5	17"					Fly Ash - moist	
6	27.5	29.0	4	2	3	17"		30			Same as 5	
7	32.5	34.0	5	6	6	17"					Same as 5	
8	37.5	39.0	3	4	5	18"					Top 10" Same as 5 Saturated V-Fine Silty Sand - w/ layers of Fly Ash - 1 2" Clayey Sand - DK. Br.	
9	39.0	46.0						40		SC	100% V-Fine Grain 2.0 Push 25 Sec. 250 PSI 2.0 Rec. Brwn Silty Clay Sand	

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock

NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

JOB NO. _____
COMPANY _____
PROJECT _____
COORDINATES _____

BORING NO. S DATE _____ SHEET 3 OF 4
TYPE OF SAMPLES: SPT _____ 3" TUBE _____ CORE _____
CASING USED _____ SIZE _____ DRILLING MUD USED _____
BORING BEGUN _____ BORING COMPLETED _____
GROUND ELEVATION _____ REFERRED TO _____ DATUM
FIELD PARTY _____ RIG _____

LOCATION OF BORING:	
WATER LEVEL	
TIME	
DATE	

SAMPLE NUMBER	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOW / 6"			TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	USCS	SOIL / ROCK IDENTIFICATION	DRILLER'S NOTES
								40				
10	45.0	46.5	4	4	4	16"					Clayey Sand - Br. wet to Saturated - 100% V-Fine Grain	
11	50.0	51.5	3	2	4	11"		50			Same as 10 Saturated	
12	55.0	56.5	4	5	4	18"				SP/SM	Sand - Br - Saturated 100% Fine Grain w/ Fines	
13	60.0	61.5	4	4	5	18"		60		SC	Clayey Sand - Br - Saturated 100% V-Fine Grain	

6" x 3.25 HSA
HW CASING ADVANCER 4"
NQ CORE ROCK

NW CASING 3"
SW CASING 6"

RECORDER _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 5 Date _____ Sheet 4 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								60				
											Top	
14	65.0	66.5	3	4	6	18"				SC	Clayey Sand - Be- Saturated 100% Fine Grain	
											Bottom	
											Clayey Sand - Be. Saturated 100% V-Fine Grain - More Finer than Top Half	
15	70.0	71.5	29	26	26	11"		70			Clayey Sand & Gravel - Be- Saturated - 1" max Size - Quartz & poorly Cemented Sand Stone Frags angular	
	-											
16	75.0	76.5	24	25	26	12"					Same as 15	
											Refusal 78.4	
	6" x 3.25 HSA											
	HW Casing Advancer 4"											
	NQ Core Rock											
	NW Casing 3"											
	SW Casing 6"											

Recorder _____

NOTE: BORING LOG FOR OBS. WELL. NO 6

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING FA-8-6

Job No. _____

Company APCO

Project Kanawha River Plant Ash Area

Coordinates N-10888.8 E. 11137.6

Location of Boring:	
Water Level	33.0
Time	
Date	8-18-88

Boring No. 6 Date 8-18-88 Sheet 1 of 4

Type of Samples: SPT ✓ 3" Tube _____ Core ✓

Casing used _____ Size _____ Drilling Mud used _____

Boring begun 8-18-88 Boring Completed 8-29-88

Ground Elevation 626.6 Referred to _____ Datum

Field Party Lambert - Darst Rig 75

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
1	4.5	6.0	14	15	15	17				SM	Silty Sand Br- moist- non Fine Grain w/ Red + Gray Ash Fines	
2	9.5	11.0	3	3	2	17"		10		SM	Silty Sand- Gray - wet w/ organic material	
3	14.5	16.0	4	5	6	14"				CL	Sandy Clay - Br - low plasticity - moist to wet	
4	19.5	21.0	3	3	4	12		20			Same as 3 multi-colored Brs	

	6" x 3.25 HSA	✓
	HW Casing Advancer 4"	✓
	NQ Core Rock	
	NW Casing 3"	
	SW Casing 6"	✓

Recorder _____

FORM CE-9
REV. 1/67

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 6 Date _____ Sheet 2 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling Mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ Referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								20				
5	24.5	26.0	4	5	9	17"					Clay - Br - moist to wet w/ trace of Sand	
										CL		
6	29.5	31.0	2	3	4	17"					Sandy Clay - Br - moist to wet - 100 % Fine Grain	
								30		SC		
7	34.5	36.0	2	2	4	14"					Same as 6 more Sand	
8	39.5	41.0	2	3	5	17"					Sand - Br - Saturated - w/ Fines	
										SP		
	6" x 3.25 HSA HW Casing Advancer 4" NQ Core Rock							40				
	NW Casing 3" SW Casing 6"											

Recorder _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

JOB NO. _____
COMPANY _____
PROJECT _____
COORDINATES _____

LOCATION OF BORING:	
WATER LEVEL	
TIME	
DATE	

BORING No. 6 DATE _____ SHEET 3 OF 4
TYPE OF SAMPLES: SPT _____ 3" TUBE _____ CORE _____
CASING USED _____ SIZE _____ DRILLING MUD USED _____
BORING BEGUN _____ BORING COMPLETED _____
GROUND ELEVATION _____ REFERRED TO _____ DATUM
FIELD PARTY _____ RIG _____

SAMPLE NUMBER	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOW / 6"			TOTAL LENGTH RECOVERY	ROD %	DEPTH IN FEET	GRAPH LOG	USCS	SOIL / ROCK IDENTIFICATION	DRILLER'S NOTES
								40				
											top 6"	
9	44.5	46.0	2	4	21	18"					Sand - Br - Saturated w Fines	
											middle 10"	
											Sand - Gray - Saturated w Fines	
											Bottome 2"	
											Sand + Gravel - Br. Quartz w Fines - Saturated	
10	49.5	51.0	26	50/4		4"					Sand + Gravel - Br. Saturated Quartz - 1" max Size w Fines	
								50				
11	54.5	56.0	22	36	30	19"					Sand + Gravel - Br. Saturated 3/4" max Size - w Fines poorly cemented Sandstone	
12	59.5	59.9	50/4			3"					Same as 11 3/4" max Size	
								60				

6" x 3.25 HSA
HW CASING ADVANCER 4"
NQ CORE ROCK

NW CASING 3"
SW CASING 6"

RECORDER _____

FORM CE-5
REV. 1/67

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 6 Date _____ Sheet 4 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"	Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
						60				
	60.5	65.5		5.0	22				60.5 - 60.9 Br. Fine Grain well Cemented Hard Sand Stone	
									Vertical crack 1" at 61.1	
									60.9 - 65.5	
									Gray Fine Grain well Cemented Hard Sand stone	
									Stopped Hole 65.5	

NOTE: BORING LOG FOR OBS. WELL. NO 7

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING FA-B-7

JOB NO. _____

COMPANY APCO

PROJECT Kanawha River Plant ash storage BORING NO. 7 DATE 8-11-88 SHEET 1 OF 4

COORDINATES N. 10522.7 E. 11255.7

TYPE OF SAMPLES: SPT ✓ 3" TUBE ✓ CORE ✓

CASING USED _____ SIZE _____ DRILLING MUD USED _____

BORING BEGUN 8-11-88 BORING COMPLETED 8-16-88

GROUND ELEVATION 626.8 REFERRED TO _____ DATUM

FIELD PARTY Lambert - Darst RIG 75

LOCATION OF BORING:	
WATER LEVEL	30.0
TIME	
DATE	8-11-88

SAMPLE NUMBER	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOW / 6"			TOTAL LENGTH RECOVERY	ROD %	DEPTH IN FEET	GRAPH LOG	USCS	SOIL / ROCK IDENTIFICATION	DRILLER'S NOTES
1	2.0	3.5	6	11	13	15"					Silty Sand - Br. moist - 100% Fine Grain	
										SM		
2	7.0	8.5	5	5	9	15"		10			Silty Clay - moist - Br. low plasticity - trace of Sand	
										CL		
3	12.0	13.5	1	2	2	15"					Silty Sand - Br - moist 100% Fine Grain	
										SM		
4	19.0	21.0									Shelby Tube - Lost Sample	

6" x 3.25 HSA
HW CASING ADVANCER 4"
NQ CORE ROCK

NW CASING 3"
SW CASING 6"

RECORDER _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 9 Date _____ Sheet 2 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling Mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ Referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								20			18 Sec	
4A	21.0	23.0									200 PSI ~~Soft to Medium~~	
											2.0 Push ~~Layers~~	
											2.0 Rec BRWN SDY CLAY	
5	24.0	25.5	3	3	3	15"					Sandy Clay x Dk. Br. wet	
											100% Fine Grain	
										SL		
6	29.0	31.0									Shelby Tube Lost Samples	
								30				
6A	31.0	33.0									Shelby Tube Lost Sample	
6	34.0	35.5	2	2	3	17"					Clayey Sand - Gray Saturated	
											100% Fine Grain	
										SC		
7	39.0	40.5	2	3	3	18"					Same as 6	

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock

NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

JOB NO. _____
COMPANY _____
PROJECT _____
COORDINATES _____

LOCATION OF BORING:	
WATER LEVEL	
TIME	
DATE	

BORING No. 1 DATE _____ SHEET 2 OF 4
TYPE OF SAMPLES: SPT _____ 3" TUBE _____ CORE _____
CASING USED _____ SIZE _____ DRILLING MUD USED _____
BORING BEGUN _____ BORING COMPLETED _____
GROUND ELEVATION _____ REFERRED TO _____ DATUM
FIELD PARTY _____ RIG _____

SAMPLE NUMBER	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOW / 6"			TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	USCS	SOIL / ROCK IDENTIFICATION	DRILLER'S NOTES
								40				
											51.7%	
8	44.0	45.5	3	3	4	18"					Silty Sand - Gray - Saturated 100% Fine Grain	
										SM		
9	45.0	46.5	27	18	38	18"					Gravelly Sand - Br. Saturated 3/4" max size w/ Fines	
								50				
										SP		
10	54.0	55.5	50/12			2"					Sand some Gravels	
11	59.0	60.5	3	18	50/3	5"					Sand & Gravel - Gray - Br. 1" max size - Quartz	
										SP		
								60				

6" x 3.25 HSA
HW CASING ADVANCER 4"
NQ CORE ROCK

NW CASING 3"
SW CASING 6"

RECORDER _____

FORM CE-S
REV. 1/67

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 7 Date _____ Sheet 4 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ Referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"	Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
						60				
									Auger Refusal 63.5	
	63.5	73.5		9.8	100				63.5' - 71.7' Gray Med Fine Grain well Cemented Sand stone	
									69.6 Crack on 45° Brown Stain	
						80			71.7 - 73.5' Med med Grain Gray well Cemented Sand Stone	
									Stopped Hole 73.5	

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock

NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING FA-8-8

Job No. _____
Company APCO
Project Kanawha River Plant
Coordinates N- 12243.3 E. 12709.7

Boring No. 8 Date 9-8-88 Sheet 1 of 4
Type of Samples: SPT ✓ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling Mud used _____
Boring begun 9-8-88 Boring Completed 9-12-88
Ground Elevation 640.0 Referred to _____ Datum
Field Party Lambert - Drast Rig 75

Location of Boring:	
Water Level	9-8-88
Time	320
Date	

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
1	2.0	3.5	2	5	8	14"					Fly Ash Moist Gray	
2	7.0	8.5	3	2	3	18"		10			Same as 1	
3	12.0	13.5	4	4	4	18"					Same as 1	
4	17.0	18.5	2	3	3	18"					Same as 1	

6" x 3.25 HSA ✓
HW Casing Advancer 4" ✓
NQ Core Rock
NW Casing 3"
SW Casing 6" ✓

Recorder _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. B Date _____ Sheet 2 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ Referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								20				
5	22.0	23.5	3	2	3	18"					Fly Ash moist - Gray	
6	27.0	28.5	4	4	2	14"					Same as 5	
								30				
7	32.0	33.5	2	1	1	17"					Fly Ash Saturated - Gray	
8	37.0	38.5	2	3	3	18"					Same as 7 Top 4"	
											Bottom - 14"	
											Clayey Sand - Br. Saturated	
											100% Fine Grain	
										SC		
								40				

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock

NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Boring No. 8 Date _____ Sheet 3 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling Mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ referred to _____ Datum
Field Party _____ Rig _____

Location of Boring:	
Water Level	
Time	
Date	

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								40				
9	44.0	45.5	2	1	1	18"					Sand - Ba - Saturated - w/ Fines 10090 Fine Grain - Quartz	
10	49.0	50.5	2	2	4	18"		50			Same as 9	
11	54.0	55.5	4	6	8	18"					Same as 9	
12	59.0	60.5	26	50/3						GP	Sand & Gravel - Ba - Saturated Quartz - 1" max size poorly Graded - w/ Trace of Fines	
								60				

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock

NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-5
REV. 1/67

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 8 Date _____ Sheet 4 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ Referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								60				
13	64.0	65.5	29	5/4		9"					Sand & Gravel - Br. Saturated Quartz - poorly Graded 3/4" max Size - w/ Trace of Fines	
14	69.0	70.5	16	15	8	4"		70			Same as 13	
15	74.0	75.5	41	5/4		9"					Same as 13 w/ more Fines	
											Refusal 75.6	
											Stopped Hole 75.6	

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock

NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING PA-B-9

Job No. _____
Company APCO
Project Kanawha River Plant
Coordinates N-11893.7 E 12381.2

Location of Boring:		
Water Level	43.0	5:21
Time		
Date	9-13-88	9-14-88

Boring No. 9 Date 9-13-88 Sheet 1 of 5
Type of Samples: SPT V 3" Tube V Core _____
Casing used _____ Size _____ Drilling Mud used _____
Boring begun 9-13-88 Boring Completed 9-14-88
Ground Elevation 642.4 Referred to _____ Datum
Field Party Lambert - Danst Rig 75

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
1	2.0	3.5	4	8	8	14"					Fly Ash - Gray - Moist	
2	7.0	8.5	3	4	4	18"		10			Same as 1	
3	12.0	13.5	3	5	4	17"					Same as 1	
4	17.0	18.5	4	4	3	18"		20			Same as 1	

6" x 3.25 HSA ✓
HW Casing Advancer 4" ✓
NQ Core Rock
NW Casing 3"
SW Casing 6" ✓

Recorder _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 9 Date _____ Sheet 2 of 5
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								20				
												22
5	22.0	23.5'	3	3	2	17"					Fly ash - Gray - Saturated	
6	27.0	28.5	3	2	3	17"					Same as 5	
								30				
7	32.0	33.5	1	1	2	15"					Same as 5	
8	37.0	38.5	1	1	6	18"					Top 4 Same as 5	
											Bottom 4 Clay - Br - moist - low to med plasticity	
										CL		
								40				

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock

NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 9 Date _____ Sheet 3 of 5
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								40			CLAY	
9	39.0	41.0									44 Sec BRN SDY SILT 750 PSI 2.0 Push 15" Rec	
10	44.0	45.5	Weight of								Sandy clay- Br. SATURATED 100% Fine Grain	
			140	Hammer						CL		
11	49.0	51.0									18 Sec BRN SDY SILT 200 PSI 2.0 Push 11" Rec	
								50				
12	54.0	55.9	1	1	For 12	10"					Sandy clay- Br. SATURATED 100% Fine Grain	
										SC		
13	59.0	60.5	1	1	5	9"					Silty Sand- Gray. Saturated 100% Fine Grain	
										SM		
	6" x 3.25 HSA HW Casing Advancer 4" NQ Core Rock							60				
	NW Casing 3" SW Casing 6"										Recorder _____	

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 9 Date _____ Sheet 4 of 5
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								60				
											TOP-7	
14	64.0	65.5	9	16	21	15"					Sand - Gray- Saturated	
											100 % Fine Grain - Trace	
										SP	OF Fines	
											Bottom 8"	
											Sand & Gravel - Gray	
											Poorly Graded - 3/4" max	
											Size - w/ Fines	
										GP		
15	69.0	70.5	17	21	16	10"						
											Sand & Gravel - Rust Br.	
								70			poorly Graded - 3/4" max	
											Size - Saturated - w/ Fines	
											Quartz	
										GP		
16	74.0	75.5	27	15	17	15"						
											Gravelly Sand - Gray - Saturated	
											3/4" max size - poorly Graded	
											Quartz	
										SP		
	77.8	87.8				8.1						
											Refusal @ 77.8	
											77.8 - 80.8 - Gray Soft	
								80			Sandy Shale	

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock

NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 9 Date _____ Sheet 5 of 5
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"	Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
						80			80.3 – 87.8	
									Gray Soft Shaley Sand Stone	
						90				

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING FA-B-10

Job No. _____
Company APCO
Project Kanawha River Plant Ash Area
Coordinates N- 11476.0 E- 12336.9

Location of Boring:	
Water Level	33.0
Time	8-30-88
Date	

Boring No. 10 Date 8-30-88 Sheet 1 of 1
Type of Samples: SPT ✓ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling Mud used _____
Boring begun 8-30-88 Boring Completed 8-31-88
Ground Elevation 645.2 Referred to _____ Datum
Field Party Lambert-Darst Rig 75

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
1	2.0	3.5	7	8	10	12"					Fly Ash moist	
2	7.0	8.5	7	9	11	15"		10			Same as 1	
3	12.0	13.5	9	16	17	15"					Same as 1	
4	17.0	18.5	3	4	7	18"					Same as 1	

6" x 3.25 HSA	✓
HW Casing Advancer 4"	✓
NQ Core Rock	
NW Casing 3"	
SW Casing 6"	✓

Recorder _____

FORM CE-S
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 10 Date _____ Sheet 2 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling Mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								20				
5	22.0	23.5	4	4	7	17"					Fly Ash - moist	
6	27.0	28.5	10	10	14	17"					Same as 5	
								30				
7	32.0	33.5	6	6	7	18"					Same as 5 Saturated	
8	37.0	38.5	2	1	4	18"					Same as 5 Saturated	
								40				

6" x 5.25 HSA
HW Casing Advancer 4"
NQ Core Rock

NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 10 Date _____ Sheet 3 of 4
Type of Samples: SPT_____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling Mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ Referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								40				
9	42.0	43.5	8	9	10	18"					Silty Sand - Br - moist 100% Fine Grain	
										Sa		
10	48.5	50.0	2	2	5	0						
								50				
11	53.5	55.0	4	5	5	8"					Sandy Clay - wet to saturated Br - low plasticity	
										CL		
12	58.5	60.0	3	3	4	18"					Silty Sand - Br. saturated 100% Fine Grain	
										Sm		
								60				

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock

NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 10 Date _____ Sheet 4 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling Mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ Referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth, in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								60				
13	63.5	65.0	11	36	43	12"					Sand + Gravel - Saturated Br - 1" max size - Quartz w/ Fines	
										GP		
14	68.5	70.0	39	50/3		8"					Same as 13 3/4" max size	
								70				
											Refusal 70.7	
	6" x 3.25 HSA											
	HW Casing Advancer 4"											
	NQ Core Rock											
	NW Casing 3"											
	SW Casing 6"											

Recorder _____

FORM CE-9
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING FA-B-11

Job No. _____
Company APCO
Project Kanawha River Plant ash stack
Coordinates N. 11095.1 E 11890.4

Boring No. 11 Date 9-7-88 Sheet 1 of 4
Type of Samples: SPT ✓ 3" Tube ✓ Core _____
Casing used _____ Size _____ Drilling mud used _____
Boring begun 9-7-88 Boring Completed 9-8-88
Ground Elevation 650.7 referred to _____ Datum
Field Party Lambert - Darst Rig _____

Location of Boring:	
Water Level	33.4
Time	
Date	

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
1	2.0	3.5	8	13	19	15					Fly ash - moist	
2	7.0	8.5	2	2	4	18"		10			Same as 1	
3	12.0	13.5	1	1	1	18"					Same as 1	
4	17.0	18.5	1	1	1	18"		20			Same as 1	

6" x 3.25 HSA	✓	
HW Casing Advancer 4"	✓	
NQ Core Rock		
NW Casing 3"		
SW Casing 6"	✓	

Recorder _____

FORM CE-8
REV. 1/67

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 11 Date _____ Sheet 2 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
5	22.0	23.5	1	1	10	17"		20			Fly ash - moist	
6	27.0	28.5	4	5	5	18"		30			Same as 5	
7	32.0	33.5	4	4	5	18"					Same as 5	
8	37.0	38.5	1	5	7	18"		40			Same as 5 Saturated	

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock

NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 11 Date _____ Sheet 3 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								40				
9	42.0	43.5	3	8	9	14"					Fly Ash - moist	
											Top - Saturated Ash	
10	47.0	48.5	5	10	10	17"					Bottom -	
											Silt / Sand - Br - moist	
											100% Fine Grain	
11	49.0	51.0								SM		
											PSI - 700	
											20 Sec	
								50			Push 2.0	
12	51.0	53.0									Rec 0	
											PSI - 250	
											Time 15 Sec Silty Sand	
											Push 2.0 Br.	
											Rec 2.0	
13	54.0	55.5	2	5	6	18"					Sand. Br. Saturated	
											100% Fine Grain if Fines	
										SP		
											Same as 13	
14	59.0	60.5	6	10	11	10"						
								60				

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock

NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 11 Date _____ Sheet 4 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling Mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								60				
15	64.0	65.5	1	2	4	18"					Clayey Sand - Br- Saturated 100% Fine Grain	
										SC		
16	69.0	70.5	5	5	9	14"					5" Sandy Clay - Br. Saturated	
								70		SC		
17	74.0	74.4	50/4								Sand + Gravel - Br- Saturated 1" max Size - Quartz	
										GP		
											Stopped Hole 74.4	

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock

NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING FA-B-12

Job No. _____
Company APCo Kanawha River
Project ASH STORAGE AREA
Coordinates N-11739.4 E.11555.8

Location of Boring:		
Water Level	17.5	47.5
Time	1st ash	1st Soil
Date		

Boring No. 12 Date 7-18-88 Sheet 1 of 4
Type of Samples: SPT ✓ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling Mud used _____
Boring begun 7-18-88 Boring Completed 7-19-88
Ground Elevation 629.6 Referred to _____ Datum
Field Party Lambert - Danst Rig 75

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
1	2.5	4.0	19	12	12	15"					mixture of Bottom + Fly ash	
2	7.5	9.0	2	2	3	12"		10			mixture of Bottom + Fly ash w/ some Fine Grain Soil	
3	12.5	14.0	1	2	1	14"					Same as 2 wet to Saturated	
4	17.5	19.0	1	1	1	18"				SM	for 4" Same as 2 Bottom 14" Silty Sand - Br. Saturated - 100 % Fine Grain	

6" x 3.25 HSA ✓
HW Casing Advancer 4"
NQ Core Rock
NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-5
REV. 1/67

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

JOB NO. _____
COMPANY _____
PROJECT _____
COORDINATES _____

BORING NO. 12 DATE _____ SHEET 2 OF 4
TYPE OF SAMPLES: SPT _____ 3" TUBE _____ CORE _____
CASING USED _____ SIZE _____ DRILLING MUD USED _____
BORING BEGUN _____ BORING COMPLETED _____
GROUND ELEVATION _____ REFERRED TO _____ DATUM
FIELD PARTY _____ RIG _____

LOCATION OF BORING:	
WATER LEVEL	
TIME	
DATE	

SAMPLE NUMBER	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOW / 6"			TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	USCS	SOIL / ROCK IDENTIFICATION	DRILLER'S NOTES
								20				
5	22.5	24.0	2	1	1	18"					Silty Sand - BR - Saturated 100% Fine Grain	
										SM		
6	27.5	29.0	1	1	1	18"					Sandy clay - BR - wet to Saturated - 100% Fine Grain	
										SC		
								30				
7	32.5	34.0	1	1	2	18"					Same as 6	
8	37.5	39.0	1	1	1	18"					Same as 6	
								40				

6" x 3.25 HSA
HW CASING ADVANCER 4"
NQ CORE ROCK

NW CASING 3"
SW CASING 6"

RECORDER _____

FORM CE-5
REV. 1/67

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 12 Date _____ Sheet 3 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling Mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								40				
9	42.5	44.0	1	1	1	18"					Clayey Sand. Br. wet to Saturated - 100% Fine Grain	
10	47.5	49.0	1	1	2	18"					Silty Sand - Br. Saturated 100% Fine Grain	
											Second water Seam	
										SM		
								50				
11	52.5	54.0	21	28	28	18"					Silty Sand + Gravel - Br. 1" max size - Angular - Quartz	
12	57.5	59.0	23	21	23	12"					Top 4" Sand - Br - Saturated - Quartz w/ Trace of Fines	
										SP	Bottom - Silty Sand + Gravel - Br - 3/4" max size - angular - poorly Cemented Sand Stone Frags.	

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock

NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 12 Date _____ Sheet 4 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								60				
13	62.5	64.0	31	29	34	16"					Silty Sand & Gravel - Bit - Saturated - 3/4" max size Angular - poorly cemented Shale stone Frags	
14	64.0	64.1	54/.1								Gray Fine Grain Sandstone	
											Stopped boring 64.1	

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock

NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING FA-8-13

Job No. _____
Company APCO
Project Kanawha River Plant ash area
Coordinates N-11049.4 E 11975.6

Location of Boring:	
Water Level	32.4
Time	
Date	

Boring No. 13 Date 8-31-88 Sheet 1 of 4
Type of Samples: SPT V 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling mud used _____
Boring begun 8-31-88 Boring Completed 9-6-88
Ground Elevation 649.0 Referred to _____ Datum
Field Party Lambert - Danst Rig 75

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
1	2.0	3.5	11	13	14	15"					Fly Ash - moist	
2	7.0	8.5	10	12	15	16"		10			Same as 1	
3	12.0	13.5	7	17	19	18"					Same as 1	
4	17.0	19.5	3	4	4	12"		20			Same as 1	

6" x 3.25 HSA	✓	
HW Casing Advancer 4"	✓	
NQ Core Rock		
NW Casing 3"		
SW Casing 6"	✓	

Recorder _____

FORM CE-8
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 13 Date _____ Sheet 2 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling Mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								20				
5	22.0	23.5	4	4	4	18"					Fly ash moist	
6	27.0	28.5	3	4	5	18"					Same as 1	
								30				
7	32.0	33.5	2	1	2	18"					Fly ash - Saturated	
8	37.0	38.5	4	10	17	18"					Fly ash - moist	
								40				

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock

NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-5
REV. 1/67

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 13 Date _____ Sheet 3 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling Mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ Referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								40				
9	42.0	43.5	3	3	3	18"					Fly ash Saturated	
10	47.0	48.5	5	6	6	18"					2" Fly ash Saturated	
											16"	
								50				
11	53.5	55.0	4	7	7	14"					Silty Sand - moist to wet	
											100% Fine Grain	
										SM		
12	58.5	60.0	7	9	9	8"					Same as 11 Saturated	
								60				

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock

NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 13 Date _____ Sheet 4 of 4
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling Mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ Referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"			Total Length Recovery	Rod %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
								60				
13	63.5	65.0	6	4	4	16"					Sand - BR - Saturated 100% Fine Grain up Some Fines	
14	68.5	70.0	34	44	44	16		70			Same as 13	
15	73.5	74.8	29	21	50	12"					Same as 13 - Gray	
											Stopped Hole 74.8	
								80				

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock
NW Casing 3"
SW Casing 6"

Recorder _____

Dutch Cone Test FA-B-14

Company APCO — Probe No. 14 — Date 8-17-88

Job Kanawha River Plant Ash Area — Drillers Lambert

Recorder Davis — Page 1 of 4 — Elevation 645.4

ELEV.	DEPTH (Ft.)	DEPTH (m)	C or C+S	GAGE READINGS HIGH	GAGE READINGS LOW	CONE RESIST. (1000N)	SLEEVE RESIST. (1000N)	FRICTION RATIO (%)
GAGE ZERO READINGS				0	+.2			
			C		—			
		.2	C+S		—	N-11587.6	E-12386.8	
			C		—			
		.4	C+S		—			
			C		8.4			
		.6	C+S		9.4			
			C		6.2			
		.8	C+S		7.8			
			C		4.0			
		1.0	C+S		7.2			
			C		2.4			
		.2	C+S		5.2			
			C		4.8			
		.4	C+S		5.8			
			C		0			
		.6	C+S		3.8			
			C		3.0			
		.8	C+S		6.4			
			C		8.4			
		2.0	C+S		9.2			
			C		8.4			
		.2	C+S	22.0				
Aug.	Refusal Augered to 2.8		C	—				
		.4	C+S	—				
			C	—				
		.6	C+S	—				
			C	—				
		.8	C+S	—				
			C		8.2			
		3.0	C+S	10.0				
			C		8			
		.2	C+S	11.0				
			C		7.4			
		.4	C+S	10.0				
			C		6.4			
		.6	C+S		9.6			
			C		6.8			
		.8	C+S		9.6			
			C		8.0			
		4.0	C+S		9.0			
			C		4.2			
		.2	C+S		6.4			
			C		8.9			
		.4	C+S	12.0				
			C	18.0				
		.6	C+S	22				
	Refusal augered to 5.4		C	—				
		.8	C+S	—				
			C	—				
		.5	C+S	—				

Dutch Cone Test

Company _____ Probe No. 14 Date _____

Job _____ Drillers _____

Recorder _____ Page 2 of 4 Elevation _____

ELEV.	DEPTH (Ft.)	DEPTH (m)	C or C+S	GAGE READINGS HIGH	GAGE READINGS LOW	CONE RESIST. (1000N)	SLEEVE RESIST. (1000N)	FRICTION RATIO (%)
GAGE ZERO READINGS				0	+.2			
			C	—				
		.2	C+S	—				
			C		8.0			
		.4	C+S		8.8			
			C		5.8			
		.6	C+S		9.0			
			C		4.2			
		.8	C+S		7.4			
			C		7.4			
		6.0	C+S		9.8			
			C		6.4			
		.2	C+S		9.8			
			C		6.2			
		.4	C+S		9.2			
			C		5.4			
		.6	C+S		9.0			
			C		5.4			
		.8	C+S		7.9			
			C		5.6			
		7.0	C+S		9.8			
			C		8.2			
		.2	C+S		9.4			
			C		5.8			
		.4	C+S		9.8			
			C		5.4			
		.6	C+S		9.0			
			C		8.2			
		.8	C+S	10.0				
			C	12.0				
		8.0	C+S	20.0				
Refusal beyond 7.0 to 8.0			C	—				
		.2	C+S	—				
			C	—				
		.4	C+S	—				
			C	—				
		.6	C+S	—				
			C	—				
		.8	C+S	—				
			C	—				
		9.0	C+S	—				
			C	—				
		.2	C+S	—				
			C		9.0			
		.4	C+S	13.0				
			C	5.0				
		.6	C+S	0	9.9			
			C		5.8			
		.8	C+S	10.0				
			C		7.2			
		10.0	C+S		0.2			

Dutch Cone Test

Company _____ Probe No. 14 Date _____

Job _____ Drillers _____

Recorder _____ Page 3 of 4 Elevation _____

ELEV.	DEPTH (Ft.)	DEPTH (m)	C or C+S	GAGE READINGS HIGH	GAGE READINGS LOW	CONE RESIST. (1000N)	SLEEVE RESIST. (1000N)	FRICTION RATIO (%)
GAGE ZERO READINGS								
			C		8.2			
		.2	C+S		9.8			
			C		8.0			
		.4	C+S		9.6			
			C		3.0			
		.6	C+S		7.0			
			C		6.0			
		.8	C+S		8.0			
			C		5.9			
		11.0	C+S		9.0			
			C		5.0			
		.2	C+S		8.2			
			C		3.0			
		.4	C+S		6.9			
			C		6.2			
		.6	C+S		9.0			
			C		6.4			
		.8	C+S		9.6			
			C		5.3			
		12.0	C+S		8.6			
			C		4.0			
		.2	C+S		7.0			
			C		3.0			
		.4	C+S		5.2			
			C		3.2			
		.6	C+S		4.6			
			C		2.4			
		.8	C+S		4.0			
			C		1.9			
		13.0	C+S		2.6			
			C		1.4			
		.2	C+S		2.0			
			C		1.0			
		.4	C+S		2.0			
			C		.8			
		.6	C+S		1.0			
			C		0			
		.8	C+S		1.8			
			C		0			
		14.0	C+S		1.0			
			C		0			
		.2	C+S		.8			
			C		1.0			
		.4	C+S		2.0			
			C		0			
		.6	C+S		.8			
			C		0			
		.8	C+S		1.0			
			C		0			
		14.0	C+S		1.0			

Dutch Cone Test

Company _____ Probe No. 14 Date _____

Job _____ Drillers _____

Recorder _____ Page 4 of 4 Elevation _____

ELEV.	DEPTH (Ft.)	DEPTH (m)	C or C+S	GAGE READINGS HIGH	GAGE READINGS LOW	CONE RESIST. (1000N)	SLEEVE RESIST. (1000N)	FRICTION RATIO (%)
GAGE ZERO READINGS								
			C		.4			
		.2	C+S		1.0			
			C		0			
		.4	C+S		1.2			
			C		.4			
		.6	C+S		1.0			
			C		0			
		.8	C+S		1.0			
			C		.6			
		16.0	C+S		1.8			
			C		.4			
		.2	C+S		1.8			
			C		.3			
		.4	C+S		1.2			
			C		.4			
		.6	C+S		1.9			
			C		.4			
		.8	C+S		1.8			
			C		.5			
		17.0	C+S		2.0			
			C		1.8			
		.2	C+S		3.0			
			C		1.8			
		.4	C+S		2.4			
			C		1.9			
		.6	C+S		2.5			
			C		2.2			
		.8	C+S		3.8			
			C		2.4			
		18.0	C+S		4.0			
			C		3.0			
		.2	C+S		5.0			
			C		2.4			
		.4	C+S		4.2			
			C		5.0			
		.6	C+S		7.8			
			C		2.6			
		.8	C+S		6.2			
			C		6.4			
		19.0	C+S		7.8			
			C		4.0			
		.2	C+S		6.0			
			C		7.0			
		.4	C+S	16.0				
			C					
		.6	C+S					
			C					
		.8	C+S					
		20.	C					

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company APCO
Project Kanawha River
Coordinates Fly Ash Fill

Location of Boring: N 11,874.25 E 12,633.26	
Water Level	Drilled Holes w/ water
Time	from Kanawha River
Date	

Boring No. FA-B-16 Date 6-2-89 Sheet 1 of 3
Type of Samples: SPT _____ 3" Tube ✓ Core _____
Casing used _____ Size _____ Drilling Mud used _____
Boring begun 6-2-89 Boring Completed 6-3-89
Ground Elevation 644.8 Referred to _____ Datum
Field Party Howell - Darst Rig 61

Sample Number	Sample Depth In Feet From	To	Standard Penetration Resistance Blow / 6"	Total Length Recovery	RQD %	Depth In Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
									Started Sampling Hole 10.0	No
									Samples Required 0 - 10'	
1	10.0	12.0				10			9 Sec 650 PSI Fly Ash 2.0 Push 18 Rec	
						20				

	6" x 3.25 HSA	X	
	HW Casing Advancer 4"	X	
	NQ Core Rock		
	NW Casing 3"		
	SW Casing 6"	X	

Recorder _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 16 Date _____ Sheet 2 of 3
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ Referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"	Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
						20				
2	25.0	27.0							5 Sec 400 PSI 2.0 Push 0 Rec	
3	27.0	29.0							6 Sec 300 PSI sandy silty clay 2.0 Push w/ trace of rock 1.8 Rec.	
						30				
4	30.0	32.0							6 Sec 650 PSI stone 2.0 Push .7 Rec	
5	38.0	40.0							4 Sec sandy silty clay 500 PSI 2.0 Push 2.0 Rec	
						40				

6" x 3.25 HSA
HW Casing Advancer 4"
NQ Core Rock

NW Casing 3"
SW Casing 6"

Recorder _____

FORM CE-5
REV. 1/87

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____
Coordinates _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 16 Date _____ Sheet 3 of 3
Type of Samples: SPT _____ 3" Tube _____ Core _____
Casing used _____ Size _____ Drilling Mud used _____
Boring begun _____ Boring Completed _____
Ground Elevation _____ Referred to _____ Datum
Field Party _____ Rig _____

Sample Number	Sample Depth in Feet From	To	Standard Penetration Resistance Blow / 6"	Total Length Recovery	RQD %	Depth in Feet	Graph Log	USCS	Soil / Rock Identification	Driller's Notes
						40				
6	41.0	43.0							4 Sec Same as 5 500 PSI 2.0 Push 1.1 Rec	
7	45.0	47.0							4 Sec 450 PSI Silty Clay 2.0 Push 2.0 Rec	
8	48.0	50.0							5 Sec 500 PSI Silty Clay 2.0 Push 2.0 Rec	
						50				
9	50.0	52.0							5 Sec 400 PSI Silty Clay 2.0 Push 2.0 Rec	
10	53.0	55.0							5 Sec 440 PSI Sandy Silty 2.0 Push Clay 1.8 Rec	
									Stepped Hole 55.0 & Grouted w/ Valcimy Grouted	
	6" x 3.25 HSA HW Casing Advancer 4" NQ Core Rock									
	NW Casing 3" SW Casing 6"									

Recorder _____

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY **AMERICAN ELECTRIC POWER**

PROJECT **KANAWHA RIVER FLY ASH LANDFILL**

COORDINATES **N 438,870.6 E 1,849,416.8**

GROUND ELEVATION **647.9** SYSTEM **NAD83/NGVD29 WV S**

WATER LEVEL	▽	▼	▽
TIME			
DATE			

BORING NO **FA-B17** DATE **9/4/13** SHEET **1** OF **2**

BORING START **4/19/05** BORING FINISH **4/20/05**

PIEZOMETER TYPE _____ WELL TYPE _____

HGT. RISER ABOVE GROUND _____ DIA _____

DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____

WELL DEVELOPMENT _____ BACKFILL **QUICK GROUT**

FIELD PARTY **MCR / CB** RIG **BK-81**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		0.0	1.9									Digging permit required. Grounding procedures not in use on this boring. **Note: Shelby tube samples were taken from a separate boring, adjacent to the split spoon sample boring. Coordinates of Shelby Tube Boring N 438865.4 E1849415.5 Elev. 648.28**
1	SS	1.9	3.4	2-3-2	1.1					**N5 MEDIUM GRAY FLY ASH** Dry		
2	SS	6.9	8.4	3-5-2	1.2		5					
3	SS	11.9	13.4	1-3-2	1.2		10			**AUGER CUTTINGS SHOW BROWN SILTY CLAY** **N5 MEDIUM GRAY FLY ASH** Dry		
4	SS	16.9	18.4	2-3-4	1.3		15			**SHELBY TUBE - 16.9-18.9' FLY ASH** PUSH : 2.0' RECOVERY: 1.9' TIME: 16 sec PSI: 600		
5	SS	21.9	23.4	3-4-4	1.2		20					
6	SS	26.9	28.4	2-2-3	1.2		25			CHANGED FROM DRY to MOIST		
7	SS	31.9	33.4	4-6-11	1.5		30			**N6 MEDIUM LIGHT GRAY FLY ASH** Moist		
8	SS	36.9	38.4	3-3-3	1.5		35					
9	SS	41.9	43.4	1-1-1	1.5		40			CHANGED FROM MOIST to WET **SHELBY TUBE - 41.9-43.9' FLY ASH** PUSH : 2.0' RECOVERY: 1.9' TIME: 18 sec PSI: 500		Believe to have gone into clay @ 44.4'
10	SS	46.9	48.4	2-3-4	1.5		45					SWL @ 48.7' - 14

TYPE OF CASING USED

	NQ-2 ROCK CORE	
X	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **CB**

AEP_KANAWHA_RIVER_FA_LANDFILL.GPJ AEP.GDT 9/4/13

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY **AMERICAN ELECTRIC POWER** BORING NO **FA-B17** DATE **9/4/13** SHEET **2** OF **2**

PROJECT **KANAWHA RIVER FLY ASH LANDFILL** BORING START **4/19/05** BORING FINISH **4/20/05**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
11	SS	51.9	53.4	1-2-3	1.5		55			**MEDIUM STIFF 10YR 6/6 DARK YELLOWISH ORANGE SILTY CLAY** Moist		hour reading with HSA's to 56.9'
12	SS	56.9	58.4	1-1-3	1.5		60			**SHELBY TUBE - 56.9-58.9' DARK YELLOWISH ORANGE SILTY CLAY** PUSH : 2.0' RECOVERY: 1.9' TIME: 14 sec PSI: 450		
13	SS	61.9	63.4	2-3-4	1.5		65			**STIFF 5Y 5/2 LIGHT OLIVE GRAY SILTY CLAY** 1.0 tsf, moist, trace of fine sand **SHELBY TUBE - 66.9-68.9' LIGHT OLIVE GRAY SILTY CLAY** PUSH : 2.0' RECOVERY: 1.9' TIME: 14 sec PSI: 450		
14	SS	66.9	68.4	3-3-7	1.5		70					
15	SS	71.9	73.4	9-13-11	1.0		75			**MEDIUM DENSE 5Y 6/4 DUSKY YELLOW MEDIUM GRAIN SAND** w/ trace of fine gravel, wet		
16	SS	76.9	78.4	13-11-11	0.8							
17	SS	79.8	79.8	50/0	0							Auger and spoon refusal @ 79.8'. Stopped boring @ 79.8' on 4/20/05. Tremie grouted from 79.8' to grade using approx. 100 gallons of quick grout. Topped off bore hole with approx. 50 lbs. of hole plug.

AEP KANAWHA_RIVER_FA_LANDFILL.GPJ AEP.GDT 9/4/13

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY **AMERICAN ELECTRIC POWER**

PROJECT **KANAWHA RIVER FLY ASH LANDFILL**

COORDINATES **N 438,831.1 E 1,849,869.8**

GROUND ELEVATION **642.5** SYSTEM **NAD83/NGVD29 WV S**

WATER LEVEL	▽	▼	▼
TIME			
DATE			

BORING NO **FA-B18** DATE **9/4/13** SHEET **1** OF **2**

BORING START **4/19/05** BORING FINISH **4/19/05**

PIEZOMETER TYPE WELL TYPE

HGT. RISER ABOVE GROUND DIA

DEPTH TO TOP OF WELL SCREEN BOTTOM

WELL DEVELOPMENT BACKFILL **QUICK GROUT**

FIELD PARTY **MCR / CB** RIG **BK-81**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		0.0	2.0									Digging permit required. Grounding procedures not in use on this boring. **Note: Shelby tube samples were taken from a separate boring, adjacent to the split spoon sample boring. Coordinates of Shelby Tube Boring N 438838.3 E1849871.93 Elev. 643.06**
1	SS	2.0	3.5	9-15-15	1.4					**N5 MEDIUM GRAY FLY ASH** Dry		
2	SS	7.0	8.5	1-2-3	0.8		5					
3	SS	12.0	13.5	4-6-5	1.5		10					
4	SS	17.0	18.5	3-3-3	1.0		15			**SHELBY TUBE - 12.0-14.0'** **FLY ASH** PUSH : 2.0' RECOVERY: 1.5' TIME: 15 sec PSI: 550 CHANGED FROM DRY to MOIST CHANGED FROM MOIST to WET		
5	SS	22.0	23.5	3-4-5	1.5		20					
6	SS	27.0	28.5	1-4-2	1.5		25					
7	SS	32.0	33.5	1-1-2	1.5		30			**SHELBY TUBE - 32.0-34.0'** **FLY ASH** PUSH : 2.0' RECOVERY: 1.9' TIME: 11 sec PSI: 450		
8	SS	37.0	38.5	1-1-2	1.5		35					
9	SS	42.0	43.5	2-2-4	1.5		40			**MEDIUM STIFF 5YR 4/1 BROWNISH GRAY SILTY CLAY** Wet		
10	SS	47.0	48.5	1-2-3	1.5		45			**MEDIUM STIFF 5YR 4/1 BROWNISH GRAY SILTY CLAY**		

TYPE OF CASING USED

	NQ-2 ROCK CORE
X	6" x 3.25 HSA
	9" x 6.25 HSA
	HW CASING ADVANCER 4"
	NW CASING 3"
	SW CASING 6"
	AIR HAMMER 8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **CB**

AEP_KANAWHA_RIVER_FA_LANDFILL.GPJ AEP.GDT 9/4/13

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY **AMERICAN ELECTRIC POWER** BORING NO **FA-B18** DATE **9/4/13** SHEET **2** OF **2**

PROJECT **KANAWHA RIVER FLY ASH LANDFILL** BORING START **4/19/05** BORING FINISH **4/19/05**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
11	SS	52.0	53.5	1-2-3	1.5		55			Wet, w/ trace of fine sand **SHELBY TUBE - 52.0-54.0'** **BROWNISH GRAY SILTY CLAY** PUSH : 2.0' RECOVERY: 1.9' TIME: 11 sec PSI: 450		
12	SS	57.0	58.5	2-3-4	1.5		60					
13	SS	62.0	63.5	2-4-11	1.5		65			**STIFF 5YR 4/1 BROWNISH GRAY SILTY CLAY** Moist **SHELBY TUBE - 62.0-63.0'** **BROWNISH GRAY SILTY CLAY** PUSH : 1.0' RECOVERY: 1.0' TIME: 8 sec PSI: 500 until lifting rig		No water on A-rods until drilling into sand & gravel @ 67.0'
14	SS	67.0	68.5	15-18-25	1.2		70					
15	SS	72.0	73.5	17-18-13	1.2		75			**DENSE 5YR 4/1 BROWNISH GRAY MEDIUM GRAIN SAND** Moist, 1" sandstone fragment in spoon **DENSE 10YR 5/4 PALE YELLOWISH BROWN MEDIUM GRAIN SAND** Moist, w/ trace of fine gravel		Spoon refusal @ 77.6'. Auger refusal @ 78.9'. Stopped boring @ 78.9' on 4/19/05. Tremie grouted from 78.9' to grade using approx. 110 gallons of quick grout. Topped off bore hole with approx. 50 lbs. of hole plug.
16	SS	77.0	77.6	26-50/.1	0.6					**N6 MEDIUM GRAY WEATHERED SHALE** Moist		

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY **AMERICAN ELECTRIC POWER**

PROJECT **KANAWHA RIVER PLANT**

COORDINATES **N 439,079.0 E 1,848,763.7**

GROUND ELEVATION **629.8** SYSTEM _____

Water Level, ft	▽	▼	▼
TIME			
DATE			

BORING NO. **B-14-01** DATE **1/16/15** SHEET **1** OF **3**

BORING START **11/11/14** BORING FINISH **11/11/14**

PIEZOMETER TYPE _____ WELL TYPE _____

HGT. RISER ABOVE GROUND _____ DIA _____

DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____

WELL DEVELOPMENT **NO** BACKFILL **QUICK GROUT**

FIELD PARTY **ZLR / TAS** RIG **D-120**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SS	1.5	3.0	6-14-15	1.5					VERY STIFF MEDIUM DARK GRAY N4 FLYASH		
2	SS	4.0	5.5	10-14-18	1.5		5			VERY STIFF DARK GRAY N3 FLYASH		
										SHALY SANDSTONE		
3	SS	6.5	8.0	5-9-13	1.5					VERY STIFF DARK GRAY N3 FLYASH		
										SHALY SANDSTONE		
4	SS	9.0	10.5	3-5-6	1.5		10			MEDIUM STIFF DARK GRAY N3 FLYASH		
5	SS	11.5	13.0	3-3-4	1.5					SOFT DARK GRAY N3 FLYASH		
6	SS	14.0	15.5	2-3-4	1.5		15					
7	SS	16.5	18.0	2-2-3	1.5							
8	SS	19.0	20.5	2-2-4	1.5							

TYPE OF CASING USED

	NQ-2 ROCK CORE	
	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER _____

AEP KR_FA.GPJ AEP.GDT 1/16/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY **AMERICAN ELECTRIC POWER** BORING NO. **B-14-01** DATE **1/16/15** SHEET **2** OF **3**

PROJECT **KANAWHA RIVER PLANT** BORING START **11/11/14** BORING FINISH **11/11/14**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
9	SS	21.5	23.0	3-2-3	1.5							
10	SS	24.0	25.5	2-3-3	1.5		25					
11	SS	26.5	28.0	1-1-1	1.5					VERY SOFT LIGHT BROWNISH GRAY FLYASH saturated		
12	SS	29.0	30.5	WOH	1.5		30					
13	SS	31.5	33.0	2-2-3	1.5					SOFT MODERATE YELLOWISH BROWN 10YR 5/4 SANDY CLAY		
14	SS	34.0	35.5	1-2-2	1.5		35			VERY SOFT MODERATE YELLOWISH BROWN 10YR 5/4 SAND saturated		
15	SS	36.5	38.0	WOH	1.5							
16	SS	39.0	40.5	1-1-1	1.5		40			VERY SOFT MODERATE YELLOWISH BROWN 10YR 5/4 SAND w/sandstone fragments, saturated		
17	SS	41.5	43.0	WOH	1.5					VERY SOFT MODERATE YELLOWISH BROWN 10YR 5/4 SAND saturated		
18	SS	44.0	45.5	WOH	1.5		45			SOFT MODERATE YELLOWISH BROWN 10YR 5/4 SANDY CLAY wet		

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY **AMERICAN ELECTRIC POWER** BORING NO. **B-14-01** DATE **1/16/15** SHEET **3** OF **3**

PROJECT **KANAWHA RIVER PLANT** BORING START **11/11/14** BORING FINISH **11/11/14**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
19	SS	46.5	48.0	1-6-6	1.5							
										SOFT MODERATE YELLOWISH BROWN 10YR 5/4 SAND wet		
20	SS	49.0	50.5	1-3-3	1.5		50			VERY SOFT MODERATE YELLOWISH BROWN 10YR 5/4 SANDY CLAY wet		
21	SS	51.5	53.0	10-13-21	1.1					VERY STIFF DARK YELLOWISH ORANGE 10YR 6/6 WEATHERED SANDSTONE		
22	SS	54.0	55.5	7-17-20	1.2		55					
23	SS	56.5	58.0	6-17-20	1.0							
24	SS	59.0	60.5	5-7-9	1.1		60			STIFF DARK YELLOWISH ORANGE 10YR 6/6 WEATHERED SANDSTONE		

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY **AMERICAN ELECTRIC POWER**

PROJECT **KANAWHA RIVER PLANT**

COORDINATES **N 438,951.7 E 1,848,733.1**

GROUND ELEVATION **629.9** SYSTEM _____

Water Level, ft	▽	▼	▼
TIME			
DATE			

BORING NO. **B-14-02** DATE **1/16/15** SHEET **1** OF **3**

BORING START **11/12/14** BORING FINISH **11/12/14**

PIEZOMETER TYPE _____ WELL TYPE _____

HGT. RISER ABOVE GROUND _____ DIA _____

DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____

WELL DEVELOPMENT **NO** BACKFILL **QUICK GROUT**

FIELD PARTY **ZLR / TAS** RIG **D-120**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SS	1.5	3.0	6-9-8	1.2					MEDIUM STIFF MEDIUM GRAY N5 FLYASH		
2	SS	4.0	5.5	5-8-9	1.5		5			STIFF MEDIUM DARK GRAY N4 FLYASH, CLAY, & SANDSTONE FRAGMENTS		
3	SHELBY	6.5	8.5							PUSH 2.0 / PSI 900 / SEC 8 / REC 2.0		
4	SS	9.0	10.5	8-7-9	1.4		10			STIFF MEDIUM DARK GRAY N4 FLYASH		
5	SS	11.5	13.0	3-4-7	1.5					MEDIUM STIFF MEDIUM DARK GRAY N4 FLYASH		
6	SS	14.0	15.5	4-5-5	1.4		15			MEDIUM STIFF MODERATE YELLOWISH BROWN 10YR 5/4 SANDY CLAY		
7	SHELBY	16.5	18.5							PUSH 2.0 / PSI 100 / SEC 6 / REC 2.0		
8	SS	19.0	20.5	3-4-5	1.5					MEDIUM STIFF MODERATE YELLOWISH BROWN 10YR 5/4 SANDY CLAY		

TYPE OF CASING USED

	NQ-2 ROCK CORE	
	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER _____

AEP KR_FA.GPJ AEP.GDT 1/16/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY **AMERICAN ELECTRIC POWER** BORING NO. **B-14-02** DATE **1/16/15** SHEET **2** OF **3**

PROJECT **KANAWHA RIVER PLANT** BORING START **11/12/14** BORING FINISH **11/12/14**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
9	SHELBY	21.5	23.5							PUSH 2.0 / PSI 200 / SEC 6 / REC 2.0		
10	SS	24.0	25.5	2-3-4	1.5		25			SOFT MODERATE YELLOWISH BROWN 10YR 5/4 SANDY CLAY		
11	SS	26.5	28.0	2-2-3	1.5							
12	SS	29.0	30.5	2-3-3	1.5		30					
13	SHELBY	31.5	33.5							PUSH 2.0 / PSI 450/ SEC 6 / REC 2.0		
14	SS	34.0	35.5	2-3-4	1.5		35			SOFT MODERATE YELLOWISH BROWN 10YR 5/4 SANDY CLAY		
15	SS	36.5	38.0	2-1-2	1.5					VERY SOFT MODERATE YELLOWISH BROWN 10YR 5/4 SANDY CLAY wet		
16	SS	39.0	40.5	WOH	1.5		40			VERY SOFT MODERATE YELLOWISH BROWN 10YR 5/4 SANDY CLAY saturated		
17	SHELBY	41.5	43.5							PUSH 2.0 / PSI 275 / SEC 6 / REC 2.0		
18	SS	44.0	45.5	WOH	1.5		45			VERY SOFT MODERATE YELLOWISH BROWN 10YR 5/4 SANDY CLAY saturated		

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY **AMERICAN ELECTRIC POWER** BORING NO. **B-14-02** DATE **1/16/15** SHEET **3** OF **3**

PROJECT **KANAWHA RIVER PLANT** BORING START **11/12/14** BORING FINISH **11/12/14**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
19	SS	46.5	48.0	2-2-4	1.5					SOFT MODERATE YELLOWISH BROWN 10YR 5/4 SILTY SAND saturated		
20	SS	49.0	50.5	1-2-3	1.5		50			VERY SOFT MODERATE YELLOWISH BROWN 10YR 5/4 SILTY SAND saturated		
21	SHELBY	51.5	53.5							PUSH 2.0 / PSI 300 / SEC 6 / NO RECOVERY		
22	SS	54.0	55.5	17-20-11	1.1		55			VERY STIFF DARK YELLOWISH ORANGE 10YR 6/6 WEATHERED SANDSTONE		
23	SS	56.5	58.0							AUGER REFUSAL		

AEP KR_FA.GPJ AEP.GDT 1/16/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY **AMERICAN ELECTRIC POWER**

PROJECT **KANAWHA RIVER PLANT**

COORDINATES **N 438,826.1 E 1,848,712.3**

GROUND ELEVATION **631.8** SYSTEM

Water Level, ft	▽	▼	▼
TIME			
DATE			

BORING NO. **B-14-03** DATE **1/16/15** SHEET **1** OF **3**

BORING START **11/12/14** BORING FINISH **11/13/14**

PIEZOMETER TYPE WELL TYPE

HGT. RISER ABOVE GROUND DIA

DEPTH TO TOP OF WELL SCREEN BOTTOM

WELL DEVELOPMENT **NO** BACKFILL **QUICK GROUT**

FIELD PARTY **ZLR / TAS** RIG **D-120**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SS	1.5	3.0	9-17-17	1.5					VERY STIFF MEDIUM GRAY N5 FLYASH		
2	SS	4.0	5.5	8-10-20	1.5		5					
3	SS	6.5	8.0	5-9-13	1.5					STIFF MEDIUM DARK GRAY N4 FLYASH w/coal fragments		
4	SS	9.0	10.5	9-31-22	1.5		10			HARD DARK GRAY N3 FLYASH		
5	SS	11.5	13.0	6-6-6	1.5					MEDIUM STIFF MODERATE YELLOWISH BROWN 10YR 5/4 SANDY CLAY		
6	SS	14.0	15.5	3-3-3	1.5					SOFT MODERATE YELLOWISH BROWN 10YR 5/4 SAND		
7	SS	16.5	18.0	2-3-3	1.5		15			MEDIUM LIGHT GRAY N6 FLYASH SOFT MODERATE YELLOWISH BROWN 10YR 5/4 SAND		
8	SS	19.0	20.5	2-2-3	1.3							

TYPE OF CASING USED

	NQ-2 ROCK CORE	
	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER

AEP KR_FA.GPJ AEP.GDT 1/16/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY **AMERICAN ELECTRIC POWER** BORING NO. **B-14-03** DATE **1/16/15** SHEET **2** OF **3**

PROJECT **KANAWHA RIVER PLANT** BORING START **11/12/14** BORING FINISH **11/13/14**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
9	SS	21.5	23.0	2-2-2	1.5							
10	SS	24.0	25.5	1-1-1	1.5		25			SOFT MODERATE YELLOWISH BROWN 10YR 5/4 SANDY CLAY wet		
11	SS	26.5	28.0	WOH	1.5							
12	SS	29.0	30.5	1-1-3	1.5		30					
13	SS	31.5	33.0	1-1-1	1.5							
14	SS	34.0	35.5	WOH	1.5		35					
15	SS	36.5	38.0	1-1-2	1.5					SOFT MODERATE YELLOWISH BROWN 10YR 5/4 SANDY CLAY saturated		
16	SS	39.0	40.5	1-1-2	1.5		40			VERY SOFT MODERATE YELLOWISH BROWN 10YR 5/4 SILTY SAND saturated		
17	SS	41.5	43.0	1-1-2	1.5							
18	SS	44.0	45.5	1-1-1	1.5		45			VERY SOFT MEDIUM LIGHT GRAY N6 SANDY SILT saturated		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY **AMERICAN ELECTRIC POWER** BORING NO. **B-14-03** DATE **1/16/15** SHEET **3** OF **3**

PROJECT **KANAWHA RIVER PLANT** BORING START **11/12/14** BORING FINISH **11/13/14**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
19	SS	46.5	48.0	1-3-3	1.5							
20	SS	49.0	50.5	2-3-4	1.5		50			SOFT MEDIUM LIGHT GRAY N6 SANDY SILT wet		
21	SS	51.5	53.0	2-4-6	1.5					MEDIUM STIFF MEDIUM LIGHT GRAY N6 SANDY SILT		
22	SS	54.0	55.5	5-12-22	1.5		55			VERY STIFF MODERATE YELLOWISH BROWN 10YR 5/4 WEATHERED SANDSTONE w/flint fragments		
23	SS	56.5	58.0	9-18-20	1.5					VERY STIFF DARK YELLOWISH ORANGE 10YR 6/6 WEATHERED SANDSTONE		
24	SS	59.0	60.5	19-23-24	1.5		60					

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **3302**

COMPANY **APPALACHIAN POWER COMPANY**

PROJECT **KANAWHA RIVER PLANT**

COORDINATES **N 439,254.4 E 1,850,725.3**

GROUND ELEVATION **627.8** SYSTEM **NAD83/NGVD88 WV S**

Water Level, ft	▽	▼	▼
TIME			
DATE			

BORING NO. **MW-1601** DATE **3/17/17** SHEET **1** OF **3**

BORING START **9/7/16** BORING FINISH **9/7/16**

PIEZOMETER TYPE _____ WELL TYPE **OW**

HGT. RISER ABOVE GROUND **3.24** DIA **2.0**

DEPTH TO TOP OF WELL SCREEN **44.0** BOTTOM **63.6**

WELL DEVELOPMENT **YES** BACKFILL **QUICK GROUT**

FIELD PARTY **REB / ZLR** RIG **D-120**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SS	0.0	1.5	3-4-6	1.2					BROWN SANDY CLAY FILL MATERIAL		
2	SS	6.5	8.0	3-4-8	1.4		5			BROWN SANDY CLAY FILL MATERIAL GRAY FLYASH / BOTTOM ASH MIXED		
3	SS	11.5	13.0	2-2-2	1.1		10			GRAY FLY ASH W/FILL MIXED IN		
4	SS	16.5	18.0	2-3-5	1.4		15			SOFT MODERATE YELLOWISH 10YR 5/4 SANDY CLAY tsf 2.0		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
X	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER _____

AEP KR MONITORING WELLS.GPJ AEP.GDT 3/17/17

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **3302**

COMPANY **APPALACHIAN POWER COMPANY** BORING NO. **MW-1601** DATE **3/17/17** SHEET **2** OF **3**

PROJECT **KANAWHA RIVER PLANT** BORING START **9/7/16** BORING FINISH **9/7/16**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
5	SS	21.5	23.0	2-3-3	1.5					SOFT MODERATE YELLOWISH 10YR 5/4 SANDY CLAY tsf 1.5		
6	SS	26.5	28.0	2-2-2	1.5		25			SOFT MODERATE YELLOWISH 10YR 5/4 SANDY CLAY tsf 1.5		
7	SS	31.5	33.0	1-1-2	1.5		30			SOFT MEDIUM GRAY N5 SANDY CLAY tsf 1.5		
8	SS	36.5	38.0	1-2-2	1.5		35			SOFT MEDIUM GRAY N5 SANDY CLAY tsf 1.0		
9	SS	41.5	43.0	17-19-24	.5		40			MEDIUM GRAY N5 SANDSTONE		
							45					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **3302**

COMPANY **APPALACHIAN POWER COMPANY** BORING NO. **MW-1601** DATE **3/17/17** SHEET **3** OF **3**

PROJECT **KANAWHA RIVER PLANT** BORING START **9/7/16** BORING FINISH **9/7/16**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
10	SS	46.5	47.2	22-50/2	.6					BROWN, GRAY & REDDISH WEATHERED SANDSTONE		
1	NQ	47.3	54.7		4.2					MEDIUM GRAY N5 SANDSTONE		
							50			LIGHT BROWN 5YR 5/6 SANDSTONE		
2	NQ	54.7	61.7		3.0		55			BROWN & GRAY SANDSTONE		
							60					
3	NQ	61.7	64.7							MEDIUM GRAY N5 SANDSTONE WELL CEMENTED		

AEP KR MONITORING WELLS.GPJ AEP.GDT 3/17/17

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **3302**

COMPANY **APPALACHIAN POWER COMPANY**

PROJECT **KANAWHA RIVER PLANT**

COORDINATES **N 438,857.2 E 1,850,783.5**

GROUND ELEVATION **627.5** SYSTEM **NAD83/NGVD88 WV S**

Water Level, ft	▽	▼	▼
TIME			
DATE			

BORING NO. **MW-1602** DATE **3/17/17** SHEET **1** OF **3**

BORING START **9/8/16** BORING FINISH **9/18/16**

PIEZOMETER TYPE _____ WELL TYPE **OW**

HGT. RISER ABOVE GROUND **3.24** DIA **2.0**

DEPTH TO TOP OF WELL SCREEN **40.0** BOTTOM **59.6**

WELL DEVELOPMENT **YES** BACKFILL **QUICK GROUT**

FIELD PARTY **REB / ZLR** RIG **D-120**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SS	1.5	3.0	3-4-4	1.0					COBBLES & GRAVELS ROAD BASE FILL MATERIAL		
2	SS	6.5	8.0	7-7-7	1.1		5			MODERATE YELLOWISH BROWN 10YR 5/4 SANDY CLAY FILL MATERIAL		
3	SS	11.5	13.0	3-5-6	1.0		10			MODERATE YELLOWISH BROWN 10YR 5/4 W/REDDISH TINT SANDY CLAY		
4	SS	16.5	18.0	2-2-4	1.1		15			MODERATE YELLOWISH BROWN 10YR 5/4 SANDY CLAY		

TYPE OF CASING USED

	NQ-2 ROCK CORE	
X	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER _____

AEP KR MONITORING WELLS.GPJ AEP.GDT 3/17/17

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **3302**

COMPANY **APPALACHIAN POWER COMPANY** BORING NO. **MW-1602** DATE **3/17/17** SHEET **2** OF **3**

PROJECT **KANAWHA RIVER PLANT** BORING START **9/8/16** BORING FINISH **9/18/16**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
5	SS	21.5	23.0	2-2-2	1.2					MODERATE YELLOWISH BROWN 10YR 5/4 SANDY CLAY		
6	SS	26.5	28.0	1-1-2	1.5		25			SOFT MODERATE YELLOWISH BROWN 10YR 5/4 SANDY CLAY tsf 1.0		
7	SS	31.5	33.0	2-3-4	1.5		30			SOFT MODERATE YELLOWISH BROWN 10YR 5/4 SANDY CLAY tsf 1.0		
8	SS	36.5	38.0	1-1-2	1.5		35			SOFT MODERATE YELLOWISH BROWN 10YR 5/4 SANDY CLAY tsf .05, moist to wet		
9	SS	41.5	43.0	2-3-5	1.5		40			MODERATE YELLOWISH BROWN 10YR 5/4 SAND FINE wet to saturated		
							45					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **3302**

COMPANY **APPALACHIAN POWER COMPANY** BORING NO. **MW-1602** DATE **3/17/17** SHEET **3** OF **3**

PROJECT **KANAWHA RIVER PLANT** BORING START **9/8/16** BORING FINISH **9/18/16**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
10	SS	46.5	48.0	17-24-18	1.4					MODERATE YELLOWISH BROWN 10YR 5/4 SAND & GRAVELS saturated		
11	SS	51.5	53.0	17-24-27	1.5		50			MODERATE YELLOWISH BROWN 10YR 5/4 SAND FINE & GRAVEL saturated		
12	SS	56.5	58.0	15-18-10	1.4		55			MEDIUM GRAY N5 SAND FINE & GRAVELS w/some small cobbles, saturated		
13	SS	61.5	63.0	50/2	.2		60			MEDIUM GRAY N5 SANDY CLAYSHALE		

AEP KR MONITORING WELLS.GPJ AEP.GDT 3/17/17

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **3302**

COMPANY **APPALACHIAN POWER COMPANY**

PROJECT **KANAWHA RIVER PLANT**

COORDINATES **N 438,681.8 E 1,849,945.1**

GROUND ELEVATION **628.0** SYSTEM **NAD83/NGVD88 WV S**

Water Level, ft	▽	▼	▼
TIME			
DATE			

BORING NO. **MW-1603** DATE **3/17/17** SHEET **1** OF **3**

BORING START **9/13/16** BORING FINISH **9/13/16**

PIEZOMETER TYPE _____ WELL TYPE **OW**

HGT. RISER ABOVE GROUND **3.18** DIA **2.0**

DEPTH TO TOP OF WELL SCREEN **36.8** BOTTOM **56.4**

WELL DEVELOPMENT **YES** BACKFILL **QUICK GROUT**

FIELD PARTY **REB / ZLR** RIG **D-120**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SS	1.5	3.0	6-11-9	1.0					FILL MATERIAL		
2	SS	6.5	8.0	12-13-13	1.3		5			HARD MODERATE YELLOWISH BROWN 10YR 5/4 SANDY SILT		
3	SS	11.5	13.0	11-11-12	1.1		10			HARD MODERATE YELLOWISH BROWN 10YR 5/4 SANDY SILT		
4	SS	16.5	18.0	2-4-6	1.1		15			MODERATE YELLOWISH BROWN 10YR 5/4 CLAYEY SAND FINE		

TYPE OF CASING USED

	NQ-2 ROCK CORE	
X	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER _____

AEP KR MONITORING WELLS.GPJ AEP.GDT 3/17/17

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **3302**

COMPANY **APPALACHIAN POWER COMPANY** BORING NO. **MW-1603** DATE **3/17/17** SHEET **2** OF **3**

PROJECT **KANAWHA RIVER PLANT** BORING START **9/13/16** BORING FINISH **9/13/16**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
5	SS	21.5	23.0							SOFT MODERATE YELLOWISH BROWN 10YR 5/4 SANDY CLAY tsf 1.0		
6	SS	26.5	28.0				25			SOFT MODERATE YELLOWISH BROWN 10YR 5/4 SANDY CLAY tsf 0.5		
7	SS	31.5	33.0	2-3-4	1.4		30			SOFT MODERATE YELLOWISH BROWN 10YR 5/4 SANDY CLAY tsf 0.5, wet		
8	SS	36.5	38.0	1-2-3	1.5		35			SOFT MODERATE YELLOWISH BROWN 10YR 5/4 SANDY CLAY tsf 0.5		
9	SS	41.5	43.0	1-2-3	1.5		40			MODERATE YELLOWISH BROWN 10YR 5/4 SAND FINE		
							45					

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **3302**

COMPANY **APPALACHIAN POWER COMPANY** BORING NO. **MW-1603** DATE **3/17/17** SHEET **3** OF **3**

PROJECT **KANAWHA RIVER PLANT** BORING START **9/13/16** BORING FINISH **9/13/16**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
10	SS	46.5	48.0	2-3-4	1.1					MEDIUM GRAY N5 SAND FINE saturated		
							50					
11	SS	51.5	53.0	20-21-12	1.5					MEDIUM GRAY N5 SAND COARSE		
							55					
12	SS	56.5	58.0	16-18-18	1.3					YELLOWISH ORANGE & GRAY SAND & GRAVELS		

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **3302**

COMPANY **APPALACHIAN POWER COMPANY**

PROJECT **KANAWHA RIVER PLANT**

COORDINATES **N 439,136.3 E 1,849,223.6**

GROUND ELEVATION **628.0** SYSTEM **NAD83/NGVD88 WV S**

Water Level, ft	▽	▼	▼
TIME			
DATE			

BORING NO. **MW-1604** DATE **3/17/17** SHEET **1** OF **3**

BORING START **9/20/16** BORING FINISH **9/20/16**

PIEZOMETER TYPE _____ WELL TYPE **OW**

HGT. RISER ABOVE GROUND **3.21** DIA **2.0**

DEPTH TO TOP OF WELL SCREEN **37.7** BOTTOM **57.3**

WELL DEVELOPMENT **YES** BACKFILL **QUICK GROUT**

FIELD PARTY **REB / ZLR** RIG **D-120**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SS	1.0	2.5	5-5-5						COBBLE BLOCKED END OF SPOON		
2	SS	6.5	8.0	34-15-11	1.5		5			VERY STIFF DARK YELLOWISH BROWN 10YR 4/2 CLAY w/weathered sandstone		
3	SS	11.5	13.0	7-4-4	.9		10			MEDIUM STIFF DARK YELLOWISH BROWN 10YR 4/2 CLAY w/some fine sand		
4	SS	16.5	18.0	2-3-4	1.5		15			MEDIUM STIFF DARK YELLOWISH BROWN 10YR 4/2 CLAY w/fine sand, moist		

TYPE OF CASING USED

	NQ-2 ROCK CORE	
X	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER _____

AEP KR MONITORING WELLS.GPJ AEP.GDT 3/17/17

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **3302**

COMPANY **APPALACHIAN POWER COMPANY** BORING NO. **MW-1604** DATE **3/17/17** SHEET **2** OF **3**

PROJECT **KANAWHA RIVER PLANT** BORING START **9/20/16** BORING FINISH **9/20/16**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
5	SS	21.5	23.0	2-1-3	1.5					SOFT DARK YELLOWISH BROWN 10YR 4/2 CLAY w/some fine sand, moist		
6	SS	26.5	28.0	1-2-3	1.5		25			VERY SOFT DARK YELLOWISH BROWN 10YR 4/2 CLAY w/fine sand, wet		
7	SS	31.5	33.0	1-2-2	1.5		30			VERY SOFT DARK YELLOWISH BROWN 10YR 4/2 FINE SANDY CLAY wet		
8	SS	36.5	38.0	1-3-3	1.5		35			VERY SOFT PALE YELLOWISH BROWN 10YR 6/2 FINE SANDY CLAY		
9	SS	41.5	43.0	5-21-21	1.0		40			VERY STIFF PALE YELLOWISH BROWN 10YR 6/2 FINE SANDY CLAY & WEATHERED SANDSTONE		
							45					

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **3302**

COMPANY **APPALACHIAN POWER COMPANY** BORING NO. **MW-1604** DATE **3/17/17** SHEET **3** OF **3**

PROJECT **KANAWHA RIVER PLANT** BORING START **9/20/16** BORING FINISH **9/20/16**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
10	SS	46.5	48.0	14-23-25	1.5					HARD PALE YELLOWISH BROWN 10YR 6/2 FINE SANDY CLAY w/weathered sandstone cobbles, wet		
11	SS	51.5	53.0	15-25-31	1.5		50			HARD PALE YELLOWISH BROWN 10YR 6/2 FINE SAND w/sandstone cobbles, wet		
12	SS	56.5	58.0	20-29/50	1.5		55			HARD LIGHT GRAY N7 MEDIUM COARSE SAND w/sandstone cobbles		
13	SS	60.0	61.5	15-50/3	.8		60			HARD LIGHT GRAY N7 WEATHERED SANDSTONE		

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **3302**

COMPANY **APPALACHIAN POWER COMPANY**

PROJECT **KANAWHA RIVER PLANT**

COORDINATES **N 438,608.5 E 1,848,999.9**

GROUND ELEVATION **628.0** SYSTEM **NAD83/NGVD88 WV S**

Water Level, ft	▽	▼	▼
TIME			
DATE			

BORING NO. **MW-1605** DATE **3/17/17** SHEET **1** OF **3**

BORING START **9/19/16** BORING FINISH **9/19/16**

PIEZOMETER TYPE _____ WELL TYPE **OW**

HGT. RISER ABOVE GROUND **3.29** DIA **2.0**

DEPTH TO TOP OF WELL SCREEN **32.5** BOTTOM **52.1**

WELL DEVELOPMENT **YES** BACKFILL **QUICK GROUT**

FIELD PARTY **REB / ZLR** RIG **D-120**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SS	1.5	3.0	2-4-5	.5					MEDIUM STIFF MODERATE YELLOWISH BROWN 10YR 5/4 CLAY		
2	SS	6.5	8.0	4-8-14	1.2		5			STIFF MODERATE YELLOWISH BROWN 10YR 5/4 FINE SANDY CLAY		
3	SS	11.5	13.0	8-10-12	1.4		10			VERY STIFF MODERATE YELLOWISH BROWN 10YR 5/4 FINE SANDY CLAY		
4	SS	16.5	18.0	3-5-6	1.5		15			MEDIUM STIFF MODERATE YELLOWISH BROWN 10YR 5/4 FINE SANDY CLAY		

TYPE OF CASING USED

	NQ-2 ROCK CORE	
X	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER _____

AEP KR MONITORING WELLS.GPJ AEP.GDT 3/17/17

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **3302**

COMPANY **APPALACHIAN POWER COMPANY** BORING NO. **MW-1605** DATE **3/17/17** SHEET **2** OF **3**

PROJECT **KANAWHA RIVER PLANT** BORING START **9/19/16** BORING FINISH **9/19/16**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
5	SS	21.5	23.0	5-7-9	1.5					STIFF MODERATE YELLOWISH BROWN 10YR 5/4 FINE SANDY CLAY		
6	SS	26.5	28.0	4-4-5	1.4		25			LOOSE MODERATE YELLOWISH BROWN 10YR 5/4 SILTY FINE SAND moist		
7	SS	31.5	33.0	4-4-4	1.5		30			LOOSE MODERATE YELLOWISH BROWN 10YR 5/4 SILTY FINE SAND moist		
8	SS	36.5	38.0	2-1-2	1.5		35			VERY LOOSE MODERATE YELLOWISH BROWN 10YR 5/4 SILTY FINE SAND		
9	SS	41.5	43.0	5-4-3	1.5		40			LOOSE MODERATE YELLOWISH BROWN 10YR 5/4 MEDIUM TO FINE SAND w/coal fragments, wet		
							45					

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **3302**

COMPANY **APPALACHIAN POWER COMPANY** BORING NO. **MW-1605** DATE **3/17/17** SHEET **3** OF **3**

PROJECT **KANAWHA RIVER PLANT** BORING START **9/19/16** BORING FINISH **9/19/16**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
10	SS	46.5	48.0	8-7-7	1.5					MEDIUM DENSE MODERATE YELLOWISH BROWN 10YR 5/4 MEDIUM COARSE SAND w/river gravel, wet		
							50					
11	SS	51.5	53.0	30-10-15	1.5					MEDIUM DENSE MODERATE YELLOWISH BROWN 10YR 5/4 WEATHERED SANDSTONE wet		

TABLE 1

SUMAMRY OF GEOTECHCNIAL TEST RESULTS

Boring Number	Soil Type	Ground Elevation (ft., MSL)	Initial Sample Depth (ft., BGS)	Initial Sample Elevation (ft., MSL)	Final Sample Depth (ft., BGS)	Final Smaple Elevation (ft., MSL)	Liquid Limit	Plastic Limit	Dry Unit Wt	Natural Moisture (%)	Triaxial Compression			
											CU Total Ø°	CU Total c (ksf)	CU Effective Ø°	CU Effective c (tsf)
FA-B17 (2005)														
	Fly Ash	647.9	41.9	606	43.9	604.0					32.6	2.84	32.8	0
	Silty Clay	647.9	56.9	591	58.9	589.0					13.8	0.93	36.4	0.1
	Silty Clay	647.9	66.9	581	68.9	579.0					12.1	1.04	32	0.46
FA-B18 (2005)														
	Fly Ash	642.8	32	610.8	34	608.8					20.9	3.07	31.2	0.27
	Silty Clay	642.8	52	590.8	54	588.8					14.6	0.65	32.8	0.46
B-15 (1989)														
1	Gray Silt (Fly Ash?)	642.3	33.6	608.7	35.6	606.7	non-plastic	non-plastic	78	39%			30.5	0
2	Silty Clay	642.3	41.6	600.7	43.6	598.7	41%	25%	96	27%				
3	Silty Clay	642.3	44.6	597.7	46.6	595.7	32%	21%	96	27%				
4	Silty Clay	642.3	48.6	593.7	50.6	591.7	39%	22%	92	30%				
5	Clayey Silt/Silty Clay	642.3	51.6	590.7	53.6	588.7	28%	19%	95	28%	10	0.7	25	0
6			53.6		55.6		34%	24%	85	36%				
7			56.6		58.6		83%	40%	72	46%				
B-16 (1989)														
1			10		12		non-plastic	non-plastic	62	14%				
3			25		27		27%	19%	103	20%				
4			30		32		33%	22%		23%				
5			38		40		34%	21%	95	30%				
6			41		43		32%	23%		27%				
7	Clayey Silt	643.4	45	598.4	47	596.4	30%	21%	96	28%	10	0.6	26.5	0
8	Clayey Silt	643.4	48	595.4	50	593.4	27%	21%	97	27%	11	0.4	27	0
8	Clayey Silt	643.4	48	595.4	50	593.4	27%	21%	97	27%	11	0.4	17	0
9	Silty Clay	643.4	50	593.4	52	591.4	30%	24%	98	25%				
10	Silty Clay	643.4	53	590.4	55	588.4	30%	20%	98	24%				

JUL 3 1 1989

LABORATORY TESTING

BBC&M JOB NO. P-160 F

KANAWHA RIVER LANDFILL

CEDAR GROVE, W. VA.

BBC&M
ENGINEERING, INC.

July 31, 1989
P-160 F

American Electric Power
Engineering Department
1 Riverside Drive
Columbus, Ohio 43215

Attention: Mr. Kevin Miller

Re: Laboratory Testing
BBC&M Job No. P-160 F
Kanawha River Landfill
Cedar Grove, W. Va.

Gentlemen:

Enclosed are the results of the laboratory tests for the Shelby tube soil specimens for the Kanawha River Landfill project. Included are the appropriate curves, listed numerical values, as well as all laboratory test work sheets and Shelby tube logs. Please notice the note for B-15, S-1 pertaining to the total Shelby tube unit weight which possibly has a weighing error. Also no unit weights were obtained for B-16, S-4 and B-16, S-6 due to excess cuttings and disturbance.

We are pleased to have been of service to you. If you have any questions regarding this work please contact this office.

Very truly yours,

BBC&M ENGINEERING, INC.

John D. Jenkins, Jr.
Laboratory Supervisor

JDJ/slf
Submitted: 2 copies

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE	DEPTH FEET	IDENTIFICATION	NATURAL MOISTURE CONTENT %	ATTERBERG LIMITS LIQUID %	ATTERBERG LIMITS PLASTIC %	RELATIVE DENSITY MAXIMUM PCF	RELATIVE DENSITY MINIMUM PCF	RELATIVE DENSITY RELATIVE %	SPECIFIC GRAVITY —	UNIT DRY WEIGHT PCF	Consolidation	UNCONFINED COMPRESSION	TRIAXIAL COMPRESSION	GRADATION SIEVE	GRADATION HYDROMETER	COMPACTION	
											* SEE INDIVIDUAL TEST CURVES						
B-15/1	33.6 – 35.6	SEE LOG OF SHELBY TUBE	AVG. 39	NON-PLASTIC						78 ~~98~~					*		
		I	38							76			*				
		II	39							75			*				
B-15/2	41.6 – 43.6	SEE LOG OF SHELBY TUBE	27	41	25					96							
B-15/3	44.6 – 46.6	SEE LOG OF SHELBY TUBE	27	32	21					96							
B-15/4	48.6 – 50.6	SEE LOG OF SHELBY TUBE	AVG. 30							92							
		I	29							95			*				
		II	30							91			*				
		III	32							89			*				
		IV		39	22										*		
B-15/5	51.6 – 53.6	SEE LOG OF SHELBY TUBE	AVG. 28							95							
		I	28							94			*				
		II	29							94			*		*		

PLATE

SUMMARY OF LABORATORY TEST RESULTS

BORING SAMPLE (Cont)	DEPTH FEET	IDENTIFICATION	NATURAL MOISTURE CONTENT %	ATTERBERG LIMITS LIQUID %	ATTERBERG LIMITS PLASTIC %	RELATIVE DENSITY MAXIMUM PCF	RELATIVE DENSITY MINIMUM PCF	RELATIVE DENSITY RELATIVE %	SPECIFIC GRAVITY —	UNIT DRY WEIGHT PCF	Consolidation	UNCONFINED COMPRESSION	TRIAXIAL COMPRESSION	GRADATION SIEVE	GRADATION HYDROMETER	COMPACTION	
											* SEE INDIVIDUAL TEST CURVES						
B-15/5	51.6 – 53.6	III	28							95			*				
		IV	28	28	19				2.69	96	*						
B-15/6	53.6 – 55.6	SEE LOG OF SHELBY TUBE	36	34	24					85							
B-15/7	56.6 – 58.6	SEE LOG OF SHELBY TUBE	46	83	40					72							
B-16/1	10.0 – 12.0'	SEE LOG OF SHELBY TUBE	14	NON-PLASTIC						62							
B-16/3	25.0' – 27.0'	SEE LOG OF SHELBY TUBE	AUG. 20							103							
		II	20	27	19				2.76	107	*			*	*		
B-16/4	30.0' – 32.0'	SEE LOG OF SHELBY TUBE	23	33	22					NO							
B-16/5	38.0' – 40.0'	SEE LOG OF SHELBY TUBE III	30	34	21					95							
B-16/6	41.0' – 43.0'	SEE LOG OF SHELBY TUBE	27	32	23					NO							

PLATE

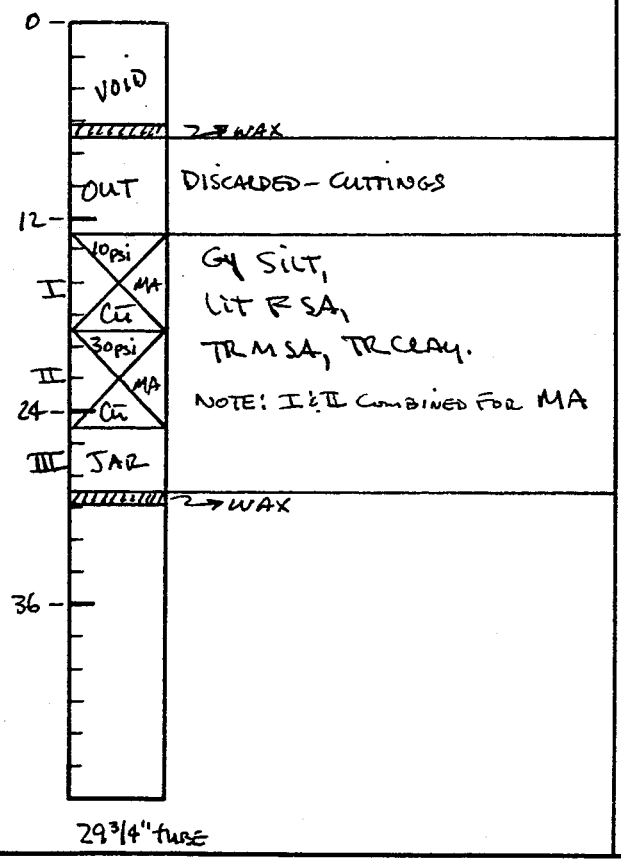
SUMMARY OF LABORATORY TEST RESULTS

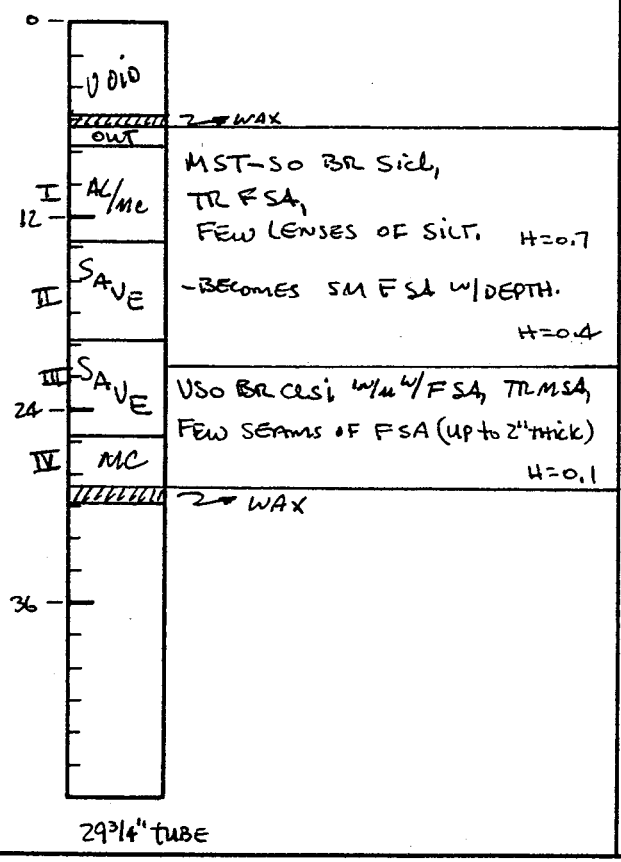
BORING SAMPLE	DEPTH FEET	IDENTIFICATION	NATURAL MOISTURE CONTENT %	ATTERBERG LIMITS LIQUID %	ATTERBERG LIMITS PLASTIC %	RELATIVE DENSITY MAXIMUM PCF	RELATIVE DENSITY MINIMUM PCF	RELATIVE DENSITY RELATIVE %	SPECIFIC GRAVITY —	UNIT DRY WEIGHT PCF	Consolidation	UNCONFINED COMPRESSION	TRIAXIAL COMPRESSION	GRADATION SIEVE	GRADATION HYDROMETER	COMPACTION
											* SEE INDIVIDUAL TEST CURVES					
B-16/1	45.0'–47.0'	SEE LOG OF SHELBY TUBE	AVG. 28							96						
		I	28							95			*			
		II	29							94			*			
		III	27							96			*			
		IV		30	21					*					*	
B-16/8	48.0'–50.0'	SEE LOG OF SHELBY TUBE	AVG. 27							97						
		I	29							94			*			
		II	27							97			*			
		III	27							96			*			
		IV		27	21										*	
B-16/9	50.0'–52.0'	SEE LOG OF SHELBY TUBE	25	30	24					98						
B-16/10	53.0'–55.0'	SEE LOG OF SHELBY TUBE	24	30	20					98						

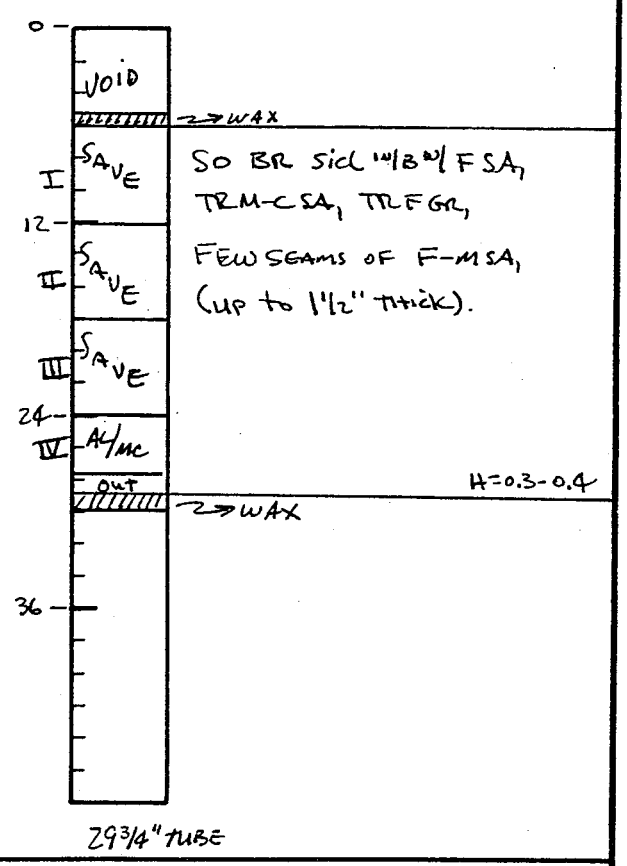
PLATE

LABORATORY LOG OF SHELBY TUBES

Boring B-15 Sample 1	Boring B-15 Sample 2	Boring B-15 Sample 3
Depth 33.6' to 35.6' Recovery 14"	Depth 41.6' to 43.6' Recovery 21"	Depth 44.6' to 46.6' Recovery 22"







LEGEND

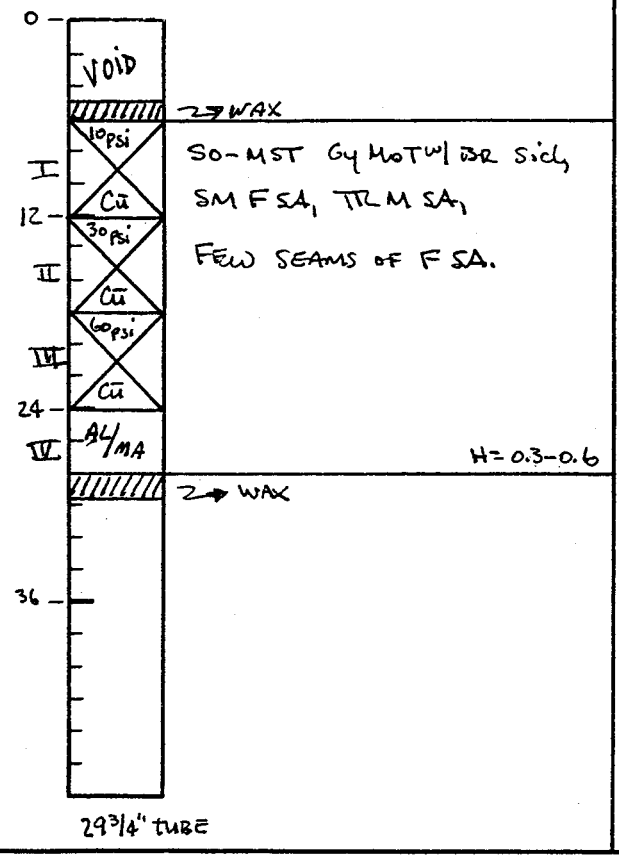
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- Consolidation, horizontal
- Unconfined Compression Test
- Triaxial Test

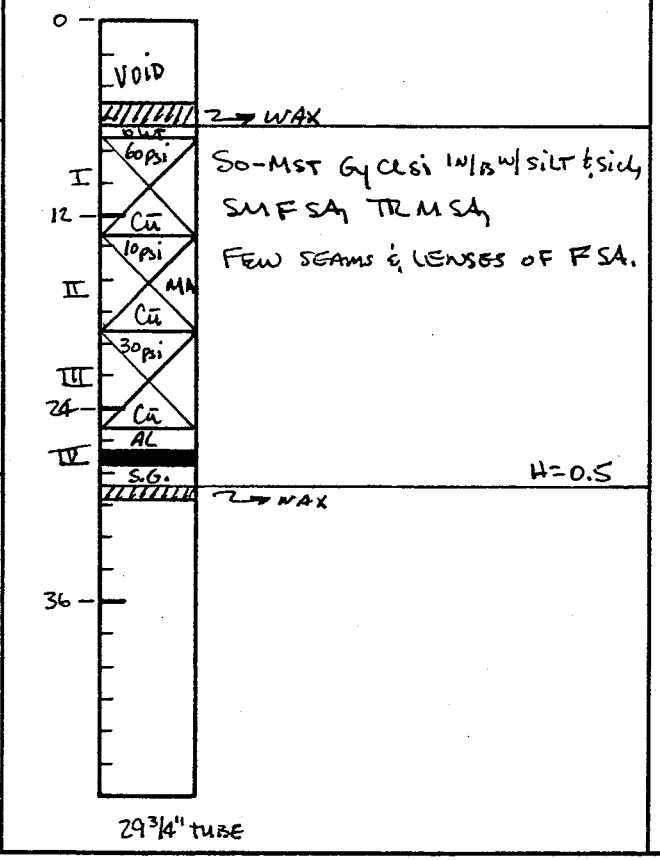
AL - Atterberg Limits
MA - Mechanical Analysis
SG - Specific Gravity
H - HAND PENETROMETER
P - Permeability
MC - Moisture Content
D_R - Relative Density

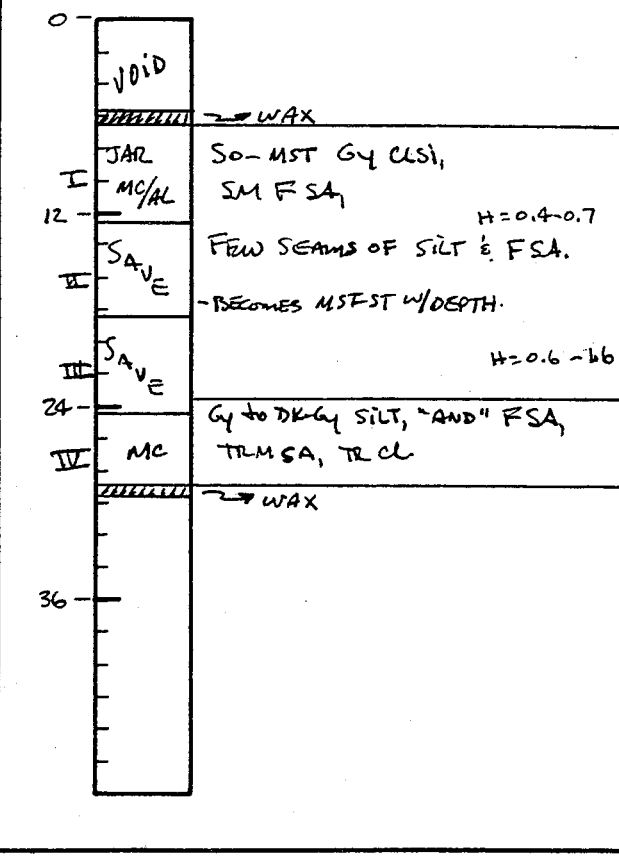
Form L-1

LABORATORY LOG OF SHELBY TUBES

Boring B-15 Sample 4	Boring B-15 Sample 5	Boring B-15 Sample 6
Depth 48.6' to 50.6' Recovery 22"	Depth 51.6' to 53.6' Recovery 21½"	Depth 53.6' to 55.6' Recovery 23"







LEGEND

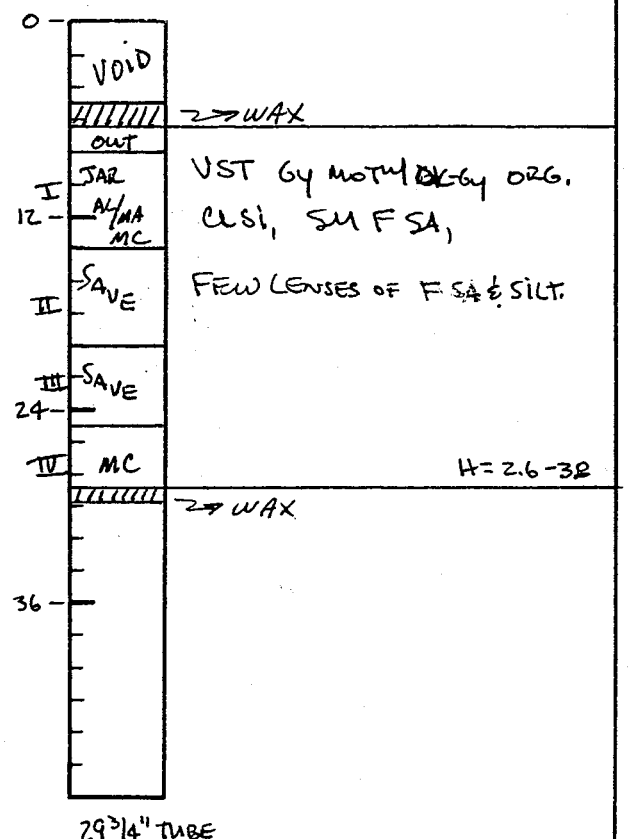
- Consolidation, vertical
- Consolidation, horizontal
- Unconfined Compression Test
- Triaxial Test

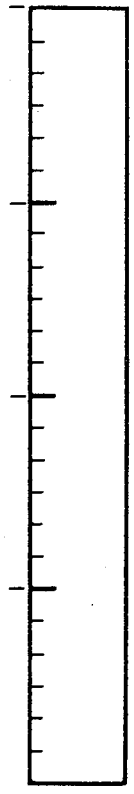
AL - Atterberg Limits
MA - Mechanical Analysis
SG - Specific Gravity
H - HAND PENETROMETER
P - Permeability
MC - Moisture Content
D_R - Relative Density

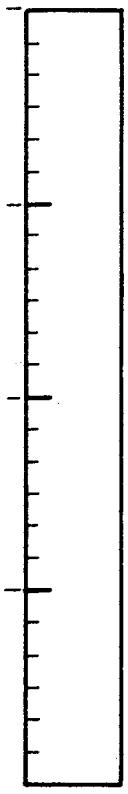
Form L-1

LABORATORY LOG OF SHELBY TUBES

Boring B-15	Sample 7	Boring	Sample	Boring	Sample
Depth 56.6' to 58.6'	Recovery 21"	Depth	Recovery	Depth	Recovery







LEGEND

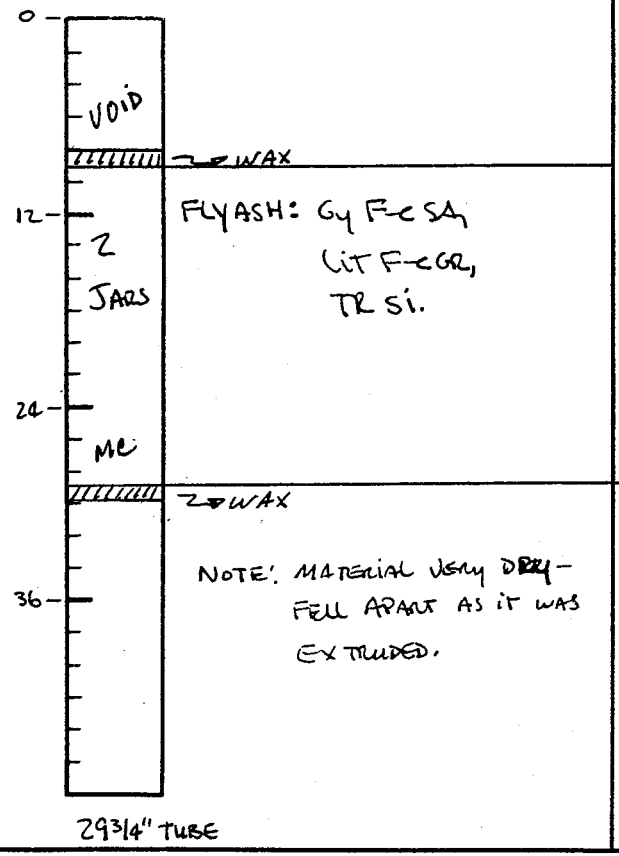
- Consolidation, vertical
- Consolidation, horizontal
- Unconfined Compression Test
- Triaxial Test

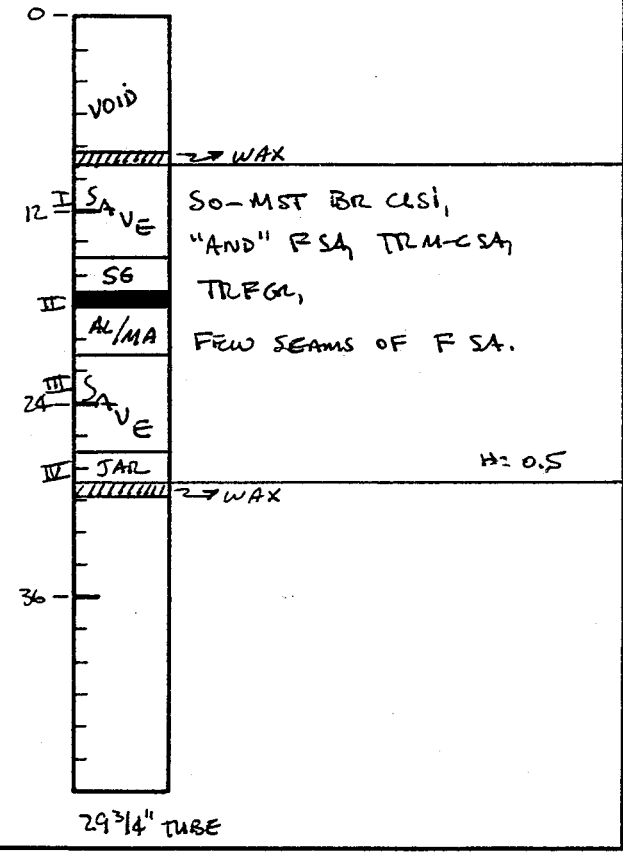
AL - Atterberg Limits
MA - Mechanical Analysis
SG - Specific Gravity
H - HAND PENETROMETER
P - Permeability
MC - Moisture Content
D_R - Relative Density

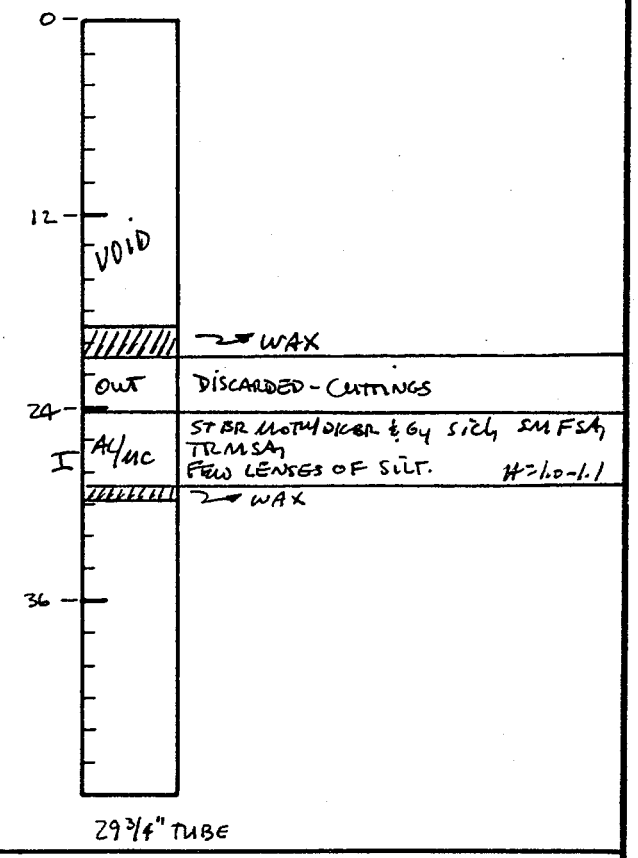
Form L-1

LABORATORY LOG OF SHELBY TUBES

Boring B-16 Sample 1	Boring B-16 Sample 3	Boring B-16 Sample 4
Depth 10.0' to 12.0' Recovery 19 1/2"	Depth 25.0' to 27.0' Recovery 20"	Depth 30.0' to 32.0' Recovery 4 3/4"







LEGEND

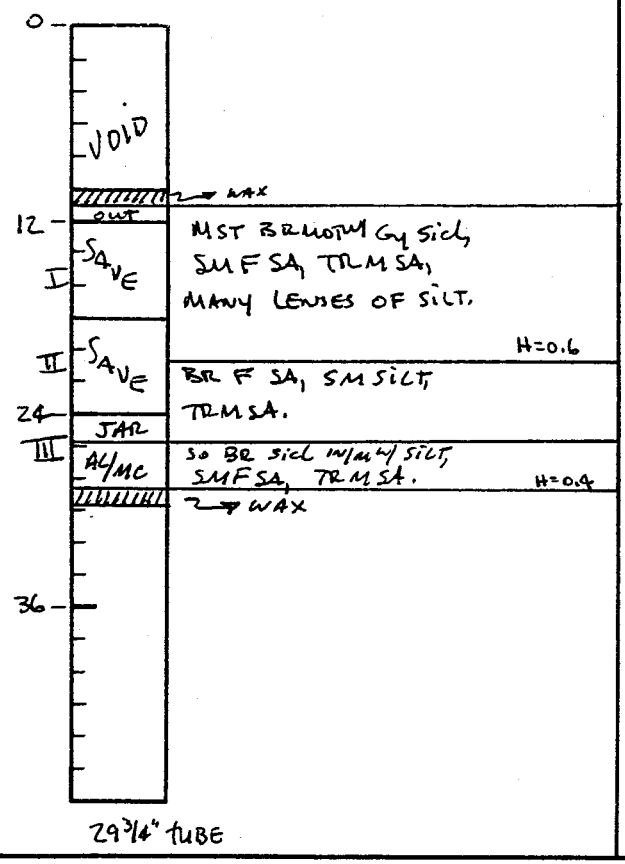
- Consolidation, vertical
- Consolidation, horizontal
- Unconfined Compression Test
- Triaxial Test

AL - Atterberg Limits
MA - Mechanical Analysis
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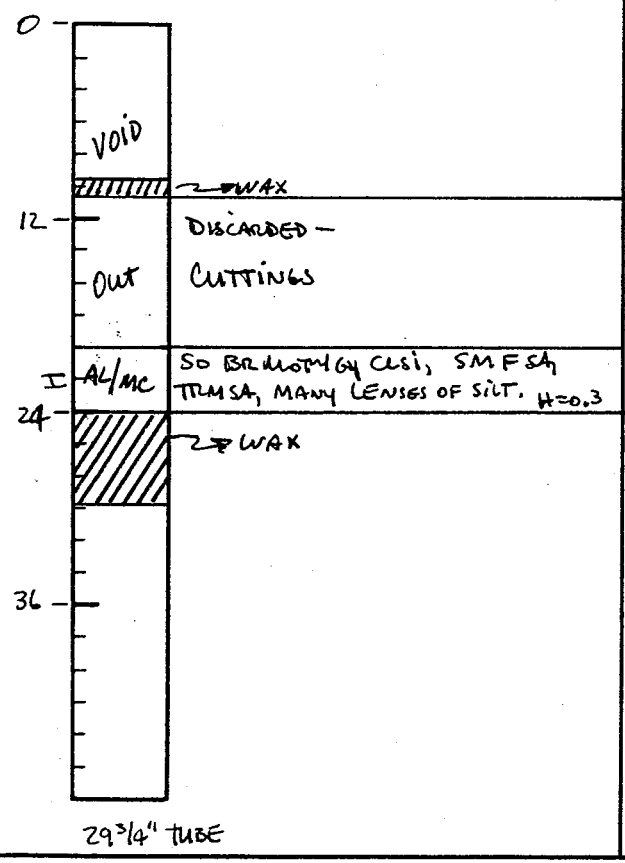
Form L-1

LABORATORY LOG OF SHELBY TUBES

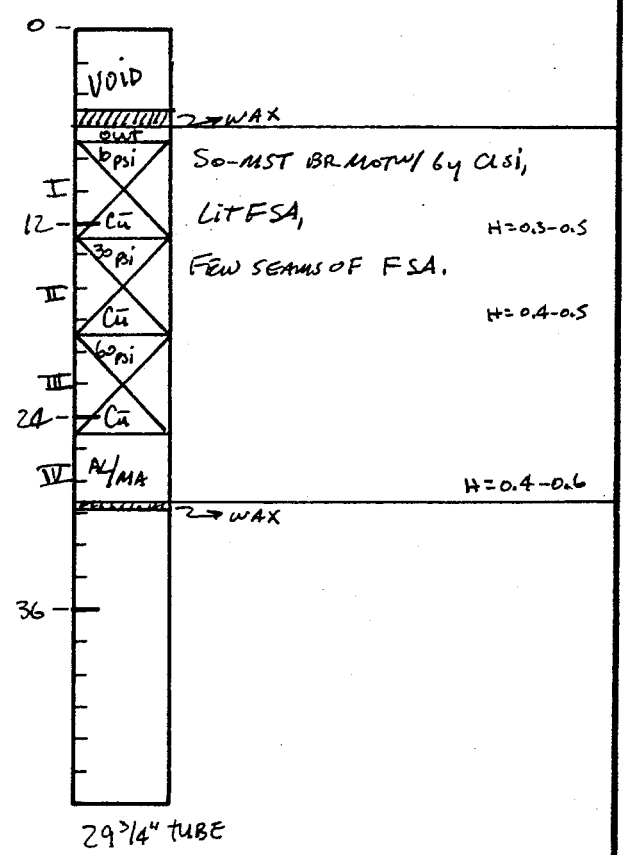
Boring B-16 Sample 5	Boring B-16 Sample 6	Boring B-16 Sample 7
Depth 38.0 'to 40.0' Recovery 16½"	Depth 41.0 'to 43.0' Recovery 4"	Depth 45.0 'to 47.0' Recovery 21½"



2 9 3/4" TUBE



2 9 3/4" TUBE



2 9 3/4" TUBE

LEGEND

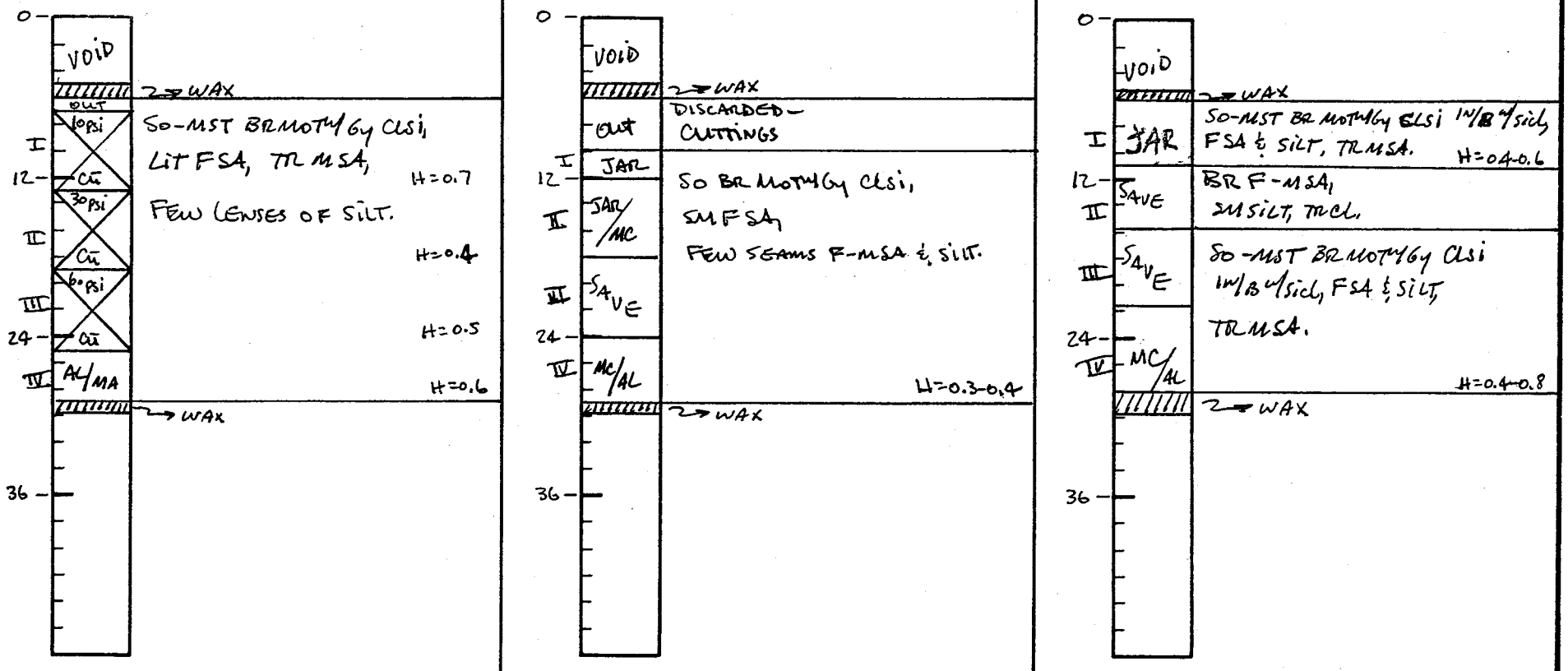
- ■ - Consolidation, vertical
- ■ - Consolidation, horizontal
- ⧸ - Unconfined Compression Test
- ⧸⧹ - Triaxial Test

AL - Atterberg Limits
MA - Mechanical Analysis
SG - Specific Gravity
H - HAND PENETROMETER
P - Permeability
MC - Moisture Content
D_R - Relative Density

Form L-1

LABORATORY LOG OF SHELBY TUBES

Boring B-16 Sample 8	Boring B-16 Sample 9	Boring B-16 Sample 10
Depth 48.0' to 50.0' Recovery 22 1/4"	Depth 50.0' to 52.0' Recovery 19 1/4"	Depth 53.0' to 55.0' Recovery 21 3/4"



LEGEND

- Consolidation, vertical
- Consolidation, horizontal
- Unconfined Compression Test
- Triaxial Test

AL - Atterberg Limits
MA - Mechanical Analysis
SG - Specific Gravity
H — HAND PENETROMETER
P - Permeability
MC - Moisture Content
D_R - Relative Density

Form L-1

Form: L-13

MOISTURE CONTENT AND IDENTIFICATION

JOB: P-160F DATE: 6/27/89

Boring	Sample	Depth	Identification	Can	Wet	Dry	Tare	Soil	Water	%
B-16	1			T-477	987.6	885.4	173.9	711.5	102.2	14.4
B-15	3			208	81.85	68.20	17.55	50.65	13.65	26.9
B-16	4			43	83.75	71.30	17.78	53.52	12.45	23.3
	5 III			77	81.45	66.60	17.18	49.42	14.85	30.0
	6			60	84.15	70.10	17.15	52.95	14.05	26.5
B-15	2		½ I + IV	WWW	1279.3	1026.30	98.7	927.6	253.0	27.3
B-15	6		½ I & IV	B	1024.0	776.1	95.0	681.1	247.9	36.4
B-15	7		½ I & III	222	853.0	617.0	101.7	515.3	236.0	45.8
B-16	9		½ II & IV	SAR	870.9	751.5	275.0	476.5	119.4	25.1
B-16	10		IV & ½ I	T-419	1312.0	1091.3	165.9	925.4	220.7	23.8

Atterberg Limit Determinations

Data & Computation Sheet Project: Job No.: P-160F

Boring: B-15 Sample: 2I Depth: 41.6'-43.6'

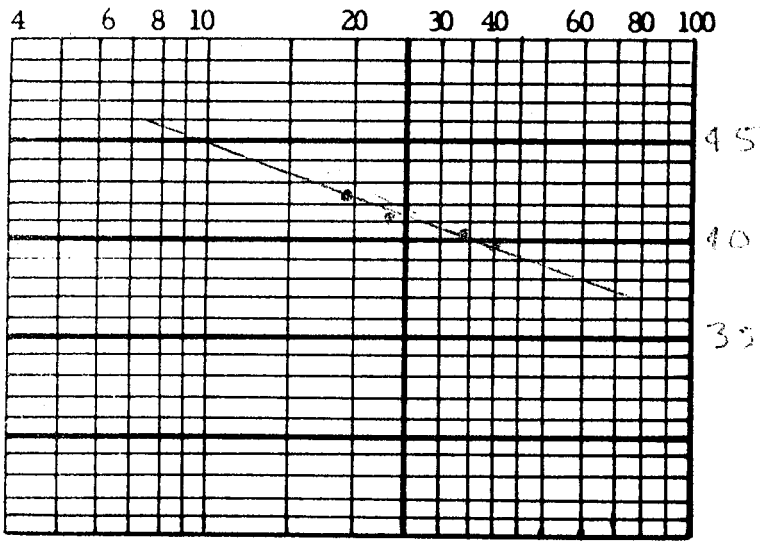
Date of Test: 28 Jan 89 Material:

Preparation: Washed - No. 40: Air-dried: @ Nat. M. C.:

Determination of Liquid Limit

	Dish No.:	217	113	192	58	
A	Wt. Wet Sple & Dish	52.9	46.5	44.5	43.7	
B	Wt. Dry Sple & Dish	42.8	38.4	36.6	35.8	
C	Wt. of Dish	17.37	18.21	17.41	17.27	
D	Dry Wt. Sple=B-C	25.43	20.19	19.19	18.53	
E	Wt. Moisture=A-B	10.1	8.1	7.9	7.9	
	% Moisture=100 E/D	39.7	40.1	41.2	42.6	
	Number of Blows:	41	34	23	19	

Blows



Summary:

Liquid Limit = 41 %

Plastic Limit = 25 %

Plas. Index = 16 %

Flow Index = Numerical difference in moisture content for 1 cycle on log plot = %

Toughness Index = P.I./F.I. = %

Determination of Plastic Limit

	Dish No.	B-34	B-64			
A	Wt. Wet Sple & Dish	11.2	13.5			
B	Wt. Dry Sple & Dish	9.6	11.6			
C	Wt. of Dish	3.15	3.81			
D	Dry Wt. Sple=B-C	6.45	7.79			
E	Wt. Moisture=A-B	1.6	1.9			
	Plastic Limit=100 E/D	24.8	24.4			

Tested By: G-Mann Computed By: Rogn Checked By: JT

Atterberg Limit Determinations

Data & Computation Sheet Project: Job No.: P-160F

Boring: B-15 Sample: 3 IV Depth: 44.6'-46.6'

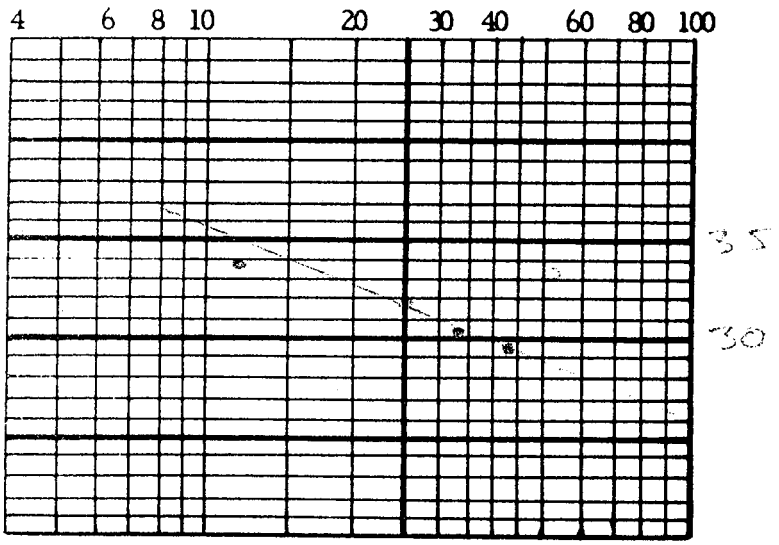
Date of Test: 28 Jun 89 Material:

Preparation: Washed - No. 40: Air-dried: @ Nat. M. C.:

Determination of Liquid Limit

	Dish No.:	159	228	129	221	
A	Wt. Wet Sple & Dish	47.4	46.7	51.8	46.8	
B	Wt. Dry Sple & Dish	40.3	40.0	44.1	39.3	
C	Wt. of Dish	17.98	17.73	17.96	17.46	
D	Dry Wt. Sple=B-C	22.32	22.27	26.14	21.89	
E	Wt. Moisture=A-B	7.1	6.7	7.7	7.5	
	% Moisture=100 E/D	31.8	30.1	29.5	34.3	
	Number of Blows:	25	33	43	12	

Blows



Summary:

Liquid Limit = 32 %

Plastic Limit = 21 %

Plas. Index = 11 %

Flow Index = Numerical difference in moisture content for 1 cycle on log plot = ____ %

Toughness Index = P.I./F.I. = ____ %

Determination of Plastic Limit RERUN TH-

	Dish No.	B-66	A-3		B-41	B-68
A	Wt. Wet Sple & Dish	11.5	14.2		15.90	16.30
B	Wt. Dry Sple & Dish	11.1	12.3		13.80	14.10
C	Wt. of Dish	9.85	4.10		3.76	3.88
D	Dry Wt. Sple=B-C	1.25	8.2		10.04	10.22
E	Wt. Moisture=A-B	.4	1.9		2.10	2.20
	Plastic Limit=100 E/D	5.5	23.2		20.9	21.5

Tested By: G-Mann Computed By: [illegible] Checked By: JJ

L-14

Atterberg Limit Determinations

Data & Computation Sheet Project: Job No.: P-160F

Boring: B-15 Sample: 4 IV Depth: 48.6' to 50.6'

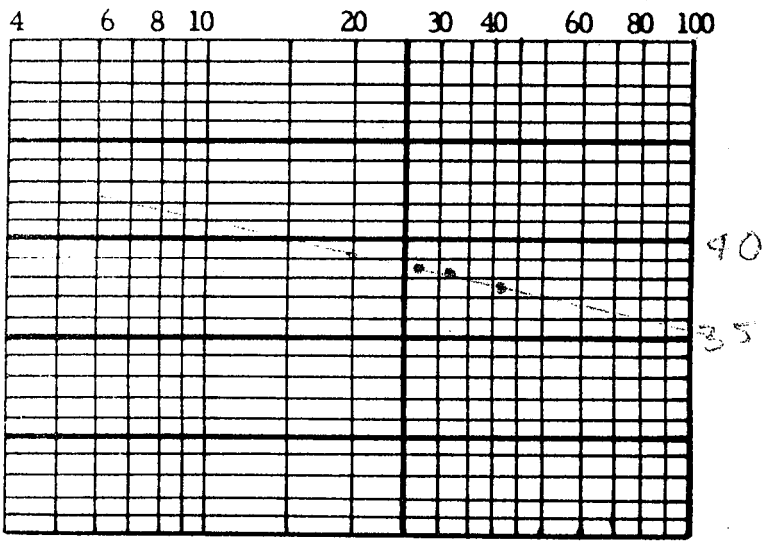
Date of Test: 28 Jun 89 Material:

Preparation: Washed - No. 40: Air-dried: @ Nat. M. C.:

Determination of Liquid Limit

	Dish No.:	135	112	125	202	
A	Wt. Wet Sple & Dish	40.7	45.6	50.6	46.7	
B	Wt. Dry Sple & Dish	34.1	37.8	41.4	38.9	
C	Wt. of Dish	17.26	17.55	17.44	17.63	
D	Dry Wt. Sple=B-C	16.84	20.25	23.96	21.27	
E	Wt. Moisture=A-B	6.6	7.8	9.2	7.8	
	% Moisture=100 E/D	39.2	38.5	38.4	36.7	
	Number of Blows:	20	27	33	42	

Blows



Summary:

Liquid Limit = 39 %

Plastic Limit = 22 %

Plas. Index = 17 %

Flow Index = Numerical difference in moisture content for 1 cycle on log plot = ____ %

Toughness Index = P.I. /F.I. = ____ %

Determination of Plastic Limit

	Dish No.	A-6	A-4			
A	Wt. Wet Sple & Dish	16.5	15.3			
B	Wt. Dry Sple & Dish	14.3	13.3			
C	Wt. of Dish	4.07	4.03			
D	Dry Wt. Sple=B-C	10.23	9.27			
E	Wt. Moisture=A-B	2.2	2.0			
	Plastic Limit=100 E/D	21.5	21.6			

Tested By: TH Computed By: Rom Checked By: JJ

Atterberg Limit Determinations

Data & Computation Sheet **Project:** **Job No.:** P-160 F

Boring: B-15 **Sample:** 5 IV **Depth:** 51.6'-53.6'

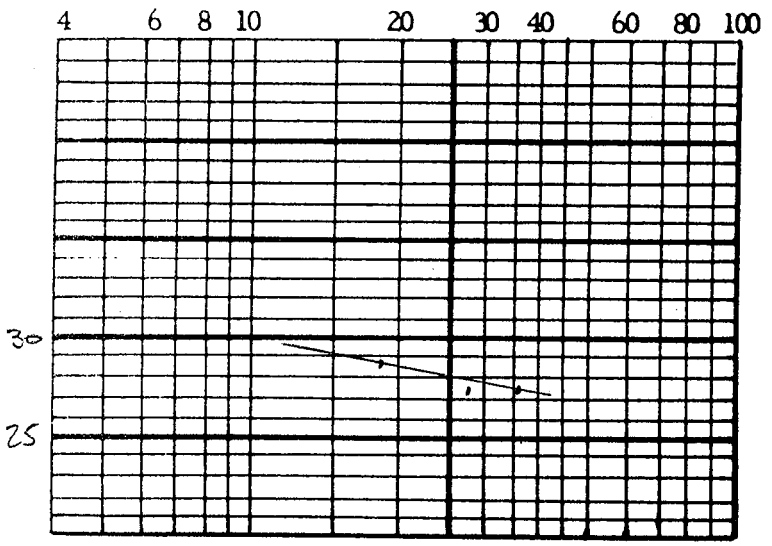
Date of Test: 10.7.89 **Material:**

Preparation: **Washed - No. 40:** **Air-dried:** **@ Nat. M. C.:**

Determination of Liquid Limit

	Dish No.:	164	150	170		
A	Wt. Wet Sple & Dish	59.78	61.73	67.33		
B	Wt. Dry Sple & Dish	50.84	51.98	56.73		
C	Wt. of Dish	18.17	18.12	17.92		
D	Dry Wt. Sple=B-C	32.67	33.86	38.81		
E	Wt. Moisture=A-B	8.94	9.75	10.60		
	% Moisture=100 E/D	27.4	28.8	27.3		
	Number of Blows:	36	18	27		

Blows



Summary:

Liquid Limit = 28 %

Plastic Limit = 19 %

Plas. Index = 9 %

Flow Index = Numerical difference in moisture content for 1 cycle on log plot = ____ %

Toughness Index = P.I./F.I. = ____ %

Determination of Plastic Limit

	Dish No.	B-34	A-10			
A	Wt. Wet Sple & Dish	15.19	15.66			
B	Wt. Dry Sple & Dish	13.30	13.76			
C	Wt. of Dish	3.15	4.18			
D	Dry Wt. Sple=B-C	10.15	9.58			
E	Wt. Moisture=A-B	1.89	1.90			
	Plastic Limit=100 E/D	18.6	19.8			

Tested By: TS **Computed By:** JJ **Checked By:**

Atterberg Limit Determinations RERUN LL

Data & Computation Sheet Project: Job No.: P-160 F

Boring: B-15 Sample: 6 Depth: I

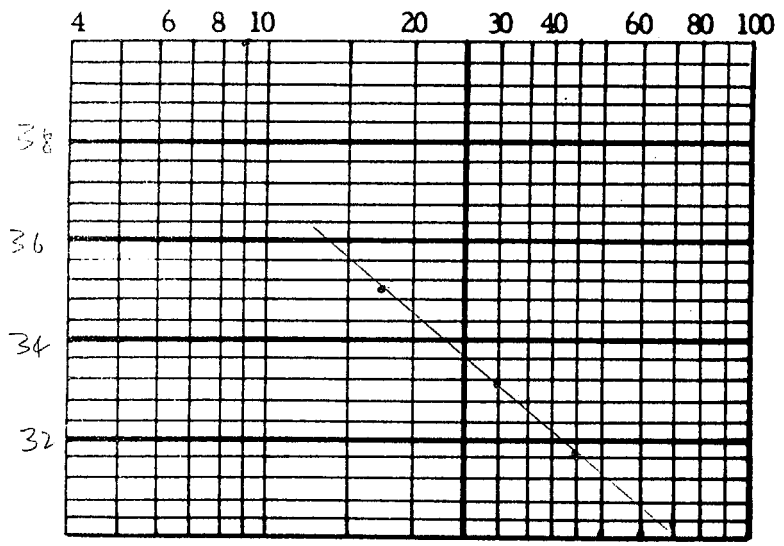
Date of Test: Material:

Preparation: Washed - No. 40: Air-dried: @ Nat. M. C.:

Determination of Liquid Limit Rerun

	Dish No.	203	111	105	122	
A	Wt. Wet Sple & Dish	51.6	51.1	46.8	52.9	
B	Wt. Dry Sple & Dish	43.5	42.8	38.6	43.1	
C	Wt. of Dish	17.98	17.75	15.13	18.59	
D	Dry Wt. Sple=B-C	25.52	25.05	23.47	24.51	
E	Wt. Moisture=A-B	8.1	8.3	8.2	9.80	
	% Moisture=100 E/D	31.7	33.1	34.9	40.0	
	Number of Blows:	45	30	17	9	

Blows



Summary:

Liquid Limit = 34 %

Plastic Limit = 24 %

Plas. Index = 10 %

Flow Index = Numerical difference in moisture content for 1 cycle on log plot = %

Toughness Index = P.I./F.I. = %

Determination of Plastic Limit

	Dish No.					
A	Wt. Wet Sple & Dish					
B	Wt. Dry Sple & Dish					
C	Wt. of Dish					
D	Dry Wt. Sple=B-C					
E	Wt. Moisture=A-B					
	Plastic Limit=100 E/D					

Tested By: JA Computed By: Checked By: JJ

Atterberg Limit Determinations

Data & Computation Sheet Project: Job No.: P-160F

Boring: B-15 Sample: 6 Depth: II

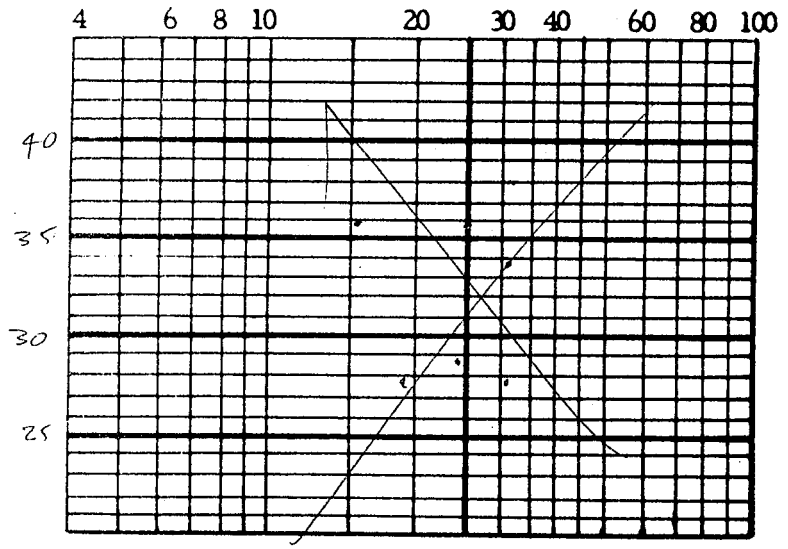
Date of Test: Material:

Preparation: Washed - No. 40: Air-dried: @ Nat. M. C.:

Determination of Liquid Limit

	Dish No.:	36	31	23		
A	Wt. Wet Sple & Dish	43.1	43.8	48.2		
B	Wt. Dry Sple & Dish	37.8	38.2	41.8		
C	Wt. of Dish	18.61	18.36	18.56		
D	Dry Wt. Sple=B-C	19.19	19.84	23.24		
E	Wt. Moisture=A-B	5.30	5.60	6.40		
	% Moisture=100 E/D	27.6	28.2	27.5		
	Number of Blows:	31	23	18		

Blows



Summary:

Liquid Limit = _____ %

Plastic Limit = 34 %

Plas. Index = _____ %

Flow Index = Numerical difference in moisture content for 1 cycle on log plot = _____ %

Toughness Index = P.I. /F.I. = _____ %

Determination of Plastic Limit

	Dish No.	123	189			
A	Wt. Wet Sple & Dish	38.3	41.8			
B	Wt. Dry Sple & Dish	34.5	37.2			
C	Wt. of Dish	18.66	17.87			
D	Dry Wt. Sple=B-C	15.84	19.33			
E	Wt. Moisture=A-B	3.80	4.60			
	Plastic Limit=100 E/D	24.0	23.8			

Tested By: RDM Computed By: BF Checked By: JJ

Atterberg Limit Determinations

Data & Computation Sheet **Project:** **Job No.:** P160F

Boring: B-15 **Sample:** 7 **Depth:** I ft IV

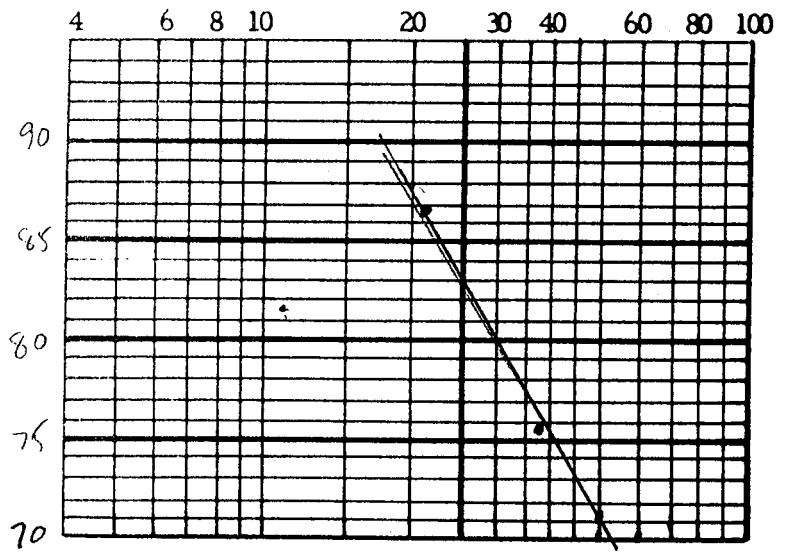
Date of Test: **Material:**

Preparation: **Washed - No. 40:** **Air-dried:** **@ Nat. M. C.:**

Determination of Liquid Limit

	Dish No.:	226	44	69	46	
A	Wt. Wet Sple & Dish	44.1	43.1	46.40	44.3	
B	Wt. Dry Sple & Dish	32.7	32.30	33.30	33.7	
C	Wt. of Dish	17.61	18.71	17.22	18.81	
D	Dry Wt. Sple=B-C	15.09	13.59	16.08	14.89	
E	Wt. Moisture=A-B	11.40	11.8	13.10	10.6	
	% Moisture=100 E/D	75.5	86.8	81.5	71.2	
	Number of Blows:	37	21	11	50	

Blows



Summary:

Liquid Limit = 83 %

Plastic Limit = 40 %

Plas. Index = 43 %

Flow Index = Numerical difference in moisture content for 1 cycle on log plot = %

Toughness Index = P.I./F.I. = %

Determination of Plastic Limit

	Dish No.	B-61	B-42			
A	Wt. Wet Sple & Dish	11.3	11.2			
B	Wt. Dry Sple & Dish	8.7	9.1			
C	Wt. of Dish	3.90	3.87			
D	Dry Wt. Sple=B-C	4.80	5.23			
E	Wt. Moisture=A-B	2.6	2.1			
	Plastic Limit=100 E/D	54.2	40.2			

Tested By: G-Mann **Computed By:** JB **Checked By:** JJ

Atterberg Limit Determinations

Data & Computation Sheet Project: Job No.: P-160F

Boring: B-16 Sample: 3 II Depth: 250'to270'

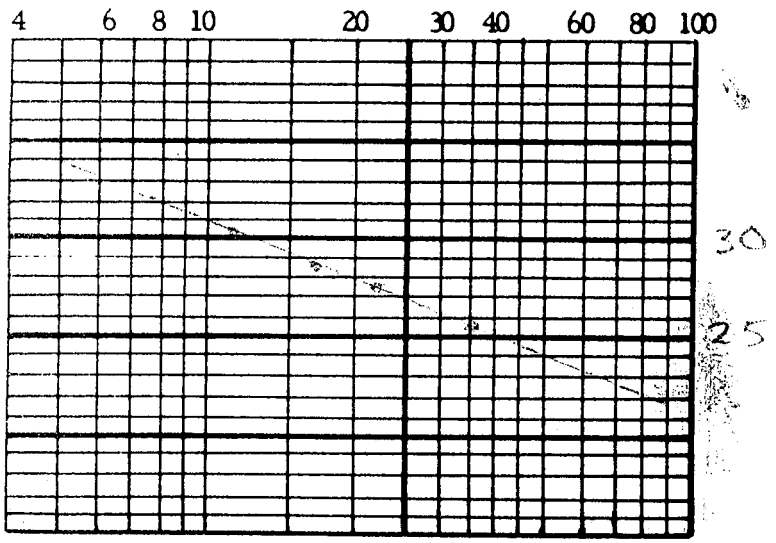
Date of Test: 2[illegible]87 Material:

Preparation: Washed - No. 40: Air-dried: @ Nat. M. C.:

Determination of Liquid Limit

	Dish No.:	134	164	41	[illegible]	
A	Wt. Wet Sple & Dish	41.2	39.1	41.0	40.0	
B	Wt. Dry Sple & Dish	36.3	34.6	36.1	34.8	
C	Wt. of Dish	17.14	18.17	18.73	17.[illegible]	
D	Dry Wt. Sple=B-C	19.16	16.43	17.37	17.29	
E	Wt. Moisture=A-B	4.9	4.5	4.9	5.2	
	% Moisture=100 E/D	25.6	27.4	28.2	30.2	
	Number of Blows:	35	22	17	12	

Blows



Summary:

Liquid Limit = 27 %

Plastic Limit = 19 %

Plas. Index = 8 %

Flow Index = Numerical difference in moisture content for 1 cycle on log plot = ____ %

Toughness Index = P.I./F.I. = ____ %

Determination of Plastic Limit

	Dish No.	B-2	B-46			
A	Wt. Wet Sple & Dish	16.4	15.5			
B	Wt. Dry Sple & Dish	14.3	13.7			
C	Wt. of Dish	3.90	3.90			
D	Dry Wt. Sple=B-C	10.4	9.8			
E	Wt. Moisture=A-B	2.1	1.8			
	Plastic Limit=100 E/D	20.2	18.4			

Tested By: M.R.B. Computed By: [illegible] Checked By: [illegible]

Atterberg Limit Determinations

Data & Computation Sheet Project: Job No.: P-160F

Boring: B-16 Sample: 4 Depth: 30.0'-32.0'

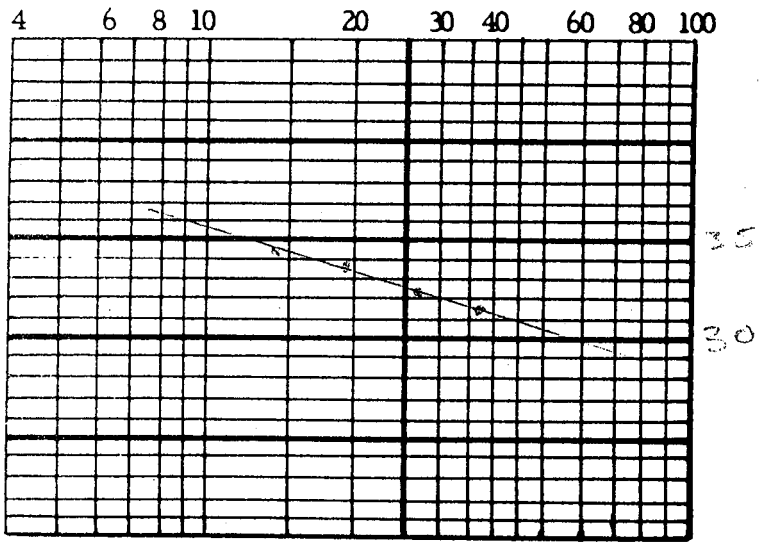
Date of Test: 28 Jan 87 Material:

Preparation: Washed - No. 40: Air-dried: @ Nat. M. C.:

Determination of Liquid Limit

	Dish No.:	213	121	108	67	
A	Wt. Wet Sple & Dish	41.2	46.4	48.2	50.9	
B	Wt. Dry Sple & Dish	35.5	38.7	40.7	42.3	
C	Wt. of Dish	17.37	14.68	18.51	17.18	
D	Dry Wt. Sple=B-C	18.13	24.02	22.19	25.12	
E	Wt. Moisture=A-B	5.7	7.7	7.5	8.6	
	% Moisture=100 E/D	31.4	32.1	33.8	34.2	
	Number of Blows:	37	27	19	14	

Blows



Summary:

Liquid Limit = 33 % (interpolated)

Plastic Limit = 22 % (interpolated)

Plas. Index = 11 % (interpolated)

Flow Index = Numerical difference in moisture content for 1 cycle on log plot = %

Toughness Index = P.I./F.I. = %

Determination of Plastic Limit

	Dish No.	B 51	A 11			
A	Wt. Wet Sple & Dish	18.4	18.6			
B	Wt. Dry Sple & Dish	15.7	16.0			
C	Wt. of Dish	3.84	4.09			
D	Dry Wt. Sple=B-C	11.86	11.91			
E	Wt. Moisture=A-B	2.7	2.60			
	Plastic Limit=100 E/D	22.8	21.8			

Tested By: Koym Computed By: Koym Checked By: JJ

Atterberg Limit Determinations

Data & Computation Sheet Project: Job No.: P-160F

Boring: B-16 Sample: 5 III (lower ½) Depth: 38.0'-40.0'

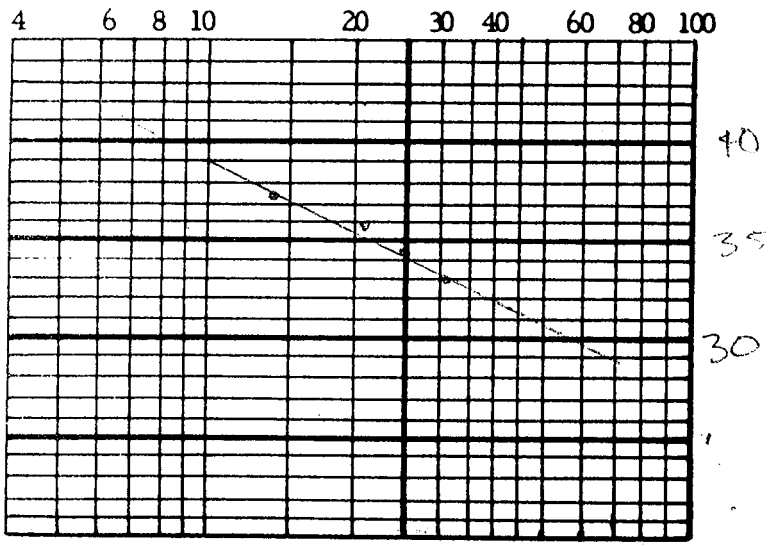
Date of Test: 4/28/89 Material:

Preparation: Washed - No. 40: Air-dried: @ Nat. M. C.:

Determination of Liquid Limit

	Dish No.:	151	98	90	89	
A	Wt. Wet Sple & Dish	48.7	49.8	52.7	51.1	
B	Wt. Dry Sple & Dish	41.1	41.5	43.7	42.3	
C	Wt. of Dish	18.04	17.44	18.62	18.67	
D	Dry Wt. Sple=B-C	23.06	24.06	25.08	23.63	
E	Wt. Moisture=A-B	7.6	8.3	9.0	8.8	
	% Moisture=100 E/D	33.0	34.5	35.9	37.2	
	Number of Blows:	31	25	21	14	

Blows



Summary:

Liquid Limit = 34 %

Plastic Limit = 21 %

Plas. Index = 13 %

Flow Index = Numerical difference in moisture content for 1 cycle on log plot = ____ %

Toughness Index = P.I./F.I. = ____ %

Determination of Plastic Limit

	Dish No.	B-16	B-49			
A	Wt. Wet Sple & Dish	14.5	13.7			
B	Wt. Dry Sple & Dish	12.7	11.8			
C	Wt. of Dish	3.88	3.12			
D	Dry Wt. Sple=B-C	8.82	8.68			
E	Wt. Moisture=A-B	1.8	1.9			
	Plastic Limit=100 E/D	20.4	21.9			

Tested By: JS Computed By: Rogm Checked By: JJ

L-14

Atterberg Limit Determinations

Data & Computation Sheet Project: Job No.: P-160F

Boring: B-16 Sample: 6 Depth: 41.0'-43.0'

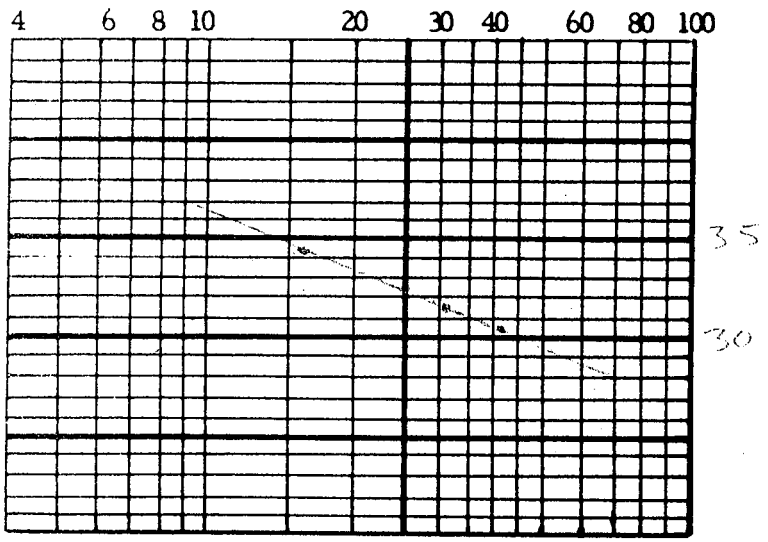
Date of Test: 28 Jun 89 Material:

Preparation: Washed - No. 40: Air-dried: @ Nat. M. C.:

Determination of Liquid Limit

	Dish No.:	109	184	172	94	
A	Wt. Wet Sple & Dish	55.6	56.3	50.3	56.3	
B	Wt. Dry Sple & Dish	46.9	47.1	47.1	46.4	
C	Wt. of Dish	18.26	17.88	18.07	17.48	
D	Dry Wt. Sple=B-C	28.64	29.22	29.03	28.92	
E	Wt. Moisture=A-B	8.7	9.2	7.9	9.9	
	% Moisture=100 E/D	30.4	31.5	32.5	34.2	
	Number of Blows:	42	31	25	16	

Blows



Summary:

Liquid Limit = 32 %

Plastic Limit = 23 %

Plas. Index = 9 %

Flow Index = Numerical difference in moisture content for 1 cycle on log plot = ____ %

Toughness Index = P.I./F.I. = ____ %

Determination of Plastic Limit

	Dish No.	B43	B15			
A	Wt. Wet Sple & Dish	19.4	17.8			
B	Wt. Dry Sple & Dish	16.4	15.1			
C	Wt. of Dish	3.84	3.18			
D	Dry Wt. Sple=B-C	12.56	11.92			
E	Wt. Moisture=A-B	3.0	2.7			
	Plastic Limit=100 E/D	23.9	22.7			

Tested By: Roger Computed By: Roger Checked By: JT

Atterberg Limit Determinations

Data & Computation Sheet Project: Job No.: P-160F

Boring: B-16 Sample: 7 VI Depth: 45.0' - 47.0'

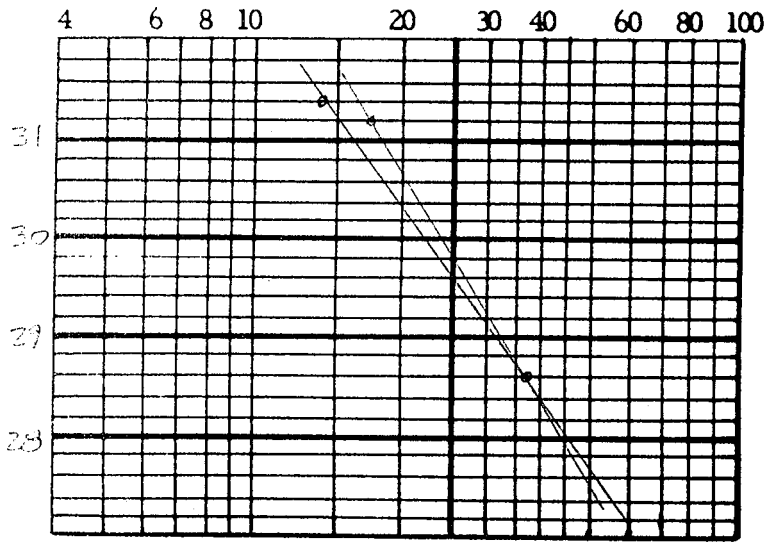
Date of Test: 6-21-89 Material:

Preparation: Washed - No. 40: Air-dried: @ Nat. M. C.:

Determination of Liquid Limit

	Dish No.:	106	56	187		
A	Wt. Wet Sple & Dish	48.1	48.6	47.7		
B	Wt. Dry Sple & Dish	41.4	41.3	40.5		
C	Wt. of Dish	17.96	17.41	17.58		
D	Dry Wt. Sple=B-C	23.44	23.39	22.92		
E	Wt. Moisture=A-B	6.70	7.30	7.20		
	% Moisture=100 E/D	28.6	31.2	31.4		
	Number of Blows:	36	17	13		

Blows



Summary:

Liquid Limit = 30 ~ %

Plastic Limit = 21 ~ %

Plas. Index = 9 ~ %

Flow Index = Numerical difference in moisture content for 1 cycle on log plot = %

Toughness Index = P.I./F.I. = %

Determination of Plastic Limit

	Dish No.	B63	B49			
A	Wt. Wet Sple & Dish	16.7	15.20			
B	Wt. Dry Sple & Dish	14.4	13.10			
C	Wt. of Dish	3.82	3.12			
D	Dry Wt. Sple=B-C	10.58	9.98			
E	Wt. Moisture=A-B	2.30	2.10			
	Plastic Limit=100 E/D	21.7	21.0			

Tested By: Roger Computed By: BF Checked By: JJ

Atterberg Limit Determinations

Data & Computation Sheet Project: Job No.: P-160 F

Boring: B-16 Sample: 8 IV Depth: 48.0' to 50.0'

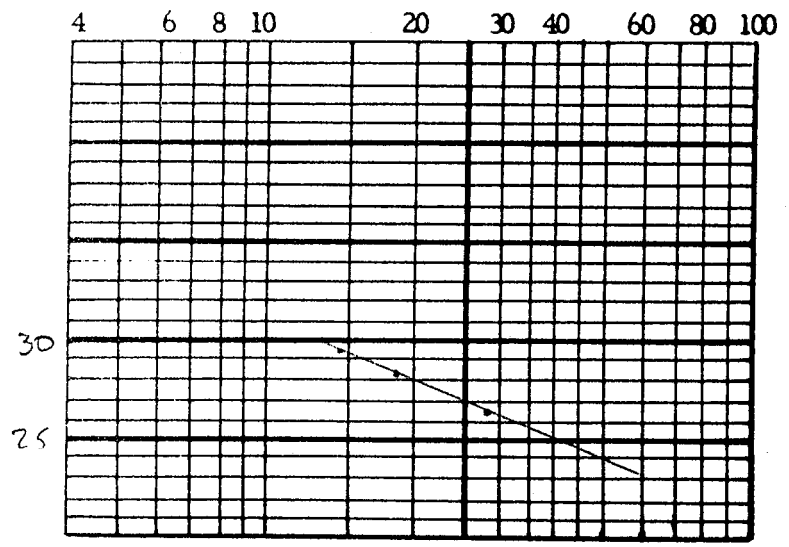
Date of Test: Material:

Preparation: Washed - No. 40: Air-dried: @ Nat. M. C.:

Determination of Liquid Limit

	Dish No.:	199	200	105		
A	Wt. Wet Sple & Dish	57.10	51.02	46.18		
B	Wt. Dry Sple & Dish	48.79	43.80	39.14		
C	Wt. of Dish	17.48	18.18	15.13		
D	Dry Wt. Sple=B-C	31.31	25.62	24.01		
E	Wt. Moisture=A-B	8.31	7.22	7.04		
	% Moisture=100 E/D	26.5	28.2	29.3		
	Number of Blows:	28	18	14		

Blows



Summary:

Liquid Limit = 27 %

Plastic Limit = 21 %

Plas. Index = 6 %

Flow Index = Numerical difference in moisture content for 1 cycle on log plot = ____ %

Toughness Index = P.I./F.I. = ____ %

Determination of Plastic Limit

	Dish No.	A-7	B39			
A	Wt. Wet Sple & Dish	18.82	14.79			
B	Wt. Dry Sple & Dish	16.29	12.81			
C	Wt. of Dish	3.97	3.15			
D	Dry Wt. Sple=B-C	12.32	9.66			
E	Wt. Moisture=A-B	2.53	1.98			
	Plastic Limit=100 E/D	20.5	20.5			

Tested By: Roy Computed By: JJ Checked By:

Atterberg Limit Determinations

Data & Computation Sheet Project: Job No.: P-160 F

Boring: B-16 Sample: 9 Depth: I & III

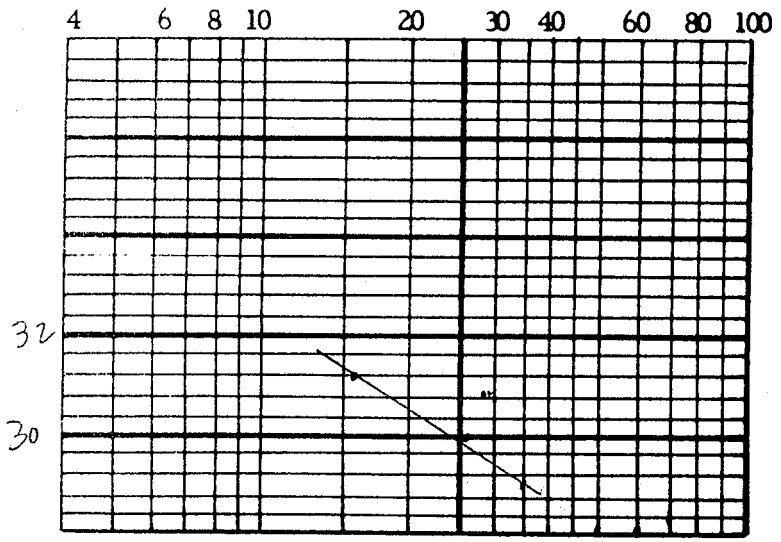
Date of Test: Material:

Preparation: Washed - No. 40: Air-dried: @ Nat. M. C.:

Determination of Liquid Limit

	Dish No.:	42	124	150	200	
A	Wt. Wet Sple & Dish	46.3	45.7	44.4	49.3	
B	Wt. Dry Sple & Dish	39.9	39.1	38.2	42.3	
C	Wt. of Dish	18.55	17.92	18.12	18.18	
D	Dry Wt. Sple=B-C	21.35	21.18	20.08	24.12	
E	Wt. Moisture=A-B	6.40	6.6	6.2	7.0	
	% Moisture=100 E/D	30.0	31.2	30.9	29.0	
	Number of Blows:	21	16	28	35	

Blows



Summary:

Liquid Limit = 30 %

Plastic Limit = 24 %

Plas. Index = 6 %

Flow Index = Numerical difference in moisture content for 1 cycle on log plot = ____ %

Toughness Index = P.I./F.I. = ____ %

Determination of Plastic Limit

	Dish No.	B-6	B-21			
A	Wt. Wet Sple & Dish	17.3	18.2			
B	Wt. Dry Sple & Dish	14.16	15.4			
C	Wt. of Dish	3.28	3.62			
D	Dry Wt. Sple=B-C	11.32	11.78			
E	Wt. Moisture=A-B	2.7	2.8			
	Plastic Limit=100 E/D	23.9	23.8			

Tested By: TH Computed By: JB Checked By: JT

Atterberg Limit Determinations

Data & Computation Sheet Project: Job No.: P-160F

Boring: B-16 Sample: 10 Depth: I & IV

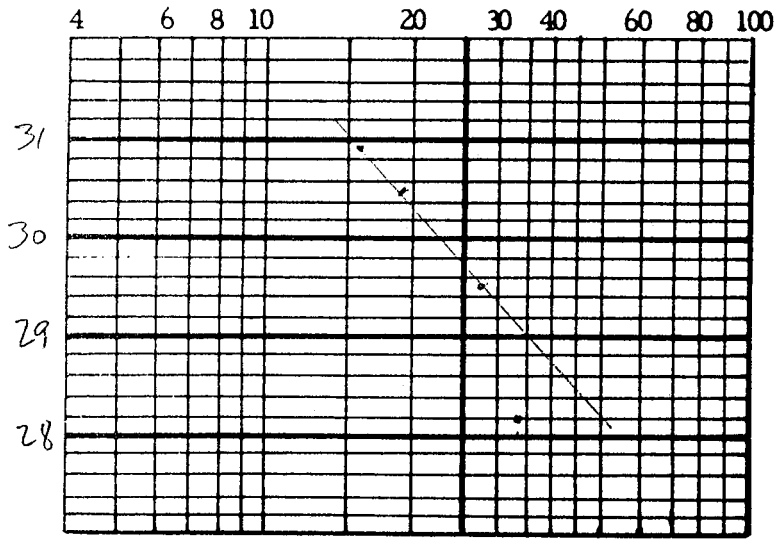
Date of Test: Material:

Preparation: Washed - No. 40: Air-dried: @ Nat. M. C.:

Determination of Liquid Limit

	Dish No.:	143	50	178	100	
A	Wt. Wet Sple & Dish	50.3	46.3	44.5	50.2	
B	Wt. Dry Sple & Dish	43.2	39.7	38.2	42.4	
C	Wt. of Dish	18.01	17.33	17.55	17.13	
D	Dry Wt. Sple=B-C	25.19	22.37	20.65	25.27	
E	Wt. Moisture=A-B	7.1	6.6	6.3	7.8	
	% Moisture=100 E/D	28.2	29.5	30.5	30.9	
	Number of Blows:	33	27	19	16	

Blows



Summary:

Liquid Limit = 30 %

Plastic Limit = 20 %

Plas. Index = 10 %

Flow Index = Numerical difference in moisture content for 1 cycle on log plot = ____ %

Toughness Index = P.I./F.I. = ____ %

Determination of Plastic Limit

	Dish No.	B-18	B-58			
A	Wt. Wet Sple & Dish	13.0	11.7			
B	Wt. Dry Sple & Dish	11.4	10.4			
C	Wt. of Dish	3.87	3.72			
D	Dry Wt. Sple=B-C	7.53	6.68			
E	Wt. Moisture=A-B	1.6	1.3			
	Plastic Limit=100 E/D	21.2	19.5			

Tested By: G. Mann Computed By: JB Checked By: JJ

FIELD AND LABORATORY RELATIVE DENSITY COMPUTATION SHEET

Project: Job: P-160 F Date: 6/6-20/89

Boring:		B-15		B-15		B-15		B-15		B-15	
Sample:		1		2		3		4		5	
Depth:		33.6'-35.6'		41.6'-43.6'		44.6'-46.6		48.6'-50.6'		51.6'-53.6'	
Description:											
		in.	cm.	in.	cm.	in.	cm.	in.	cm.	in.	cm.
Tube Measurements	Tube Length	29.75		29.75		29.75		29.75		29.75	
	Top Empty	7.32		6.25		6.50		6.18		6.38	
	Bot. Empty	0.95		1.00		1.00		0.76		1.00	
	Sple. Length	21.48		22.50		22.25		22.81		22.47	
DIAMETER		2.87		2.87		2.87		2.87		2.87	
AREA		6.469 in^2		6.469 in^2		6.469 in^2		6.469 in^2		6.469 in^2	
Wet Wt. Soil + TUBE		6476 * ~~7476~~ gms.		7003		7007		7104		7017	
WEIGHT OF TUBE		2528 gms.		2356		2400		2437		2353	
Weight of Soil		3948 ~~4948~~		4647		4607		4667		4664	
UNIT WET WEIGHT-Pcf		108.2 ~~135.7~~		121.6		121.9		120.5		122.2	
Moisture Content - % (AVERAGE)		I, II 38.5		27.3		26.9		I, II, III 30.4		I, II, III, IV 28.2	
Sample Volume - cm3		2277.04		2385.17		2358.67		2418.03		2382.07	
Unit Dry Wt. - pcf		~~98.0~~ 78.2 **		95.5		96.1		92.4		95.3	
Maximum - pcf	Wt. Sple. + Tare										
	Wt. of Tare										
	Wt. Sple.										
	Sple. Volume										
	Max. Density										
Minimum - pcf	Wt. Sple. + Tare										
	Wt. of Tare										
	Wt. Sple.										
	Sple. Volume										
	Min. Density	*									
Relative Density - %											

POSSIBLE 1000 gram WEIGHING ERROR - IF SO UNIT DRY WEIGHT ** WOULD BE 78.2 PCF

FIELD AND LABORATORY RELATIVE DENSITY COMPUTATION SHEET

Project: Job: P-160 F Date: 6/6-20/89

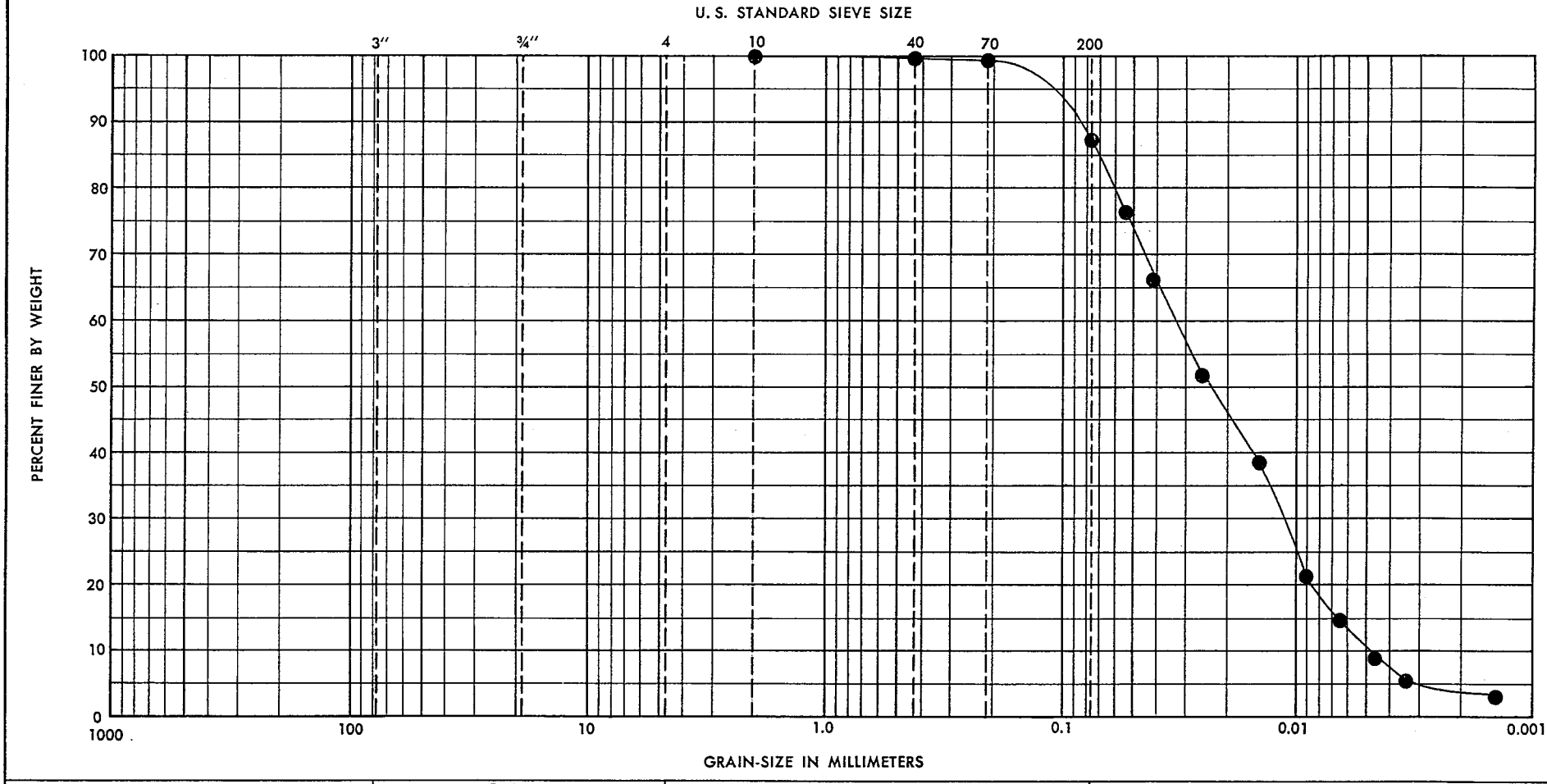
Boring:		B-15		B-15				B-16		B-16	
Sample:		6		7				1		3	
Depth:		53.6'-55.6'		56.6'-58.6'				10.0'-12.0'		25.0'-27.0'	
Description:											
Tube Measurements		in.	cm.	in.	cm.	in.	cm.	in.	cm.	in.	cm.
	Tube Length	29.75		29.75				29.75		29.75	
	Top Empty	6.33		6.50				9.25		8.95	
	Bot. Empty	0.70		0.75				1.50		0.65	
	Sple. Length	22.72		22.50				19.00		20.15	
DIAMETER		2.87		2.87				2.87		2.87	
AREA		6.469 in^2		6.469 in^2				6.469 in^2		6.469 in^2	
Wet Wt. Soil + TUBE		6926		6489				4727		6564	
WEIGHT OF TUBE		2437		2499				2444		2363	
Weight of Soil		4489		3990				2283		4201	
UNIT WET WEIGHT-Pcf		116.4		104.4				70.8		122.8	
Moisture Content - % (AVERAGE)		36.4		45.8				14.4		19.7	
Sample Volume — cm^3		2408.49		2385.17				2014.14		2136.05	
Unit Dry Wt. - pcf		85.3		71.6				61.9		102.6	
Maximum - pcf	Wt. Sple. + Tare										
	Wt. of Tare										
	Wt. Sple.										
	Sple. Volume										
	Max. Density										
Minimum - pcf	Wt. Sple. + Tare										
	Wt. of Tare										
	Wt. Sple.										
	Sple. Volume										
	Min. Density										
Relative Density - %											

FIELD AND LABORATORY RELATIVE DENSITY COMPUTATION SHEET

Project: Job: P-160 F Date: 6/6-20/89

Boring:		B-16		B-16		B-16		B-16		B-16	
Sample:		5		7		8		9		10	
Depth:		38.0'-40.0'		45.0'-47.0'		48.0'-50.0'		50.0'-52.0'		53.0'-55.0'	
Description:											
		in.	cm.	in.	cm.	in.	cm.	in.	cm.	in.	cm.
Tube Measurements	Tube Length	29.75		29.75		29.75		29.75		29.75	
	Top Empty	10.75		6.06		5.88		5.75		6.00	
	Bot. Empty	1.13		0.77		0.62		0.75		2.00	
	Sple. Length	17.87		22.92		23.25		23.25		21.75	
DIAMETER		2.87		2.87		2.87		2.87		2.87	
AREA		6.469 IN^2		6.469 IN^2		6.469 IN^2		6.469 IN^2		6.469 IN^2	
Wet Wt. Soil + TUBE		6123		7134		7259		7348		6997	
WEIGHT OF TUBE		2390		2363		2397		2534		2519	
Weight of Soil		3733		4771		4862		4814		4478	
UNIT WET WEIGHT - Pcf		123.0		122.6		123.1		121.9		121.3	
Moisture Content - % (AVERAGE)		30.0		I, II, III 28.0		I, II, III 27.4		25.1		23.8	
Sample Volume - CM^3		1894.35		2429.69		2464.76		2464.67		2305.66	
Unit Dry Wt. - pcf		94.6		95.8		96.6		97.5		97.9	
Maximum - pcf	Wt. Sple. + Tare										
	Wt. of Tare										
	Wt. Sple.										
	Sple. Volume										
	Max. Density										
Minimum - pcf	Wt. Sple. + Tare										
	Wt. of Tare										
	Wt. Sple.										
	Sple. Volume										
	Min. Density										
Relative Density - %											

GRADATION CURVES



COBBLES	GRAVEL		SAND			SILT—CLAY
	Coarse	Fine	Coarse	Medium	Fine	

Sample	Depth	IDENTIFICATION	LL	PL
1	33.6'-35.6'	Gray silt, little fine sand, trace medium sand, trace clay.	non-plastic	

KANAWHA RIVER LANDFILL

CEDAR GROVE, W. VA.

BORING: B-15

PLATE

T-1

LONG

HYDROMETER ANALYSIS

Project: _____ Job: P-160F Date: _____

Boring: B-15 Sample: 1 Depth: 33.6' to 35.6'

Material: _____

Dispersing Agent: _____ cc of _____

Soaking Beaker P Graduate _____ Hydrometer _____

SAMPLE WEIGHT DETERMINATION

Beaker + Sample : 101.1 gm

Beaker : 46.9 gm

Wet Weight Test Sample: _____ gm

Dry Weight: $W_s = \frac{\text{Wet Wt}}{1 + MC} =$ 54.2 gm

Specific Gravity: $G_s =$ EST 2.7

$\frac{100}{W_s} \times \frac{G_s}{G_s - 1} =$ 2.93 $\times H_c = P_F$

MOISTURE CONTENT OF SAMPLE

Sample + Dish--Wet: _____ gm

Sample + Dish--Dry: _____ gm

Dish No: _____ : _____ gm

Dry Soil : _____ gm

Water : _____ gm

Moisture Content : _____ %

Tare + Wet Wt Prep Sple: _____ gm

Tare: _____ : _____ gm

Wet Wt Prep Sple : _____ gm

Dry Wt Prep Sple : _____ gm

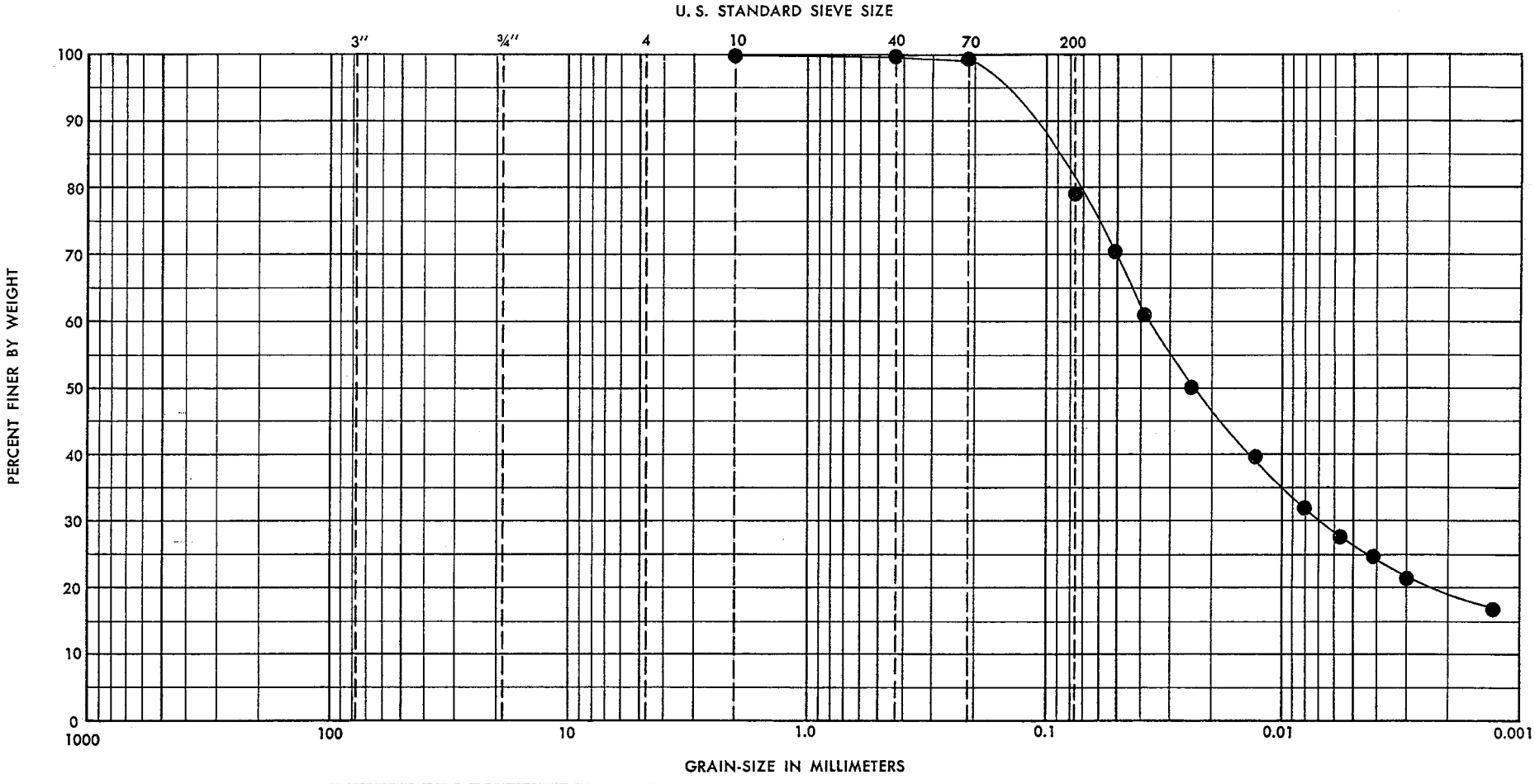
1715

Time--	Elapsed Time-- Minutes	Temperature-- °C	Hydrometer Reading @ top miniscus-- R'	True Hydrometer Reading	Diameter in mm	Temperature-- Density Correction-- Td	Corrected Hydrometer Reading-- $H_c = R' + Td$	(87.4) Per cent Finer P_F
7:56¼	0							
	½	23.5	28.0	28.5	.054	-2.9	26.1	76.5
	1	✓	25.5	26.0	.041	|	22.6	66.2
	3	✓	20.5	21.0	.025	|	17.6	51.6
	10	✓	15.5	16.0	.015	|	13.1	38.4
	30	✓	10.1	10.6	.0090	|	7.2	21.1
	60	✓	8.0	8.5	.0063	|	5.1	14.9
	120	23.0	6.0	6.5	.0046	-3.0	3.0	8.8
	~~250~~ 257	22.5	5.0	5.5	.0033	-3.1	~~2.9~~ 1.9	~~8.5~~ 5.6
	1440	21.8	4.1	4.6	.0014	-3.2	0.9	2.6

87.4 − 100 = 74.7 SILT CLAY

Tested By: JH BF Computed By: JO Checked By: JS

GRADATION CURVES



COBBLES	GRAVEL		SAND			SILT—CLAY
	Coarse	Fine	Coarse	Medium	Fine	

Sample	Depth	IDENTIFICATION	LL	PL
4IV	48.6'-50.6'	Gray mottled with brown silty clay, some fine sand, trace medium sand.	39	22

KANAWHA RIVER LANDFILL

CEDAR GROVE, W. VA.

BORING: B-15

PLATE

LONG -10 mm?

HYDROMETER ANALYSIS

Project: _____ Job: P-160F Date: 6/13 - 15/89

Boring: B-15 Sample: 4 Depth: 48.6' to 50.6'

Material: _____

Dispersing Agent: _____ cc of _____

Soaking Beaker X Graduate _____ Hydrometer _____

SAMPLE WEIGHT DETERMINATION

Beaker + Sample : 105.86 gm

Beaker : 45.86 gm

Wet Weight Test Sample: — gm

Dry Weight: $W_s = \frac{\text{Wet Wt}}{1 + MC} =$ 60.0 gm

Specific Gravity: $G_s =$ Est. 2.70

$\frac{100}{W_s} \times \frac{G_s}{G_s - 1} =$ 2.65 $\times H_c = P_F$ (1.588)

MOISTURE CONTENT OF SAMPLE

Sample + Dish--Wet: _____ gm

Sample + Dish--Dry: _____ gm

Dish No: _____ : _____ gm

Dry Soil : _____ gm

Water : _____ gm

Moisture Content : _____ %

Tare + Wet Wt Prep Sple: _____ gm

Tare: _____ : _____ gm

Wet Wt Prep Sple : _____ gm

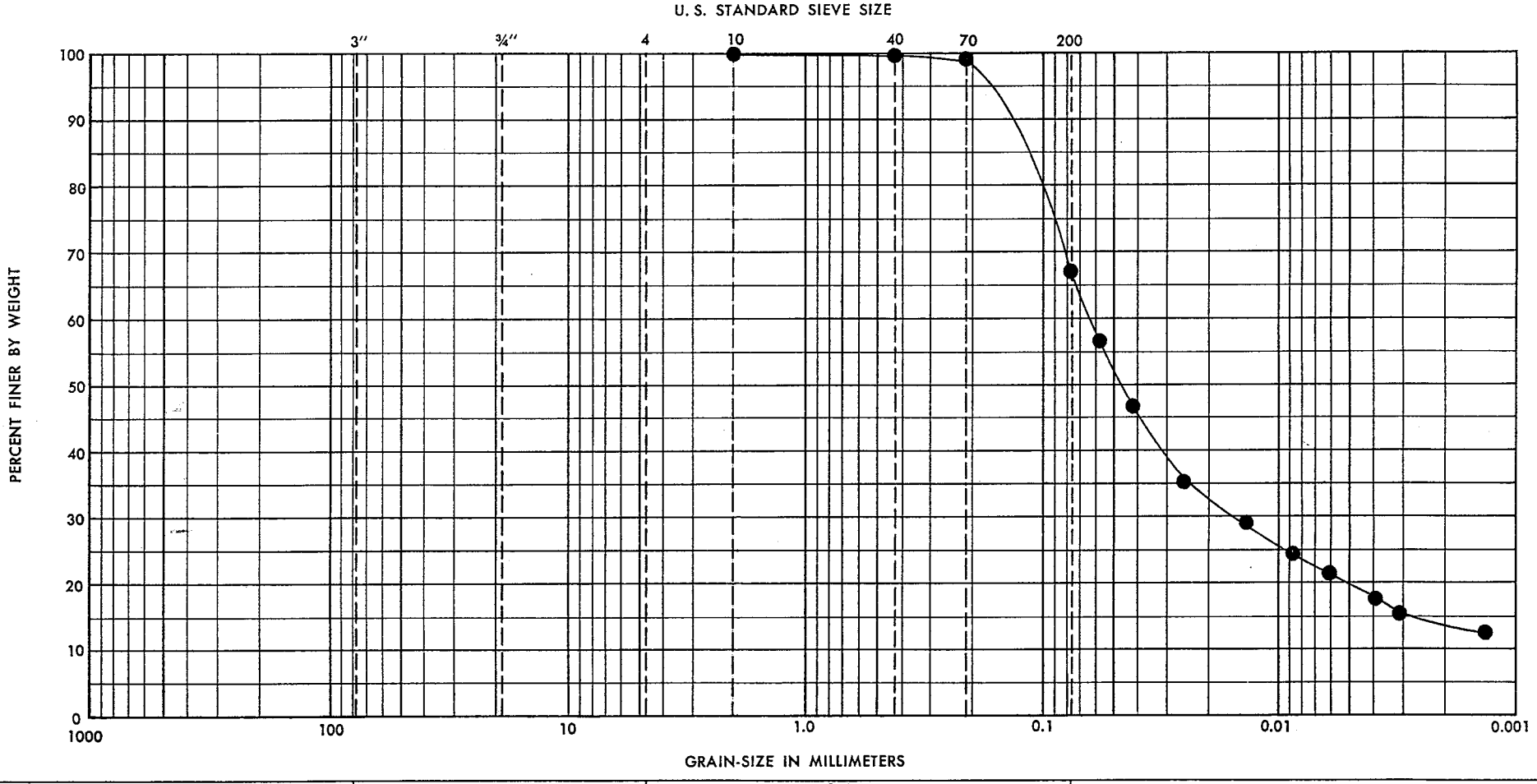
Dry Wt Prep Sple : _____ gm

040

Time--	Elapsed Time-- Minutes	Temperature-- °C	Hydrometer Reading @ top miniscus-- R'	True Hydrometer Reading	Diameter in mm	Temperature-- Density Correction-- Td	Corrected Hydrometer Reading-- Hc = R' + Td	(78.8) Per cent Finer P_F
8:05	0							
	½	24.9	30.1	30.6	.0515	-3.5	26.6	70.4
	1	✓	26.6	27.1	.0385	✓	23.1	61.1
	3	✓	22.3	22.8	.0240	✓	18.8	49.8
	10	✓	18.5	19.0	.0135	✓	15.0	39.7
	30	✓	15.5	16.0	.0082	✓	12.0	31.8
	~~60~~ 67	24.5	14.0	14.5	.0055	-3.6	10.4	27.5
	120	24.0	13.2	13.7	.0042	-3.7	9.5	25.1
	250	✓	11.8	12.3	.0030	✓	8.1	21.4
	1440	22.2	10.6	11.1	.0013	-4.1	6.5	17.2

Tested By: BF Computed By: JJ Checked By: _____

GRADATION CURVES



COBBLES	GRAVEL		SAND			SILT—CLAY
	Coarse	Fine	Coarse	Medium	Fine	

Sample	Depth	IDENTIFICATION	LL	PL
5II	51.6'-53.6'	Gray clayey silt inter-bedded with silt and silty clay, some fine sand, trace medium sand.	28	19

KANAWHA RIVER LANDFILL

CEDAR GROVE, W. VA.

BORING: B-15

PLATE

LONG

HYDROMETER ANALYSIS

Project: _____ Job: P-160F Date: _____

Boring: B-15 Sample: 5 Depth: 51.6' to 53.6'

Material: _____

Dispersing Agent: _____ cc of _____

Soaking Beaker _____ Graduate _____ Hydrometer _____

SAMPLE WEIGHT DETERMINATION

Beaker + Sample : 104.85 gm

Beaker : 46.98 gm

Wet Weight Test Sample: ——— gm

Dry Weight: $W_s = \frac{\text{Wet Wt}}{1 + MC} =$ 57.87 ✓ gm

Specific Gravity: $G_s =$ EST. 2.70

$\frac{100}{W_s} \times \frac{G_s}{G_s - 1} =$ 2.74 $\times H_c = P_F$ (1.588 ✗)

MOISTURE CONTENT OF SAMPLE

Sample + Dish--Wet: _____ gm

Sample + Dish--Dry: 1381.30 gm

Dish No: S-1 : 126.28 gm

Dry Soil : 1255.02 gm

Water : _____ gm

Moisture Content : _____ %

Tare + Wet Wt Prep Sple: _____ gm

Tare: _____ : _____ gm

Wet Wt Prep Sple : _____ gm

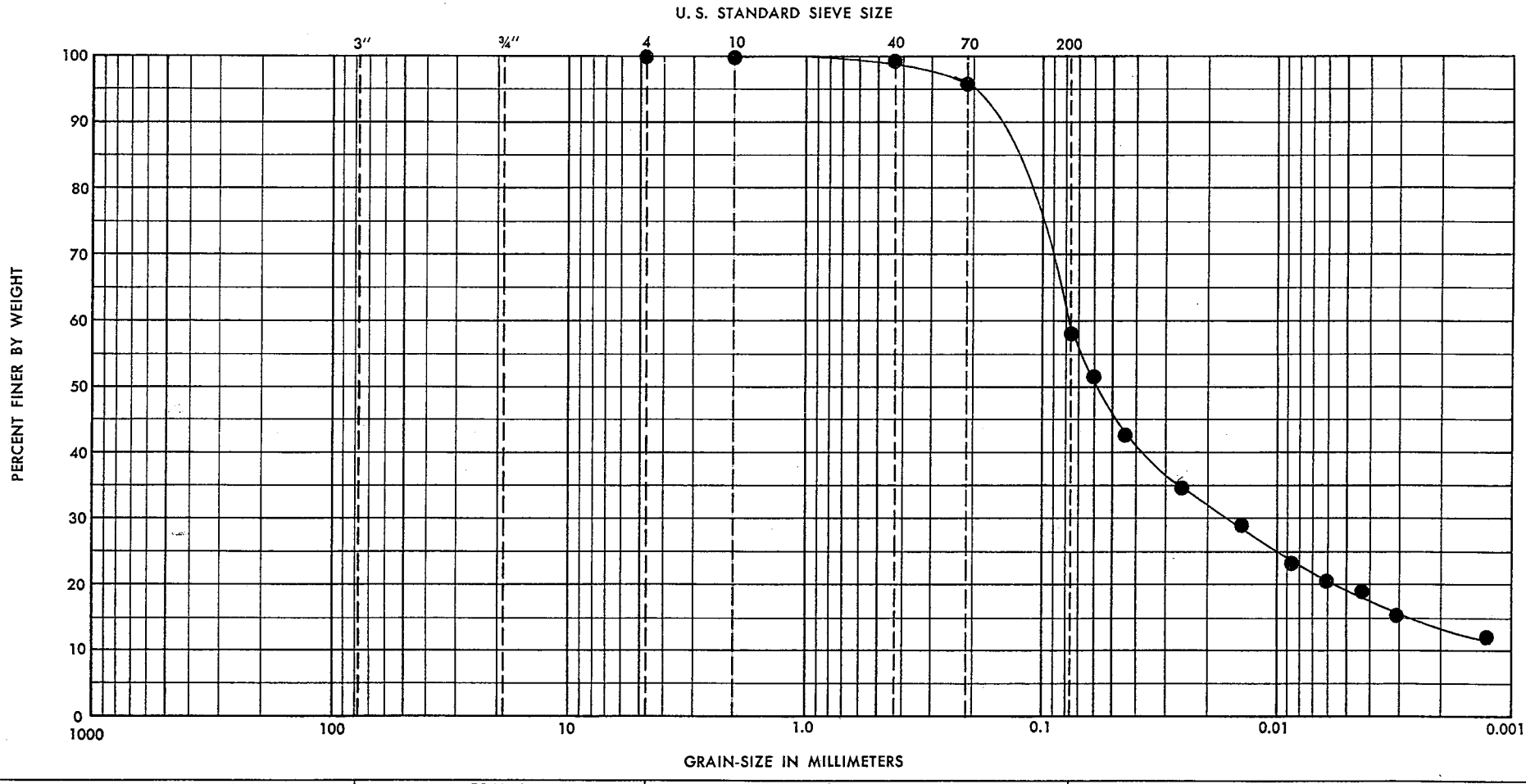
Dry Wt Prep Sple : _____ gm

040

Time--	Elapsed Time-- Minutes	Temperature-- °C	Hydrometer Reading @ top miniscus-- R'	True Hydrometer Reading	Diameter in mm	Temperature-- Density Correction-- Td	Corrected Hydrometer Reading-- $H_c = R' + Td$	Per cent Finer P_F (67.2)
7:40	0							
	½	24.5	23.5	24.0	.0 570	-3.6	19.9	54.6
	1	✓	20.5	21.0	.0 420	✓	16.9	46.4
	3	✓	16.5	17.0	.0 255	✓	12.9	35.4
	10	✓	14.2	14.7	.0 140	✓	10.6	29.1
	30	24.0	12.6	13.1	.00 85	-3.7	8.9	24.4
	60	✓	11.5	12.0	.00 60	✓	7.8	21.4
	~~120~~ 150	23.0	10.4	10.9	.00 39	-3.9	6.5	17.8
	250	22.3	9.8	10.3	.00 31	-4.1	5.7	15.6
	1440	23.0	8.5	9.0	.00 13	-3.9	4.6	12.6

Tested By: BF Computed By: JJ Checked By: _____

GRADATION CURVES



COBBLES	GRAVEL		SAND			SILT—CLAY
	Coarse	Fine	Coarse	Medium	Fine	

Sample	Depth	IDENTIFICATION	LL	PL
3II	25.0'-27.0'	Brown clayey silt, "and" fine sand, trace medium to coarse sand, trace fine gravel.	27	19

KANAWHA RIVER LANDFILL

CEDAR GROVE, W. VA.

BORING: B-16

PLATE

LONG

HYDROMETER ANALYSIS

Project: _____ Job: P-160 F Date: 7/11-12/89

Boring: B-16 Sample: 3 II Depth: 26.0'-27.0'

Material: _____

Dispersing Agent: _____ cc of _____

Soaking Beaker _____ Graduate _____ Hydrometer _____

SAMPLE WEIGHT DETERMINATION

Beaker + Sample : 97.30 gm

Beaker 5 : 46.88 gm

Wet Weight Test Sample: _____ gm

Dry Weight: $W_s = \frac{\text{Wet Wt}}{1 + MC} =$ 50.42 gm

Specific Gravity: $G_s =$ 2.76

$\frac{99.7}{100} \times \frac{G_s \; 1.568}{G_s - 1} =$ 3.14 $\times H_c = P_F$

W_s

MOISTURE CONTENT OF SAMPLE

Sample + Dish--Wet: _____ gm

Sample + Dish--Dry: _____ gm

Dish No: _____ : _____ gm

Dry Soil : _____ gm

Water : _____ gm

Moisture Content : _____ %

Tare + Wet Wt Prep Sple: _____ gm

Tare : _____ gm

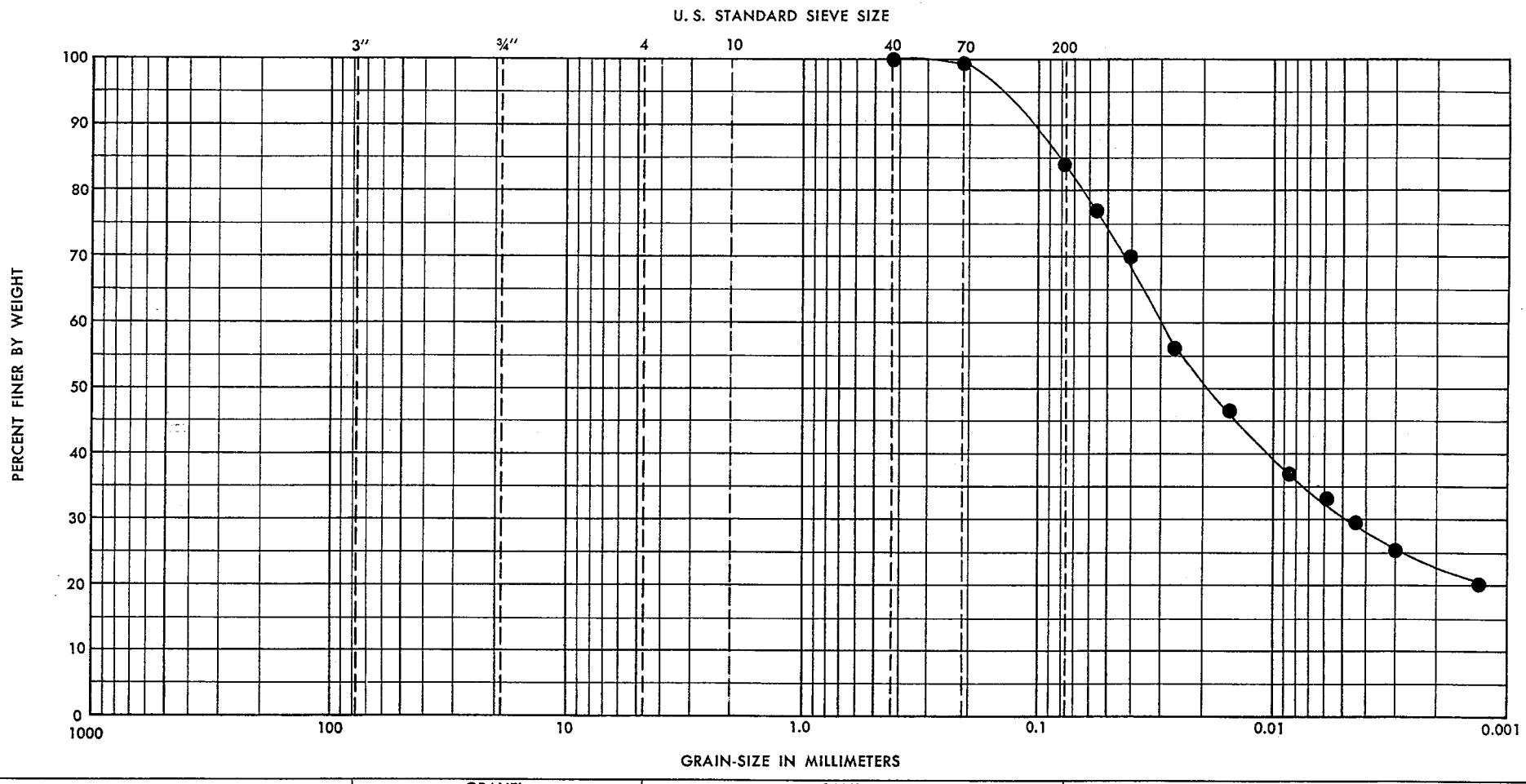
Wet Wt Prep Sple : _____ gm

Dry Wt Prep Sple : _____ gm

Time--	Elapsed Time-- Minutes	Temperature-- °C	Hydrometer Reading @ top miniscus-- R'	True Hydrometer Reading	Diameter in mm	Temperature-- Density Correction-- Td	Corrected Hydrometer Reading-- $H_c = R' + Td$	Per cent Finer P_F (58.0)
8:46	0							
46½	½	23.0	20.4	20.9	.0600	-4.0	16.4	51.5
47	1	✓	17.6	18.1	.0440	✓	13.6	42.7
49	3	✓	15.0	15.5	.0260	✓	11.0	34.5
	10	✓	13.2	13.7	.0145	✓	9.2	28.9
	30	22.9	11.3	11.8	.0088	✓	7.3	22.9
	60		10.6	11.1	.0061	✓	6.6	20.7
	120	22.5	10.0	10.5	.0043	✓	6.0	18.8
1:30	250	22.5	9.0	9.5	.0031	✓	5.0	15.7
	1440	22.5	7.8	7.8	.0013	✓	3.8	11.9

Tested By: JDJ Computed By: JJ Checked By: _____

GRADATION CURVES



COBBLES	GRAVEL		SAND			SILT—CLAY
	Coarse	Fine	Coarse	Medium	Fine	

Sample	Depth	IDENTIFICATION	LL	PL
7IV	45.0'-47.0'	Brown mottled with gray clayey silt, little fine sand.	30	21

KANAWHA RIVER LANDFILL

CEDAR GROVE, W. VA.

BORING: B-16

PLATE

T-477 LONG

HYDROMETER ANALYSIS

Project: _____ Job: P-160 F Date: _____

Boring: B-16 Sample: 7 III Depth: 45.0'-47.0'

Material: _____

Dispersing Agent: _____ cc of _____

Soaking Beaker _____ Graduate _____ Hydrometer _____

SAMPLE WEIGHT DETERMINATION

Beaker + Sample : _____ gm

Beaker : 46.89 gm

Wet Weight Test Sample: 53.4 gm

Dry Weight: $W_s = \frac{\text{Wet Wt}}{1 + MC}$ = _____ gm

Specific Gravity: G_s = EST. 2.70

$\frac{100}{W_s} \times \frac{G_s}{G_s - 1}$ = 2.97 x H_c = P_F

MOISTURE CONTENT OF SAMPLE

Sample + Dish--Wet: _____ gm

Sample + Dish--Dry: _____ gm

Dish No: _____ : _____ gm

Dry Soil : _____ gm

Water : _____ gm

Moisture Content : _____ %

Tare + Wet Wt Prep Sple: _____ gm

Tare: _____ : _____ gm

Wet Wt Prep Sple : _____ gm

Dry Wt Prep Sple : _____ gm

040

Time--	Elapsed Time-- Minutes	Temperature-- °C	Hydrometer Reading @ top miniscus-- R'	True Hydrometer Reading	Diameter in mm	Temperature-- Density Correction-- Td	Corrected Hydrometer Reading-- $H_c = R' + Td$	Per cent Finer P_F
7:55	0							
	½	23.5	27.0	29.5	.054	-2.9	26.1	77.5
	1	✓	26.5	27.0	.040	-2.9	23.6	70.1
	3	✓	22.0	22.5	.024	-2.9	19.1	56.7
	10	✓	18.7	19.2	.014	-2.9	15.8	46.9
	30	✓	15.5	16.0	.0084	-2.9	12.6	37.4
	60	✓	14.0	14.5	.0059	-2.9	11.1	33.0
	120	23.0	12.9	13.4	.0043	-2.9	10.0	29.7
	~~250~~ 257	✓	11.5	12.0	.0030	-2.9	8.6	25.5
	1440	21.8	10.0	10.5	.0013	-3.2	6.8	20.2

Tested By: TF Computed By: JB Checked By: JJ

SIEVE ANALYSIS

Project: _____ Job: P-160 F Date: _____

Boring: B-16 Sample: 7 IV Depth: 45.0'-47.0'

Material: _____

Sieve No.	Grain Dia. Microns	Wt. Re-tained	% Re-tained	% Passing
2"	50,800			
1½"	38,100			
1"	25,400			
3/4"	19,100			
½"	12,700			
3/8"	9,520			
#4	4,760			
#8	2,380			
#10	2,000			
#16	1,190			
#20	840			
#30	590			
#40	420	–	–	100%
#50	297			
#60	250			
#70	210	0.01	.1	99.9
#100	149			
#200	74	8.7	16.3	83.6
PAN	--	1.8		

Moisture Content

Sample + Tare--Wet: _____ gm

Sample + Tare--Dry: 563.0 gm

Tare No. T-477 : 173.9 gm

Dry Sample : _____ gm

Water : _____ gm

Moisture Content : _____ %

No +10 Before Wash

Oven Dry Spl. + Tare: _____ gm

Tare No. _____ : _____ gm

Oven Dry Sample : _____ gm

After Wash

Oven Dry Spl. + Tare: _____ gm

Tare No. _____ : _____ gm

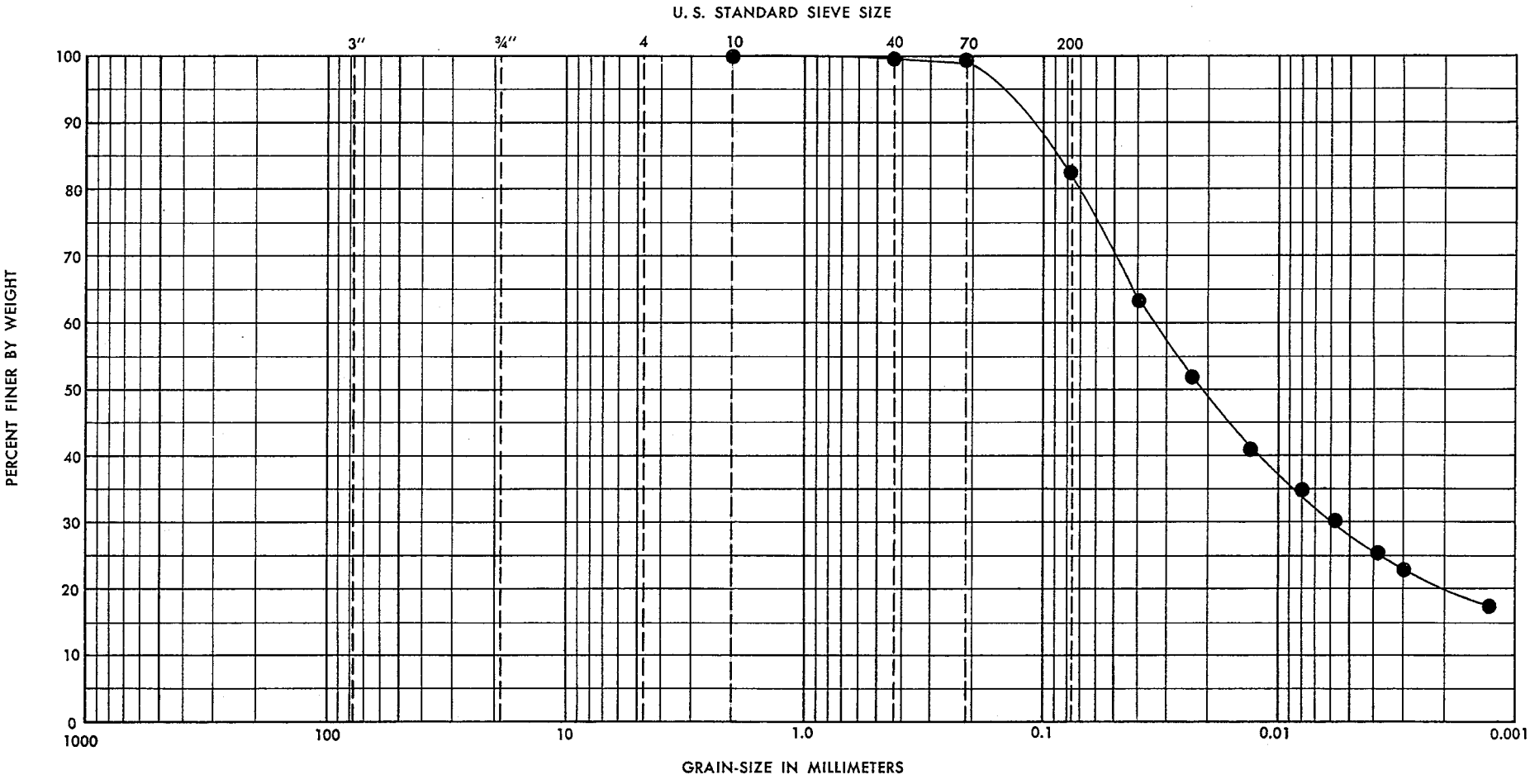
Oven Dry Sample : _____ gm

Maximum Size: +200 X-10

Remarks: _____

Tested By: _____ Computed By: JB Checked By: _____

GRADATION CURVES



COBBLES	GRAVEL		SAND			SILT—CLAY
	Coarse	Fine	Coarse	Medium	Fine	

Sample	Depth	IDENTIFICATION	LL	PL
SIV	48.0'to50.0'	Brown mottled with gray clayey silt, little fine sand, trace medium sand.	27	21

KANAWHA RIVER LANDFILL

CEDAR GROVE, W. VA.

BORING: B-16

PLATE

long

HYDROMETER ANALYSIS

Project: _____ Job: P-160F Date: _____

Boring: B-16 Sample: 8 Depth: 48.0'-50.0'

Material: _____

Dispersing Agent: _____ cc of _____

Soaking Beaker _____ Graduate _____ Hydrometer _____

SAMPLE WEIGHT DETERMINATION

Beaker + Sample : 106.99 ✓ gm

Beaker J : 46.94 ✓ gm

Wet Weight Test Sample: ✓ gm

Dry Weight: $W_s = \frac{\text{Wet Wt}}{1 + MC} =$ 60.05 ✓ gm

Specific Gravity: $G_s =$ EST. 2.70

$\frac{100}{W_s} \times \frac{G_s}{G_s - 1} =$ 2.64 $\times H_c = P_F$ (1.588 ✗)

1415

MOISTURE CONTENT OF SAMPLE

Sample + Dish--Wet: _____ gm

Sample + Dish--Dry: 488.08 gm

Dish No: P-1 : 124.48 gm

Dry Soil : _____ gm

Water : _____ gm

Moisture Content : _____ %

Tare + Wet Wt Prep Sple: _____ gm

Tare: _____ : _____ gm

Wet Wt Prep Sple : _____ gm

Dry Wt Prep Sple : _____ gm

Time--	Elapsed Time-- Minutes	Temperature-- °C	Hydrometer Reading @ top miniscus-- R'	True Hydrometer Reading	Diameter in mm	Temperature-- Density Correction-- Td	Corrected Hydrometer Reading-- $H_c = R' + Td$	(82.4) Per cent Finer P_F
7:41¼	0							
	½	25.0	29.0	29.5	.0530	-3.5	25.5	67.3
	1	✓	27.5	28.0	.0380	✓	24.0	63.4
	3	✓	23.2	23.7	.0233	✓	19.7	52.0
	10	24.8	19.0	19.5	.0136	✓	15.5	40.9
	30	✓	16.8	17.3	.0080	✓	13.3	35.1
	60	24.0	15.2	15.7	.0059	-3.7	11.5	30.4
	~~120~~ 150	23.5	13.5	14.0	.0038	-3.8	9.7	25.6
	250	22.5	12.7	13.2	.0030	-4.0	8.7	23.0
	1440	23.0	10.7	11.2	.0013	✓	6.7	17.7

Tested By: BF Computed By: JJ Checked By: _____

SIEVE ANALYSIS

Project: _____ Job: P-160 F Date: _____

Boring: B-16 Sample: 8 Depth: 48.0' to 50.0'

Material: _____

Sieve No.	Grain Dia. Microns	Wt. Retained	% Retained	% Passing
2"	50,800			
1½"	38,100			
1"	25,400			
3/4"	19,100			
½"	12,700			
3/8"	9,520			
#4	4,760			
#8	2,380			
#10	2,000	—	—	100
#16	1,190			
#20	840			
#30	590			
#40	420	.10	0.2	99.8
#50	297			
#60	250			
#70	210	.10	0.2	99.6
#100	149			
#200	74	10.30	17.2	82.4
PAN	--			

L-12

361.44
60.05

WASH

LTFSA
17.4

Moisture Content

Sample + Tare--Wet: 587.21 gm

Sample + Tare--Dry: 486.42 gm

Tare No. P-1 : 124.48 gm

Dry Sample : 361.94 gm

Water : 94.79 gm

Moisture Content : 26.2 %

Before Wash

Oven Dry Spl. + Tare: _____ gm

Tare No. #10 #10 : _____ gm

Oven Dry Sample : _____ gm

After Wash

Oven Dry Spl. + Tare: _____ gm

Tare No. _____ : _____ gm

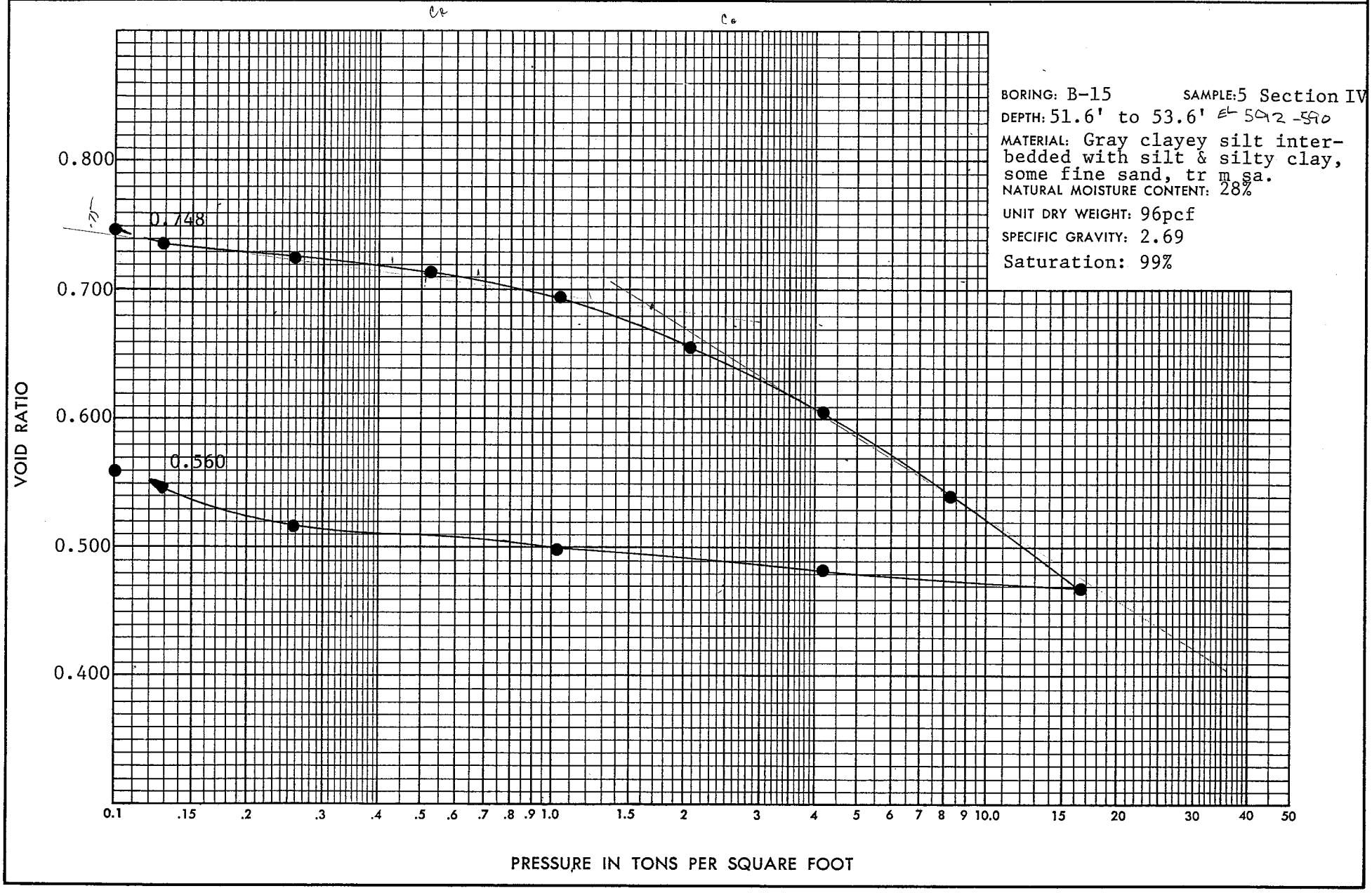
Oven Dry Sample : _____ gm

Maximum Size: _____

Remarks: #200 H-S

Tested By: BF Computed By: BF Checked By: JJ

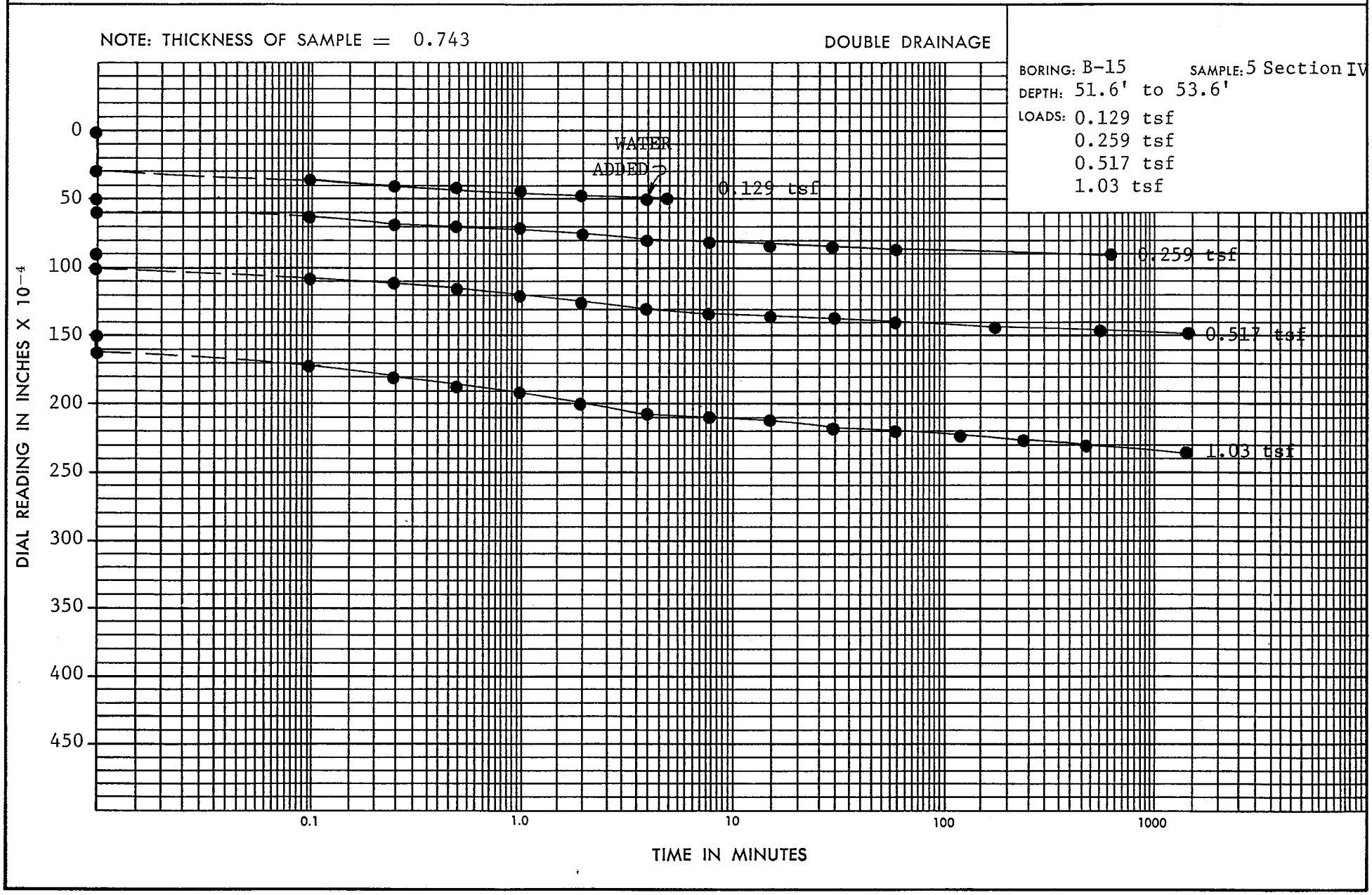
PRESSURE — VOID RATIO CURVE



BORING: B-15 SAMPLE: 5 Section IV
DEPTH: 51.6' to 53.6' EL 592-590
MATERIAL: Gray clayey silt interbedded with silt & silty clay, some fine sand, tr m sa.
NATURAL MOISTURE CONTENT: 28%
UNIT DRY WEIGHT: 96pcf
SPECIFIC GRAVITY: 2.69
Saturation: 99%

PLATE

CONSOLIDATION — TIME CURVES



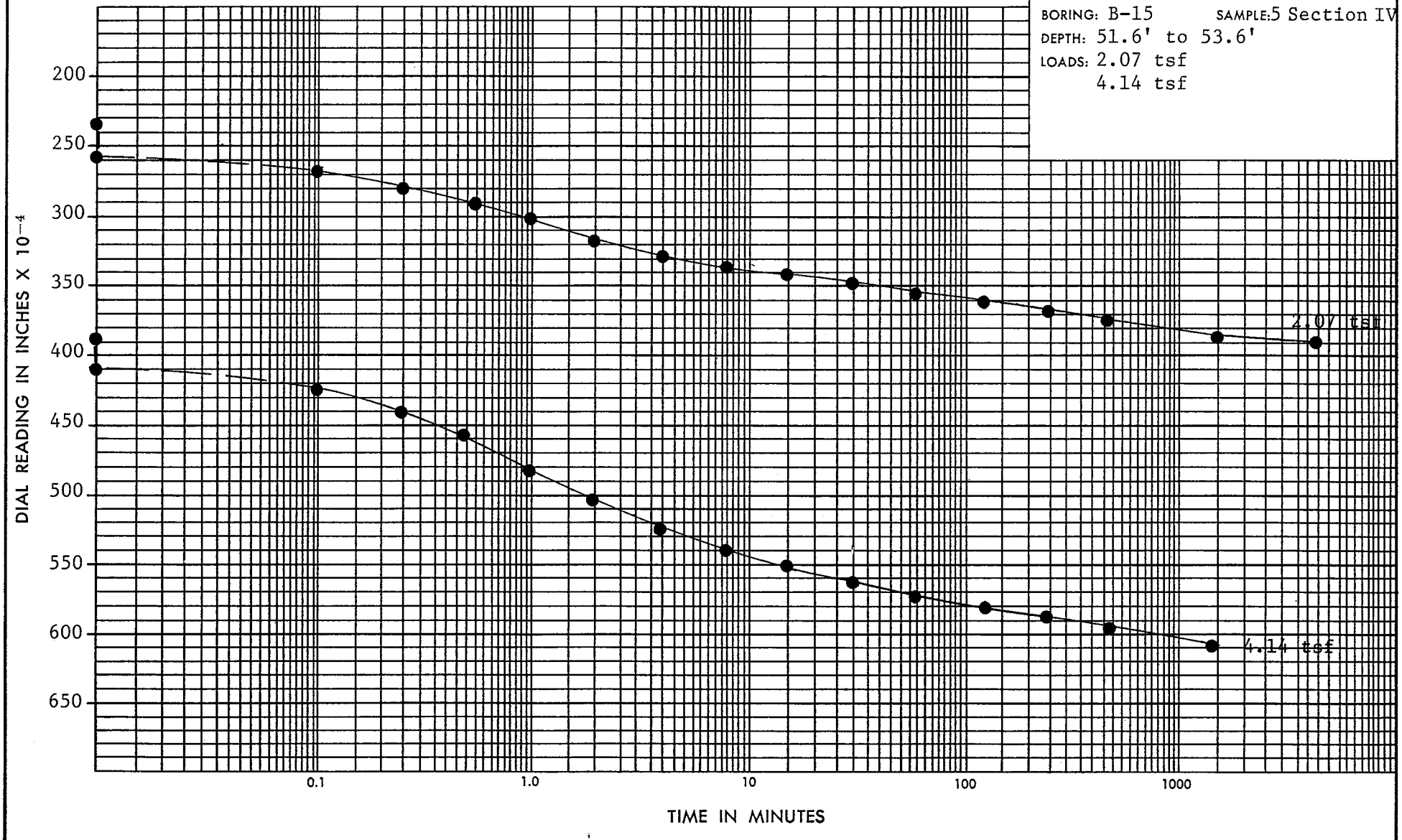
PLATE

CONSOLIDATION — TIME CURVES

NOTE: THICKNESS OF SAMPLE = 0.720"

DOUBLE DRAINAGE

BORING: B-15 SAMPLE: 5 Section IV
DEPTH: 51.6' to 53.6'
LOADS: 2.07 tsf
4.14 tsf



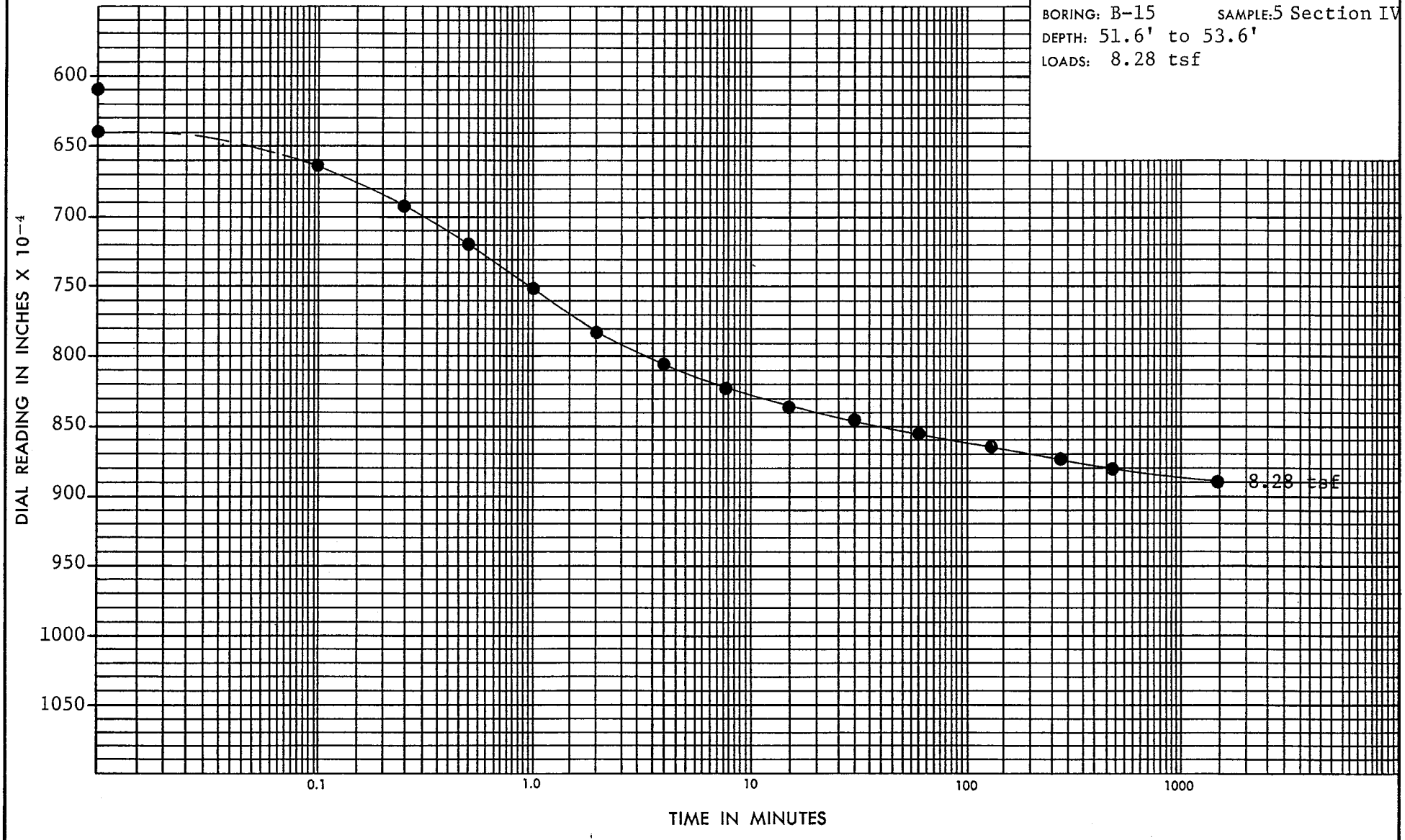
PLATE

CONSOLIDATION — TIME CURVES

NOTE: THICKNESS OF SAMPLE = 0.682"

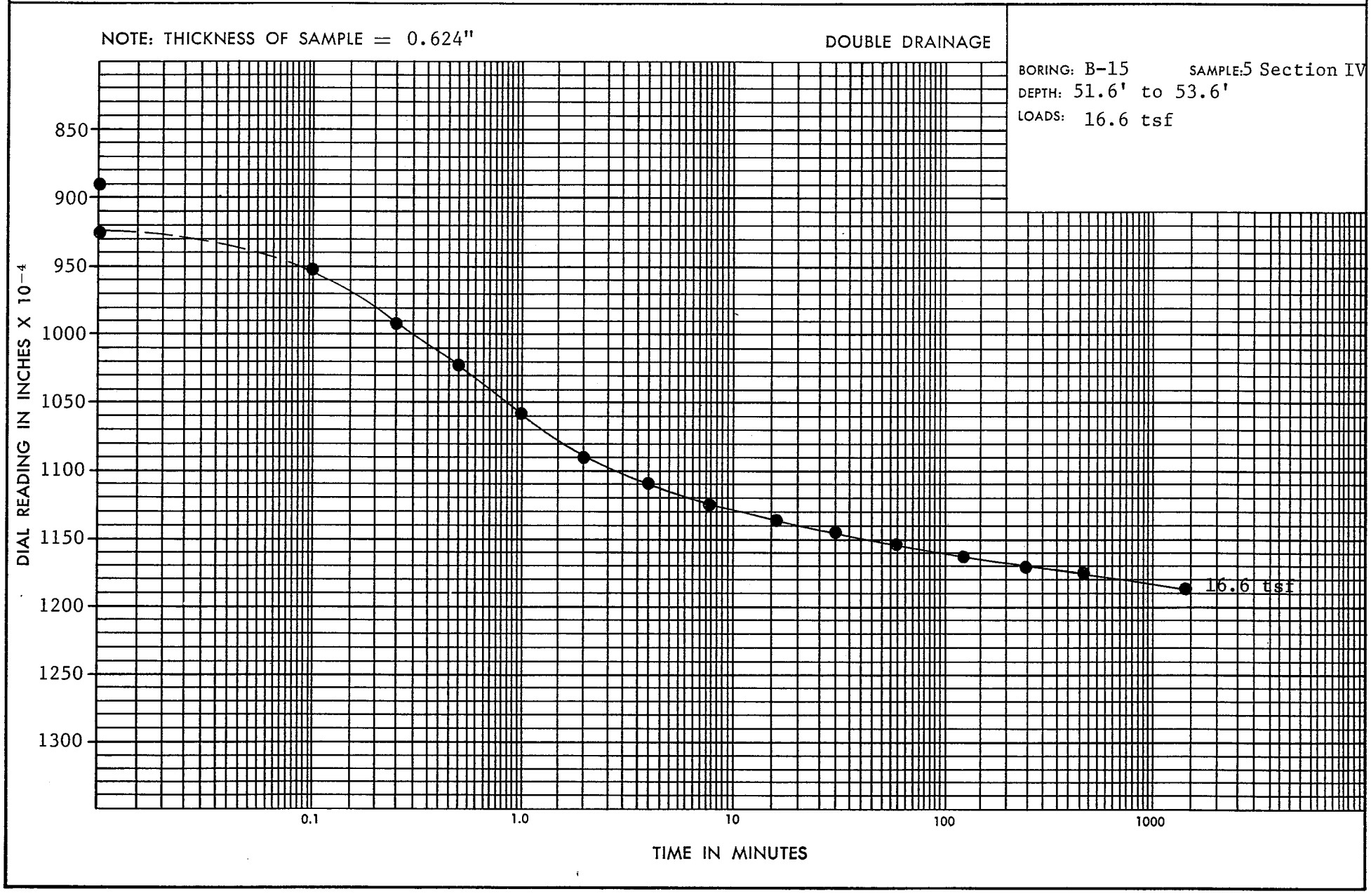
DOUBLE DRAINAGE

BORING: B-15 SAMPLE: 5 Section IV
DEPTH: 51.6' to 53.6'
LOADS: 8.28 tsf



PLATE

CONSOLIDATION — TIME CURVES



PLATE

CONSOLIDATION TEST

Job: P-160 E Boring: B-15 Sample: 5 IV Depth: 51.6 - 53.6

Description:

Ring: B-1 Consol: Date:

Moisture Content		Before Test		After Test		From Trimmings
Wt. Wet Sple.& Ring 480.34 Plates 0.61	A	599.99 g	F	594.40 g	Can No.	E
Wt. Ring & Plates	B	480.95 g	B	480.80 g	Wet+Tare	151.12 g
Wt. Wet Sample	C	A-B= 119.04 g	G	F-B= 113.60 g	Dry+Tare	124.18 g
Wt. Dry Sple. & Pan		x x x x x x x	H	— g	Tare	27.18 g
Wt. Pan No. H-3		x x x x x x x	J	— g	Dry Wt. Soil	97.00 g
Wt. Dry Sple.		x x x x x x x	K	H-J= 93.35 g	Wt. H_2O	26.94 g
Wt. Water	D	C-K= 25.69 g	L	G-K= 20.25 g		
Moisture Content	E	100 D/K= 27.5 %	M	100 L/K= 21.7 %		27.8 %

FORM: L-9

Before Test

N: Specific Gravity = 2.69

Area of Ring = 32.10 cm^2

P: Height of Sample = 1.888 cm | 0.743 in

Q: Volume of Sample = 60.6 cc

R: Vol. Solids = K/N = 34.7 cc

S: Ht. Solids = PR/Q = 1.081 cm | 0.425 in

T: Ht. Voids = P-S = 0.807 cm | 0.318 in

U: Vol. Voids = Q-R = 25.9 cc

Before Test

UDW = 62.43K/Q = 96.2 pcf

UWW = 62.43C/Q = 122.6 pcf

% Saturation=100D/U = 99.2 %

After Test

V: Vol. Voids = R·e = 19.4 cc

W: Vol. Sample = V+R = 54.1 cc

UDW = 62.43 K/W = 107.7 pcf

% Saturation = 100 L/V = 104.4 %

Pressure - Void Ratio Summary

Pressure tsf	Dial Reading Inches	Y Cum. Dial Chg., in.	Height of Voids T-Y, in	Void Ratio $\frac{T-Y}{S}$	Cons. in/in Y/P	W t_{50} min.	C_v, in^2/day 70.9 p^2/W
0.00	.0000	.0000	.3180	0.748			
0.129	.0049	.0049	.3131	0.737			
0.259	.0090	.0090	.3090	0.727			
0.517	.0149	.0149	.3031	0.713			
1.03	.0235	.0235	.2945	0.693			
2.07	.0389	.0389	.2791	0.657			
4.14	.0609	.0609	.2571	0.605			
8.28	.0890	.0890	.2290	0.539			
16.6	.1188	.1188	.1992	0.469			
4.14	.1130	.1130	.2050	0.482			
1.03	.1061	.1061	.2119	0.499			
0.259	.0980	.0980	.2200	0.518			
0.00	.0799	.0799	.2381	0.560			

Computed By: JJ Date: 6/20/89

Checked By: Date:

Job No.: P-160 E Boring: B-15 Sample: 5 SS Depth: 51.6'-53.6' Consol.: _____

DATE	TIME	ELAPSED TIME MIN	DIAL READING INCHES	LOAD
6/6	8:15P	0	.0000	0.129
		INS.	.0030	
		.1	.0035	
		.25	.0039	
		.5	.0041	
		1	.0044	
		2	.0047	
		4	.0050	WATER ADDED
		5	.0049	
6/6	8:20P	0	.0049	0.159
		INS	.0059	
		.1	.0063	
		.25	.0067	
		.5	.0070	
		1	.0072	
		2	.0075	
		4	.0078	
		8	.0081	
		15	.00825	
		30	.0084	
		60	.0086	
6/7	7:00A	640	.0090	
6/7	7:00	0	.0090	0.517
		INS	.0101	
		.1	.0106	
		.25	.0111	
		.5	.0115	
		1	.0120	
		2	.0125	
		4	.0129	
		8	.0132	
		15	.01345	
		30	.0137	
		60	.01395	
		175	.0143	
	4:22	562	.01465	
6/8	7:20	1460	.0149	
6/8	7:20	0	.0149	1.03
		INS	.0163	
		.1	.0173	
		.25	.0180	
		.5	.01865	
		1	.0193	
		2	.0200	
		4	.0206	
		8	.0210	(2)
		15	.0213	
		30	.0217	
		60	.0220	
		120	.0224	
		240	.0227	
		488	.02305	
6/9	7:10	1430	.0235	
6/9	7:10	0	.0235	2.07
		INS	.0257	
		.1	.0268	
		.25	.0281	
		.5	.0292	
		1	.0303	

DATE	TIME	ELAPSED TIME MIN	DIAL READING INCHES	LOAD
		2	.0316	
		4	.0326	
		8	.0335	
		15	.0342	
		30	.0348	
		60	.0355	
		120	.0362	
		240	.0366	
	3:10	480	.03735	
6/10	7:30P	1460	.0385	
6/12	7:00A	4310	.0389	
6/12	7:00	0	.0389	4.14
		INS	.0410	
		.1	.0423	
		.25	.0440	
		.5	.0458	
		1	.0482	
		2	.0504	
		4	.0524	
		8	.0540	
		15	.0551	(3)
		30	.0563	
		60	.0573	
		120	.0581	
		240	.0589	
		480	.0598	
6/13	7:00	1440	.0609	
6/13	7:00	0	.0609	8.23
		INS	.0640	
		.1	.0663	
		.25	.0693	
		.5	.0720	
		1	.0752	
		2	.0782	
		4	.0806	
		8	.0823	(4)
		15	.0835	
		30	.0846	
		60	.0855	
		135	.0865	
		270	.0873	
		480	.0880	
6/14	7:00	1440	.0890	
6/14	7:00	0	.0890	16.6
		INS	.0925	
		.1	.0952	
		.25	.0992	
		.5	.1022	
		1	.1058	
		2	.1090	
		4	.1110	
		8	.11245	(5)
		16	.1136	
		30	.1144	
		60	.1153	
		120	.1160	
		240	.1170	
	3:00	480	.1176	
6/15	7:00	1440	.1188	

DATE	TIME	ELAPSED TIME MIN	DIAL READING INCHES	LOAD
6/15	7:00	0	.1188	4.14
	8:30		.1130	
	10:00		.1130	
6/15	10:00	0	.1130	1.03
	11:05		.1064	
	2:00		.1061	
6/15	2:00	0	.1061	0.259
	6:30P		.0980	
6/15	6:30P	0	.0980	0.00
6/16	7:40A		.0799	

681.50
24.2°

E

151.12

Dry
134.18

SPECIFIC GRAVITY DETERMINATION

Steps:

1. Weigh flask partly filled with distilled water.
2. Add dry soil and weigh again; difference in weights = weight of soil added (W_s)
3. After soaking period, evacuate for 15 minutes, then add distilled water to calibration line.
4. Weigh flask, soil and H_2O (W_{bws}) (Record temperature)
5. Determine from calibration chart, weight of flask and H_2O for temperature recorded (W_{bw})
6. Specific gravity = $\frac{W_s}{W_s + W_{bw} - W_{bws}}$

Job. No P-160E Date 6/13/89

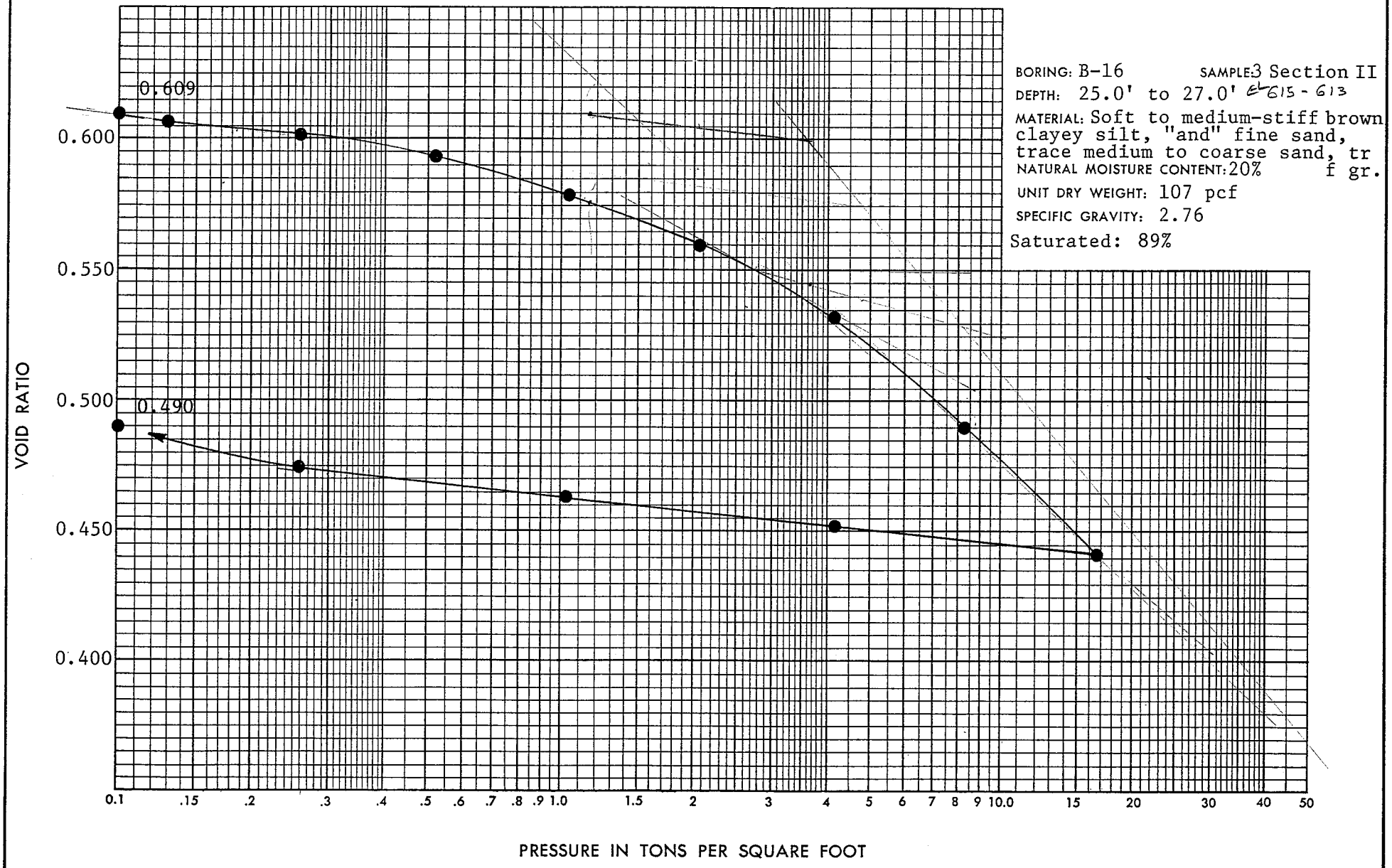
Boring: B-15 Sample: 5 IV Depth: 51.6'-53.6'

Material:			
Flask No.	2		
A: Flask + H_2O + Soil	594.25		
B: Flask + H_2O	535.08		
C: W_s = A - B	59.17		
Temp. °C	25.0°		
D: W_{bw} (from chart)	681.60		
E: (C+D) = $W_{bw}+W_s$	740.77		
F: W_{bws}	718.74		
G = (E - F) = $W_s + W_{bw} - W_{bws}$	22.03		
Specific Gravity = $\frac{C}{G}$	2.69		

Tested By: JJ Computed By: JJ Checked By: _____

Form: L-15

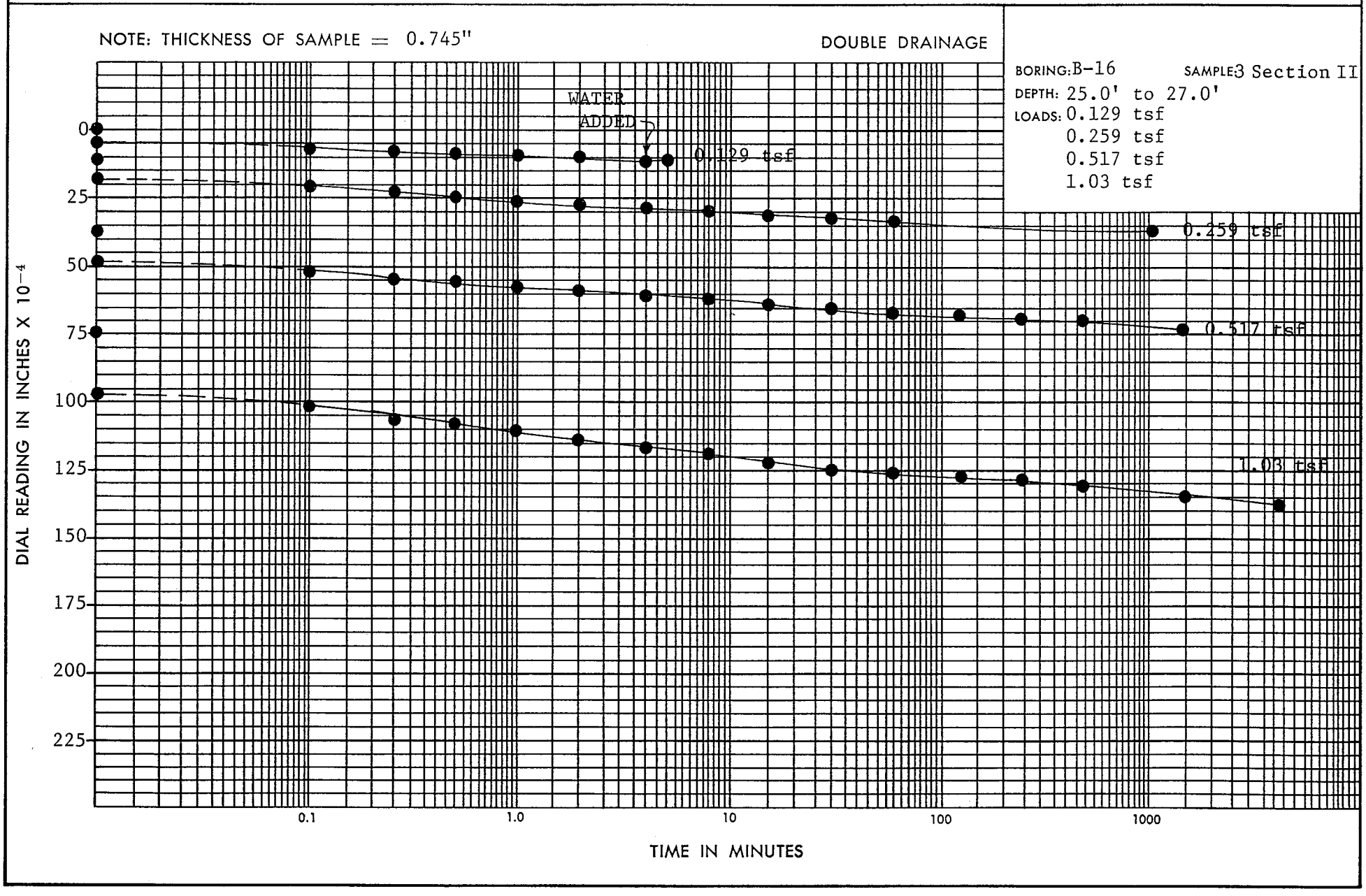
PRESSURE — VOID RATIO CURVE



BORING: B-16 SAMPLE: 3 Section II
DEPTH: 25.0' to 27.0' El 615 - 613
MATERIAL: Soft to medium-stiff brown clayey silt, "and" fine sand, trace medium to coarse sand, tr f gr.
NATURAL MOISTURE CONTENT: 20%
UNIT DRY WEIGHT: 107 pcf
SPECIFIC GRAVITY: 2.76
Saturated: 89%

PLATE

CONSOLIDATION — TIME CURVES



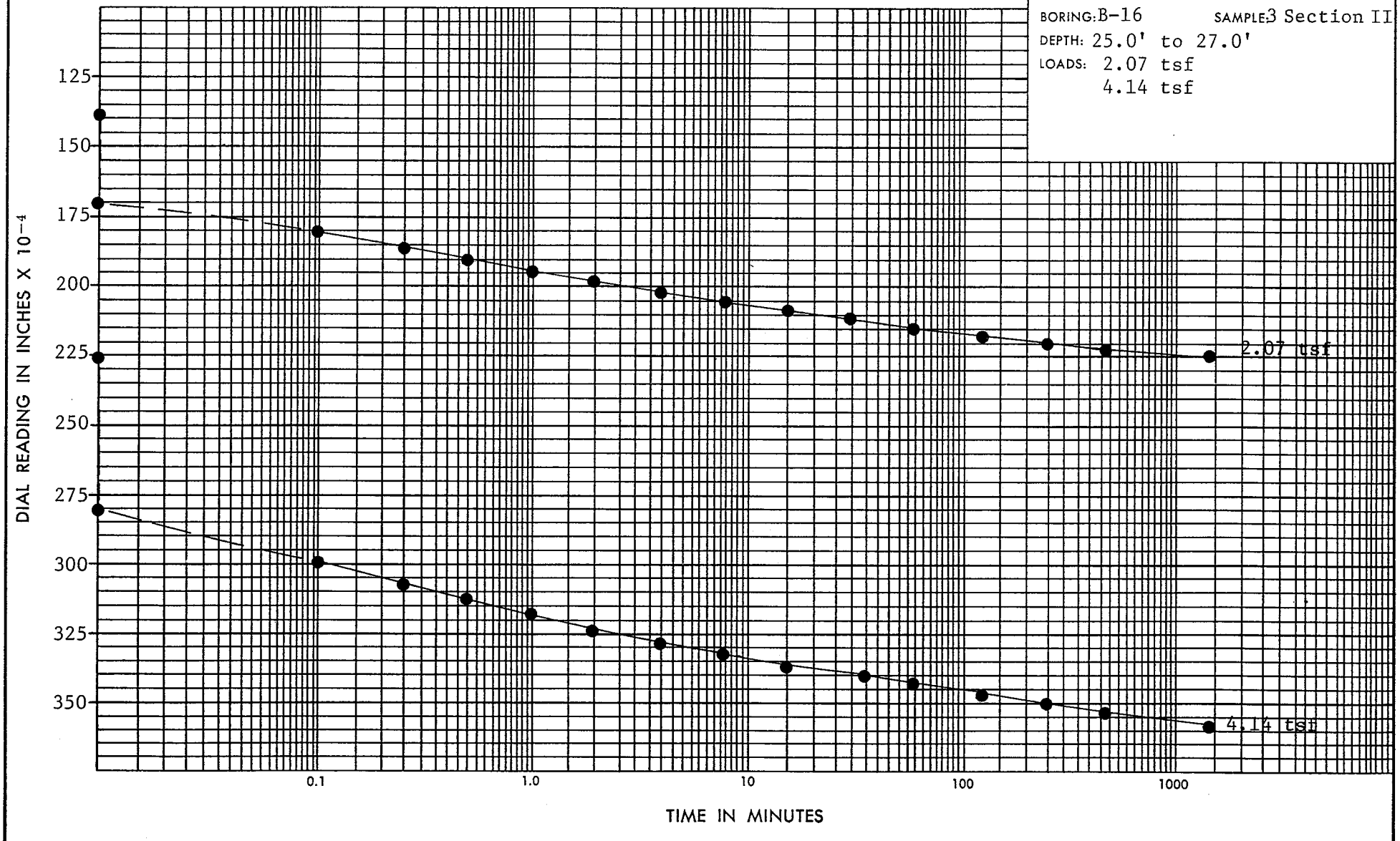
PLATE

CONSOLIDATION — TIME CURVES

NOTE: THICKNESS OF SAMPLE = 0.731"

DOUBLE DRAINAGE

BORING: B-16 SAMPLE: 3 Section II
DEPTH: 25.0' to 27.0'
LOADS: 2.07 tsf
4.14 tsf



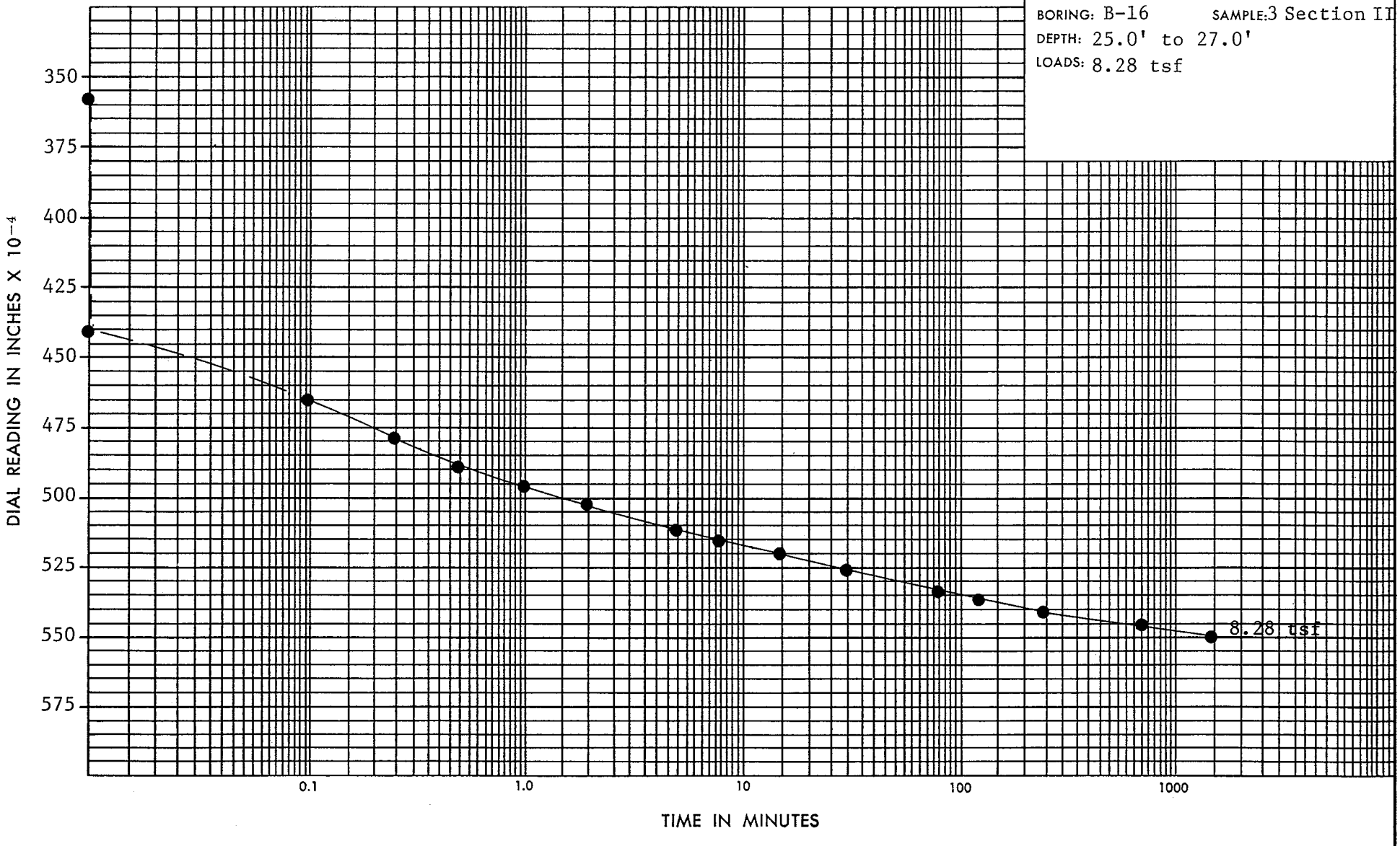
PLATE

CONSOLIDATION — TIME CURVES

NOTE: THICKNESS OF SAMPLE = 0.709"

DOUBLE DRAINAGE

BORING: B-16 SAMPLE: 3 Section II
DEPTH: 25.0' to 27.0'
LOADS: 8.28 tsf



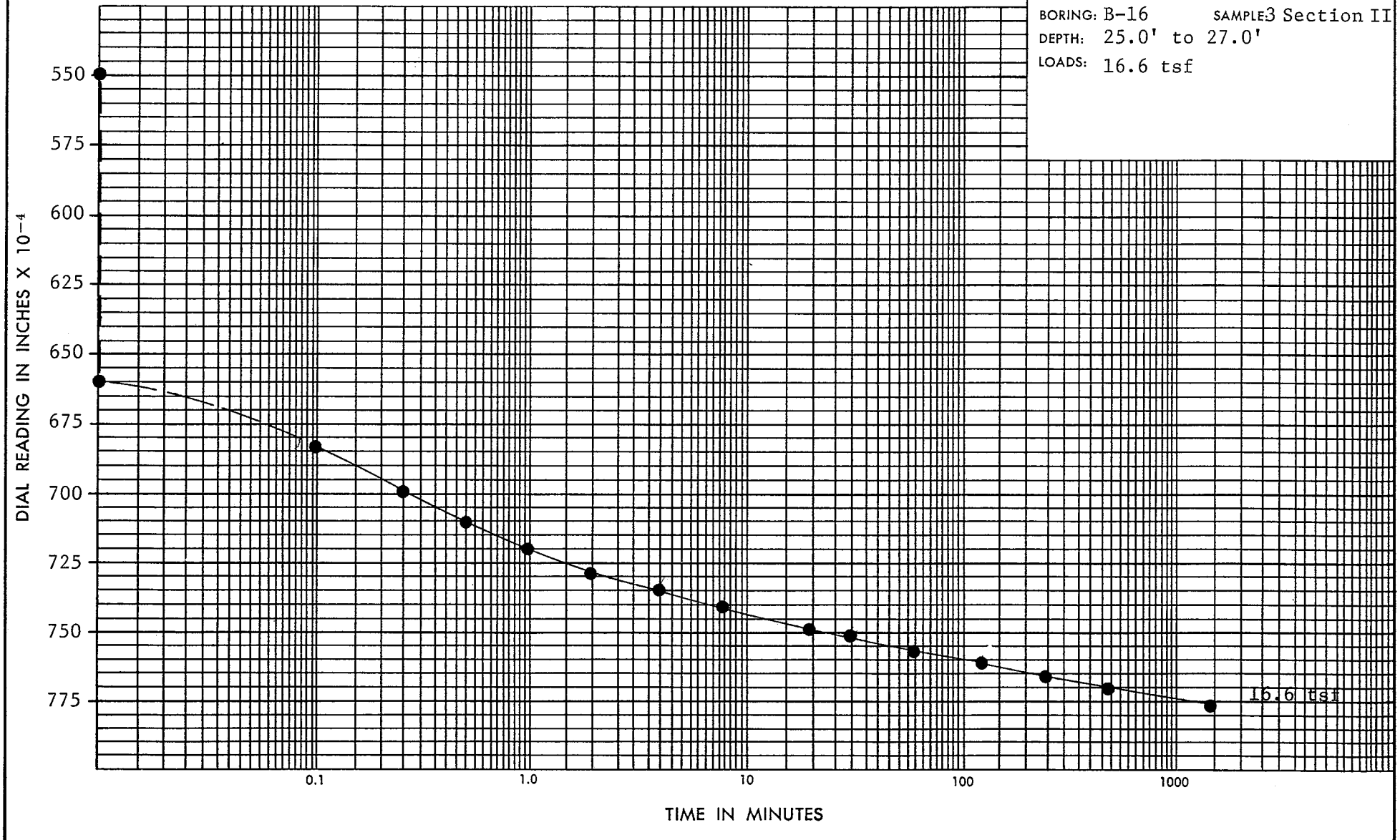
PLATE

CONSOLIDATION — TIME CURVES

NOTE: THICKNESS OF SAMPLE = 0.690"

DOUBLE DRAINAGE

BORING: B-16 SAMPLE 3 Section II
DEPTH: 25.0' to 27.0'
LOADS: 16.6 tsf



PLATE

CONSOLIDATION TEST

Job: P-160 F Boring: B-16 Sample: 3 II Depth: 25.0'to27.0'

Description:

Ring: B-5 Consol: Date: 6/14-24/89

Moisture Content		Before Test		After Test		From Trimmings
Wt. Wet Sple.& Ring 492.8 Plates 0.6	A	618.2 g	F	615.6 g	Can No.	
Wt. Ring & Plates	B	493.4 g	B	493.1 g	Wet+Tare	g
Wt. Wet Sample	C	A-B= 124.8 g	G	F-B= 122.5 g	Dry+Tare	g
Wt. Dry Sple. & Pan		x x x x x x x x	H	— g	Tare	g
Wt. Pan No. H-9		x x x x x x x x	J	— g	Dry Wt. Soil	g
Wt. Dry Sple.		x x x x x x x x	K	H-J= 104.3 g	Wt. H_2O	g
Wt. Water	D	C-K= 20.50 g	L	G-K= 18.2 g		
Moisture Content	E	100 D/K= 19.7 %	M	100 L/K= 17.4 %		%

Before Test

N: Specific Gravity = 2.76

Area of Ring = 32.10 cm^2

P: Height of Sample = 1.893 cm | 0.745 in

Q: Volume of Sample = 60.77 cc

R: Vol. Solids = K/N = 37.79 cc

S: Ht. Solids = PR/Q = 1.177 cm | 0.463 in

T: Ht. Voids = P-S = 0.716 cm | 0.282 in

U: Vol. Voids = Q-R = 22.98 cc

Before Test

UDW = 62.43K/Q = 107.1 pcf

UWW = 62.43C/Q = 128.2 pcf

% Saturation=100D/U = 89.2 %

After Test

V: Vol. Voids = R·e = 18.52 cc

W: Vol. Sample = V+R = 56.31 cc

UDW = 62.43 K/W = 115.6 pcf

% Saturation = 100 L/V = 98.4 %

FORM: L-9

Pressure - Void Ratio Summary

Pressure tsf	Dial Reading Inches	Y Cum. Dial Chg., in.	Height of Voids T-Y, in	Void Ratio $\frac{T-Y}{S}$	Cons. in/in Y/P	W t_{50} min.	C_v, in^2/day 70.9 p^2/W
0.00	.0000	.0000	0.2820	0.609			
0.129	.0011	.0011	.2809	0.607			
0.259	.0037	.0037	.2783	0.601			
0.517	.0074	.0074	.2746	0.593			
1.03	.0138	.0138	.2682	0.579			
2.07	.0225	.0225	.2595	0.560			
4.14	.0358	.0358	.2462	0.532			
8.28	.0550	.0550	.2270	0.490			
16.6	.0776	.0776	.2044	0.441			
4.14	.0726	.0726	.2094	0452			
1.03	.0675	.0675	.2145	0.463			
0.259	.0625	.0625	.2195	0.474			
0.00	.0553	.0553	.2267	0.490			

Computed By: JJ Date: 6/26/89

Checked By: Date:

Job No.: P-160 F Boring: B-16 Sample: 3 II Depth: 25'-27' Consol.: _____

DATE	TIME	ELAPSED TIME MIN	DIAL READING INCHES	LOAD
6/14	2:06	0	.0000	0.129
		INS	.0005	
		.1	.00065	
		.25	.00075	
		.5	.00085	
		1	.00095	
		2	.0010	
		4	.0012	WATER ADDED
		8	.0011	
6/14	2:11¼	0	.0011	0.259
		INS	.0018	
		.1	.0021	
		.25	.0023	
		.50	.0025	
		1	.00265	
		2	.00275	
		4	.0029	
		8	.00295	
		15	.00315	
		30	.00325	
		60	.00335	
6/15	6:55	1026	.0037	
6/15	6:55	0	.0037	0.517
		INS	.0048	
		.1	.00552	
		.25	.0055	
		.5	.0056	
		1	.0058	
		2	.0059	
		4	.0061	
		8	.0062	
		15	.0064	
		30	.0065	
		60	.00665	
		120	.0068	
		240	.0069	
		480	.0070+	
6/16	7:40	1485	.0074	
6/16	7:45	0	.0074	1.03
		INS	.0097	
		.1	.0102	
		.25	.0106	
		.5	.01085	
		1	.0111	
		2	.0114	
		4	.0117	(2)
		8	.0119	
		15	.0123	
		30	.0125	
		60	.0126	
		120	.0127	
		240	.0129	
		480	.0131	
6/17	8:30	1485	.0135	
6/19	7:00	4275	.0138	

DATE	TIME	ELAPSED TIME MIN	DIAL READING INCHES	LOAD
6/19	7:00	0	.0138	2.07
		INS.	.0173	
		.1	.0180	
		.25	.0186+	
		.5	.0190	
		1	.01945	
		2	.0198	
		4	.0202	
		8	.0205	
		15	.0208	
		30	.0211	
		60	.0214	
		120	.0217	
		240	.0220	
	3:15	495	.0222	
6/20	6:50	1430	.0225	
6/20	6:50	0	.0225	4.14
		INS	.0280	
		.1	.0298	
		.25	.0307	
		.5	.0312	
		1	.0317	
		2	.0323	
		4	.03275	(3)
		8	.0332	
		15	.0336	
		35	.0340+	
		60	.0343	
		120	.0347	
		250	.0350	
		480	.0353+	
6/21	6:55	1445	.0358	
6/21	6:55	0	.0358	8.70
		INS	.0440	
		.1	.0465	
		.25	.0479	
		.5	.0489	
		1	.0496	
		2	.0503	
		5	.0512	
		8	.0516	(4)
		15	.0520	
		30	.0526	
		80	.0534	
		120	.05365	
		240	.0541	
6/21	6:40P	705	.0546	
6/22	7:10	1465	.0550	
6/22	7:20	0	.0550	16.6
		INS	.0660	
		.1	.0683	
		.25	.0699	
		.5	.0711	
		1	.0720	
		2	.0728	(5)
		4	.0735	
		8	.0741	
		19	.07485	
		30	.0752	
		60	.0757	

DATE	TIME	ELAPSED TIME MIN	DIAL READING INCHES	LOAD
		120	.0761	
		240	.0766	
		480	.0770	
6/23	6:55	1415	.0776	
6/23	6:55	0	.0776	4.14
	8:05		.0726	
	9:35		.0726	
6/23	9:35	0	.0726	1.03
	12:25		.0675	
6/23	12:25	0	.0675	0.259
	4:20		.0625	
6/23	4:20	0	.0625	0.00
6/24	2:45		.0553	

K wet + tare 177.70 gms
Dry + tare 151.8 g
tare 26.00

SPECIFIC GRAVITY DETERMINATION

Steps:
1. Weigh flask partly filled with distilled water.
2. Add dry soil and weigh again; difference in weights = weight of soil added (W_s)
3. After soaking period, evacuate for 15 minutes, then add distilled water to calibration line.
4. Weigh flask, soil and H_2O (W_{bws}) (Record temperature)
5. Determine from calibration chart, weight of flask and H_2O for temperature recorded (W_{bw})
6. Specific gravity = $\dfrac{W_s}{W_s + W_{bw} - W_{bws}}$

Job. No P-160 F Date

Boring: B-16 Sample: 3 II Depth:

Material:			
Flask No.	2		
A: Flask + H_2O + Soil	599.60		
B: Flask + H_2O	528.80		
C: W_s = A - B	70.80		
Temp. °C	23.0°		
D: W_{bw} (from chart)	681.62		
E: (C+D) = $W_{bw}+W_s$	752.42		
F: W_{bws}	726.80		
G = (E - F) = $W_s + W_{bw} - W_{bws}$	25.62		
Specific Gravity = $\frac{C}{G}$	2.76		

Tested By: M R R Computed By: JJ Checked By:

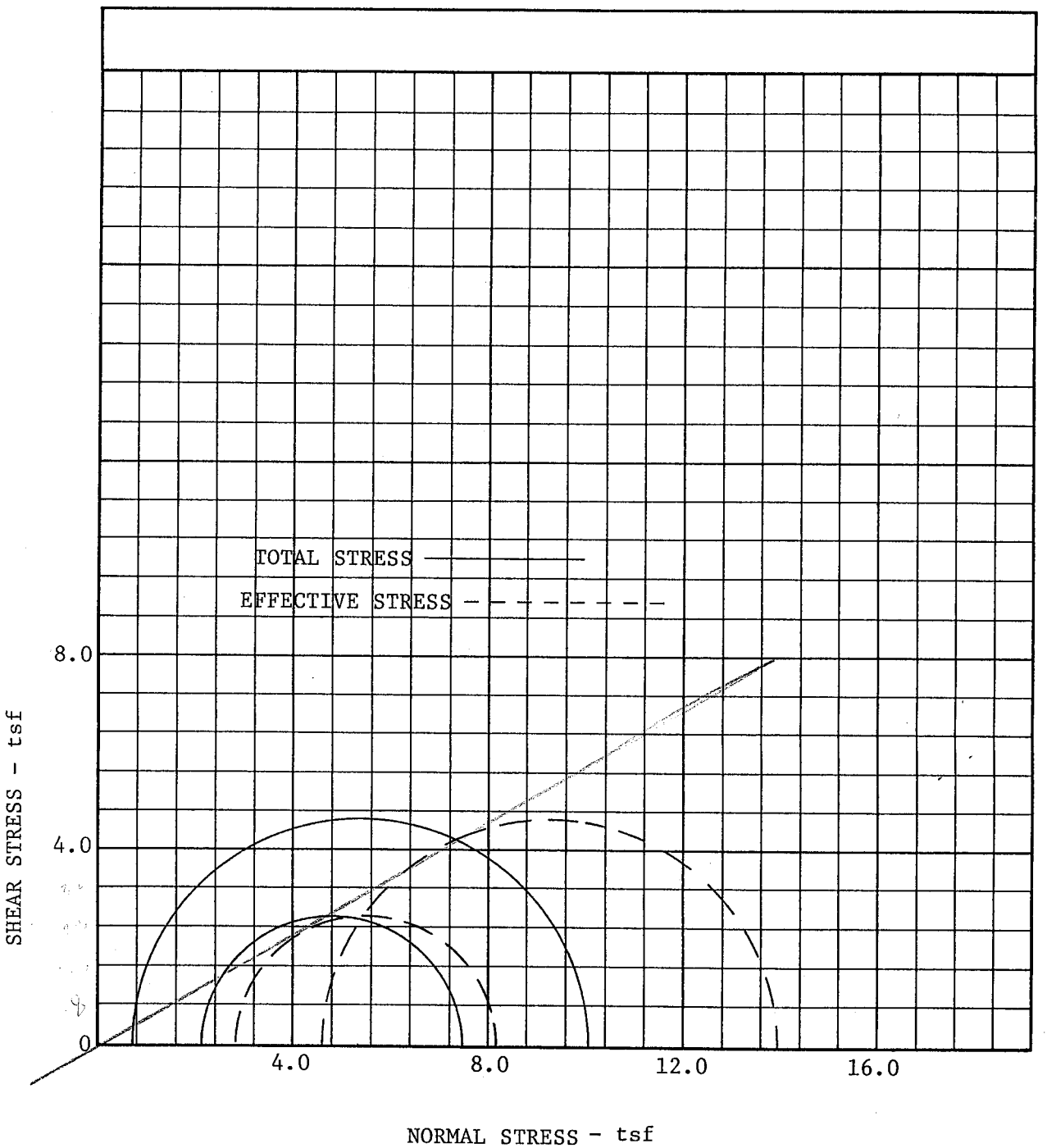
SUMMARY OF TRIAXIAL COMPRESSION TESTS
SATURATED, CONSOLIDATED, UNDRAINED
WITH PORE-PRESSURE MEASUREMENTS

PROJECT: KANAWHA RIVER LANDFILL

LOCATION: CEDAR GROVE, W. VA.

BORING: B-15 SAMPLE: 1 SECTIONS I & II DEPTH: 33.6' to 35.6'

MATERIAL: Gray silt, little fine sand, trace medium sand, trace clay.



PLATE

TRIAXIAL COMPRESSION TEST
SATURATED, CONSOLIDATED, UNDRAINED
WITH PORE-PRESSURE MEASUREMENTS

PROJECT: KANAWHA RIVER LANDFILL

LOCATION: CEDAR GROVE, W. VA.

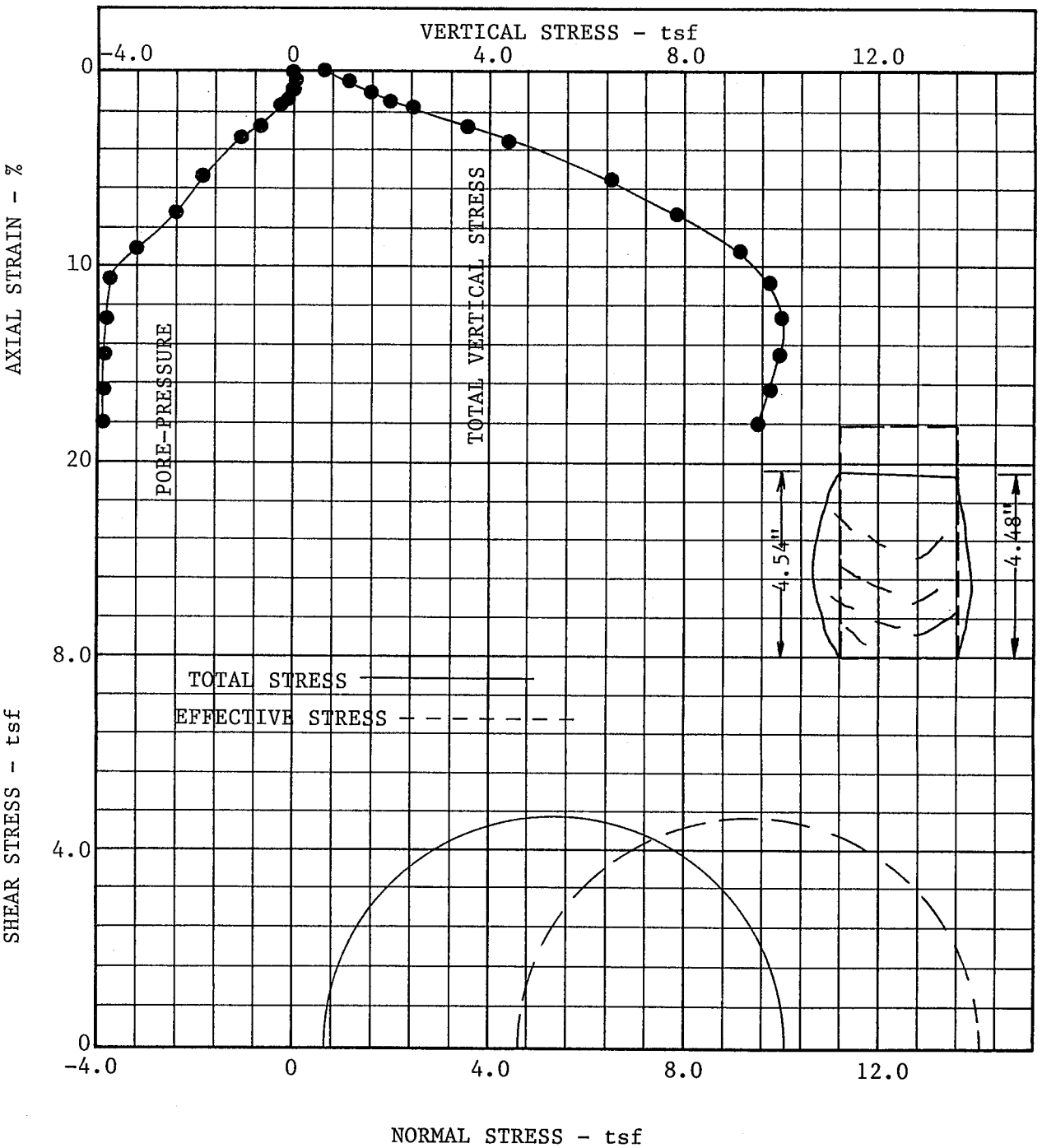
BORING: B-15 SAMPLE: 1 SECTION I DEPTH: 33.6' to 35.6'

MATERIAL: Gray silt, little fine sand, trace medium sand, trace clay.

INITIAL MOISTURE CONTENT: 38% UNIT WET WEIGHT: 105 pcf

FINAL MOISTURE CONTENT: 35% UNIT DRY WEIGHT: 76 pcf

SIZE: 5.60" x 2.87" Diam.



PLATE

.800"
.757"
.043"

TRIAXIAL COMPRESSION TEST DATA and COMPUTATION SHEET

Project: _____ Job: P-160P Date: 6/24-26/89

Boring: B-15 Sample: 1 I Depth: 33.6' to 35.6'

Material: _____

Height: 5.60" Circ. 9.02" Dia. 2.87" Area 6.474in²

Volume: 594.14 cm³

Wet Wt. of Sple: 999.3 gms.

UWW : 105.0 pcf

UDW : 76.1 pcf

Vol. Change cc: —

Type of Test: Cu, SAT

Proving Ring : 2213 / 14234 *

Moisture Content	Before Test	After Test
Can - Dish No.	—	P-1
Wet Wt. Sple + Can	999.3	978.1
Dry Wt. Sple + Can	—	—
Wt. of Can	—	—
Wt. of Dry Soil	724.1	724.1
Wt. of Water	275.2	254.0
% Moisture	38.0	35.1

B = 10/10 = 1.00

ΔH=.043" 5.56"

Conf Press t s f	Dial Defl.	% Strain	1 - Strain	Avr. Area	Load Dial Reading	Load lbs	Shearing Strength psi	Shearing Strength t s f	Tot. Vert. Stress tsf
0.72	0	.0000	1.0000	6.37	0			0.00	0.72
	25	.0045	.9955	6.40	165			0.57	1.29
	50	.0090	.9910	6.43	261			0.91	1.63
	75	.0135	.9865	6.46	374			1.29	2.01
	100	.0180	.9820	6.49	503			1.78	2.50
	25	.0225	.9775	6.52	563			2.28	3.00
	50	.0270	.9730	6.55	625			2.79	3.51
	75	.0315	.9685	6.58	692			3.34	4.06
	200	.0360	.9640	6.61	733			3.67	4.39
	50	.0450	.9550	6.67	870			4.78	5.50
	300	.0540	.9460	6.73	990			5.72	6.44
	50	.0629	.9371	6.80	284 *			6.26	6.98
	400	.0719	.9281	6.86	326			7.13	7.85
	50	.0809	.9191	6.93	367			7.94	8.66
	500	.0899	.9101	7.00	393			8.42	9.14
	50	.0989	.9011	7.07	417			8.85	9.57
	600	.1079	.8921	7.14	432			9.08	9.80
	50	.1169	.8831	7.21	445			9.26	9.98
	700	.1259	.8741	7.29	451			9.28	10.00
	50	.1349	.8651	7.36	456			9.29	10.01
	800	.1439	.8561	7.44	460			9.27	9.99
	50	.1529	.8471	7.52	460			9.18	9.90
	900	.1619	.8381	7.60	457			9.02	9.74
	50	.1709	.8291	7.68	435			8.89	9.61
	1000	.1799	.8201	7.77	450			8.69	9.41
	50	.1888	.8112	7.85					
	1100	.1978	.8022	7.94					
	50	.2068	.7932	8.03					
	1200	.2158	.7842	8.12					

TRIAXIAL SHEAR TEST
(with pore pressure measurement)

PROJECT: _____ JOB: P-160P DATE: 6/26/89

BORING: B-15 SAMPLE: 1 I DEPTH: 33.6'to35.6'

MATERIAL: _____

	BEFORE	AFTER
MOISTURE CONTENT:	38.0%	35.1%

CHAMBER PRESSURE (σ_{CH}) 80 psi, BACK PRESSURE (σ_B) 70 psi

CONFINING PRESSURE (σ_c) 0.72 tsf, INITIAL PORE PRESSURE (u_i) 70.0 psi

Dial Defl. Inch $\times 10^{-3}$	% Strain	Total Pore Pressure psi	Excess Pore Pressure		Total Axial Stress tsf	Effective Axial Stress tsf	Effective Radial Stress tsf	Deviator Stress tsf
			psi	tsf				
δ	ϵ	u_t	$u_t - u_i$	u	σ_a	$\sigma_a - u$	$\sigma_r - u$	$\sigma_a - \sigma_r$
0	0	70.0	0.00	0.00	0.72	0.72	0.72	0.00
25	0.45	71.1	1.1	0.08	1.29	1.21	0.64	0.57
50	0.90	70.1	0.1	0.01	1.63	1.62	0.71	0.91
75	1.35	68.2	-1.8	-0.13	2.01	2.14	0.85	1.29
100	1.80	65.7	-4.3	-0.31	2.50	2.81	1.03	1.78
25	2.25	62.9	-7.1	-0.51	3.00	3.51	1.23	2.28
50	2.70	60.0	-10.0	-0.72 ✓	3.51	4.23	1.44	2.79
75	3.15	56.6	-13.4	-0.96	4.06	5.02	1.68	3.34
200	3.60	54.9	-15.1	-1.09	4.39	5.48	1.81	3.67
50	4.50	49.5	-20.5	-1.48	5.50	6.98	2.20	4.78
300	5.40	44.5	-25.5	-1.84	6.44	8.28	2.56	5.72
50	6.29	42.6	-27.4	-1.97	6.98	8.95	2.69	6.26
400	7.19	36.2	-33.8	-2.43	7.85	10.28	3.15	7.13
50	8.09	30.4	-39.6	-2.85	8.66	11.51	3.57	7.94
500	8.99	25.9	-44.1	-3.18	9.14	12.32	3.90	8.42
50	9.89	22.4	-47.6	-3.43	9.57	13.00	4.15	8.85
600	10.79	18.8	-51.2	-3.69	9.80	13.49	4.41	9.08
50	11.69	17.9	-52.1	-3.75	9.98	13.73	4.47	9.26
700	12.59	16.8	-53.2	-3.83	10.00	13.83	4.55	9.28
50	13.49	16.4	-53.6	-3.86	10.01	13.87	4.58	9.29
800	14.39	16.2	-53.8	-3.87	9.99	13.86	4.59	9.27
50	15.29	16.2	-53.8	-3.87	9.90	13.77	4.59	9.18
900	16.19	16.3	-53.7	-3.87	9.74	13.61	4.59	9.02
50	17.09	16.5	-53.5	-3.85	9.61	13.46	4.57	8.89
1000	17.99	17.0	-53.0	-3.89	9.41	13.30	4.61	8.69
50								
1100								
50								
1200								

4.645
0.72
5.365

TRIAXIAL COMPRESSION TEST
SATURATED, CONSOLIDATED, UNDRAINED
WITH PORE-PRESSURE MEASUREMENTS

PROJECT: KANAWHA RIVER LANDFILL

LOCATION: CEDAR GROVE, W. VA.

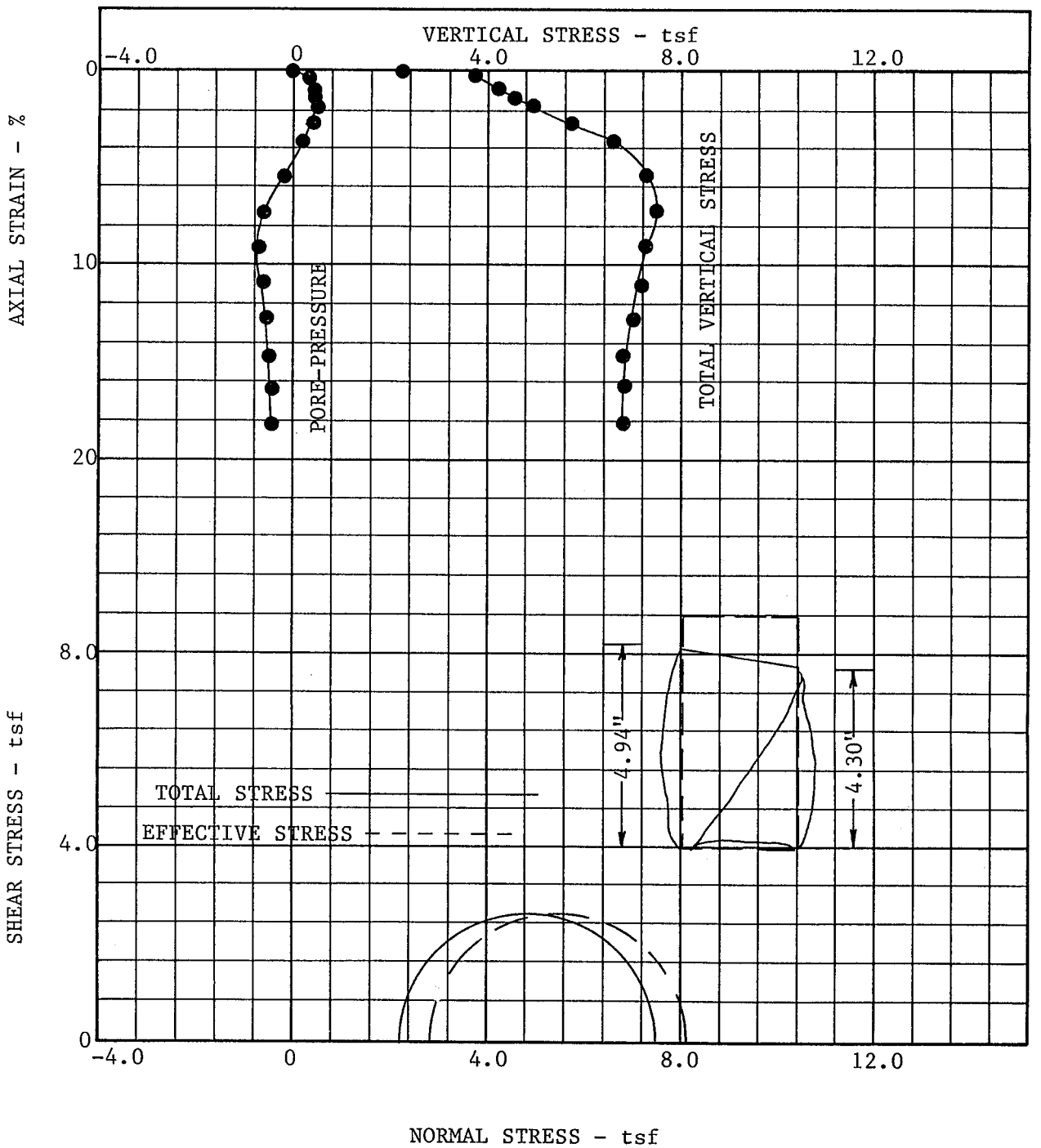
BORING: B-15 SAMPLE: 1 SECTION II DEPTH: 33.6' to 35.6'

MATERIAL: Gray silt, little fine sand, trace medium sand, trace clay.

INITIAL MOISTURE CONTENT: 39% UNIT WET WEIGHT: 104 pcf

FINAL MOISTURE CONTENT: 37% UNIT DRY WEIGHT: 75 pcf

SIZE: 5.60" x 2.87" Diam.



PLATE

.333"

.067"

TRIAXIAL COMPRESSION TEST DATA and COMPUTATION SHEET

Project: _____ Job: P-160 F Date: 6/24-26/89

Boring: B-15 Sample: 1 II Depth: 33.6-35.6

Material: _____

Circ. 9.02"
Height: 5.60" Dia. 2.87" Area 6.474in²

Volume: 594.14cm³

Wet Wt. of Sple: 989.20 gms.

UWW : 103.9 pcf

UDW : 74.7 pct

Vol. Change cc: —

Type of Test: Cū SAT.

Proving Ring: 14234

Moisture Content	Before Test	After Test
Can - Dish No.	—	B
Wet Wt. Sple + Can	989.2	973.4
Dry Wt. Sple + Can	—	—
Wt. of Can	—	—
Wt. of Dry Soil	711.7	711.7
Wt. of Water	277.5	261.7
% Moisture	39.0	36.8

B = 10/10 = 1.00

ΔH=.067" 5.53"

Conf Press t s f	Dial Defl.	% Strain	1 - Strain	Avr. Area	Load Dial Reading	Load lbs	Shearing Strength psi	Shearing Strength t s f	Tot. Vert. Stress tsf
2.16	0	.0000	1.0000	6.32	0			0.00	2.16
	25	.0045	.9955	6.35	65			1.54	3.70
	50	.0090	.9910	6.38	88			2.07	4.23
	75	.0136	.9864	6.41	106			2.48	4.64
	100	.0181	.9819	6.44	122			2.84	5.00
	25	.0226	.9774	6.47	140			3.25	5.41
	50	.0271	.9729	6.50	157			3.62	5.78
	75	.0316	.9684	6.53	176			4.04	6.20
	200	.0362	.9638	6.56	194			4.44	6.60
	50	.0452	.9548	6.62	213			4.83	6.99
	300	.0542	.9458	6.68	227			5.10	7.26
	50	.0633	.9367	6.75	235			5.22	7.38
	400	.0723	.9277	6.81	241			5.31	7.47
	50	.0814	.9186	6.88	232			5.06	7.22
	500	.0904	.9096	6.95	236			5.09	7.25
	50	.0995	.9005	7.02	240			5.13	7.29
	600	.1085	.8915	7.09	235			4.97	7.13
	50	.1175	.8825	7.16	234			4.90	7.06
	700	.1266	.8734	7.24	232			4.81	6.97
	50	.1356	.8644	7.31	231			4.74	6.90
	800	.1447	.8553	7.39	229			4.65	6.81
	50	.1537	.8463	7.47	232			4.66	6.82
	900	.1627	.8373	7.55	237			4.71	6.87
	50	.1718	.8282	7.63	238			4.68	6.84
	1000	.1808	.8192	7.71	242			4.71	6.87
	50	.1899	.8101	7.80					
	1100	.1989	.8011	7.89					
	50	.2080	.7920	7.98					
	1200	.2170	.7830	8.07					

TRIAXIAL SHEAR TEST
(with pore pressure measurement)

PROJECT: _____ JOB: C-160 F DATE: 6/26/89

BORING: B-15 SAMPLE: 1 IC DEPTH: 33.6'-35.6'

MATERIAL: _____

	BEFORE	AFTER
MOISTURE CONTENT:	39.0%	36.8%

CHAMBER PRESSURE (σ_{CH}) 80 psi, BACK PRESSURE (σ_B) 50 psi

CONFINING PRESSURE (σ_c) 2.16 tsf, INITIAL PORE PRESSURE (u_i) 50.0 psi

Dial Defl. Inch $\times 10^{-3}$	% Strain	Total Pore Pressure psi	Excess Pore Pressure		Total Axial Stress tsf	Effective Axial Stress tsf	Effective Radial Stress tsf	Deviator Stress tsf
			psi	tsf				
δ	ϵ	u_t	$u_t - u_i$	u	σ_a	$\sigma_a - u$	$\sigma_r - u$	$\sigma_a - \sigma_r$
0	0	50.0	0.00	0.00	2.16	2.16	2.16	0.00
25	0.45	54.6	4.6	0.33	3.70	3.37	1.83	1.54
50	0.90	55.4	5.4	0.39	4.23	3.84	1.77	2.07
75	1.36	55.9	5.9	0.42	4.64	4.22	1.74	2.48
100	1.81	56.5	6.5	0.47	5.00	4.53	1.69	2.84
25	2.26	57.0	7.0	0.50	5.41	4.91	1.66	3.25
50	2.71	56.1	6.1	0.44	5.78	5.34	1.72	3.62
75	3.16	54.5	4.5	0.32	6.20	5.88	1.84	4.04
200	3.62	52.5	2.5	0.18	6.60	6.42	1.98	4.44
50	4.52	50.0	0.0	0.00	6.99	6.99	2.16	4.83
300	5.42	47.5	-2.5	-0.18	7.26	7.44	2.34	5.10
50	6.33	44.5	-5.5	-0.40	7.38	7.78	2.56	5.22
400	7.23	41.6	-8.4	-0.60	7.47	8.07	2.76	5.31
50	8.14	40.0	-10.0	-0.72	7.22	7.94	2.88	5.06
500	9.04	40.5	-9.5	-0.68	7.25	7.93	2.84	5.09
50	9.95	40.9	-9.1	-0.66	7.29	7.95	2.82	5.13
600	10.85	41.5	-8.5	-0.61	7.13	7.74	2.77	4.97
50	11.75	41.8	-8.2	-0.59	7.06	7.65	2.75	4.90
700	12.66	42.1	-7.9	-0.57	6.97	7.54	2.73	4.81
50	13.56	42.5	-7.5	-0.54	6.90	7.44	2.70	4.74
800	14.47	43.0	-7.0	-0.50	6.81	7.31	2.66	4.65
50	15.37	43.1	-6.9	-0.50	6.82	7.32	2.66	4.66
900	16.27	43.4	-6.6	-0.48	6.87	7.35	2.64	4.71
50	17.18	43.2	-6.8	-0.49	6.84	7.33	2.65	4.68
1000	18.08	43.5	-6.5	-0.47	6.87	7.34	2.63	4.71
50								
1100								
50								
1200								

2.655
2.16
4.815

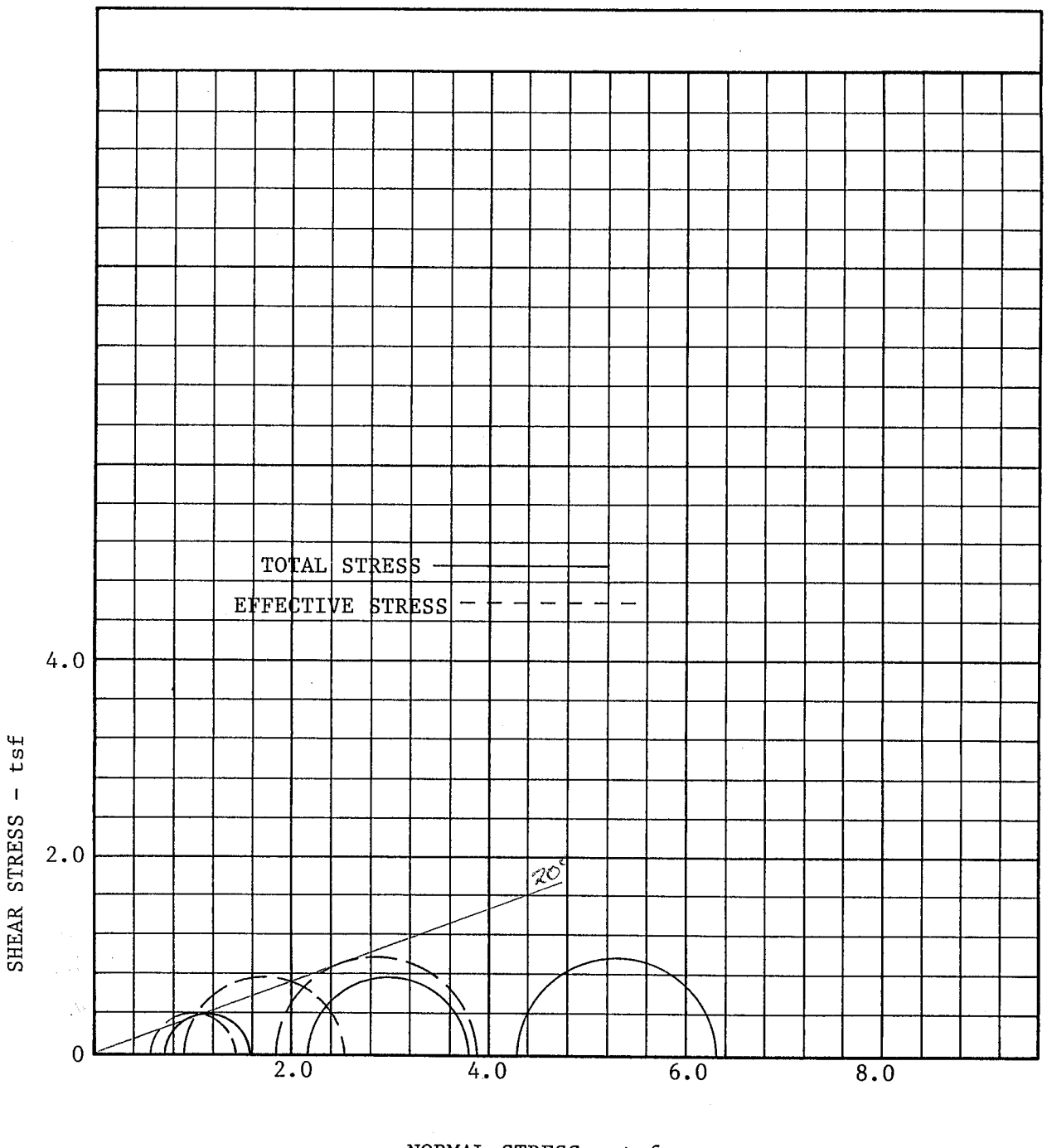
SUMMARY OF TRIAXIAL COMPRESSION TESTS
SATURATED, CONSOLIDATED, UNDRAINED
WITH PORE-PRESSURE MEASUREMENTS

PROJECT: KANAWHA RIVER LANDFILL

LOCATION: CEDAR GROVE, W. VA.

BORING: B-15 SAMPLE: 4 SECTION I, II, III DEPTH: 48.6' to 50.6'

MATERIAL: Soft to medium-stiff brown mottled with gray silty clay, some fine sand, trace medium sand, many lenses of silt.



PLATE

TRIAXIAL COMPRESSION TEST
SATURATED, CONSOLIDATED, UNDRAINED
WITH PORE-PRESSURE MEASUREMENTS

PROJECT: KANAWHA RIVER LANDFILL

LOCATION: CEDAR GROVE, W. VA.

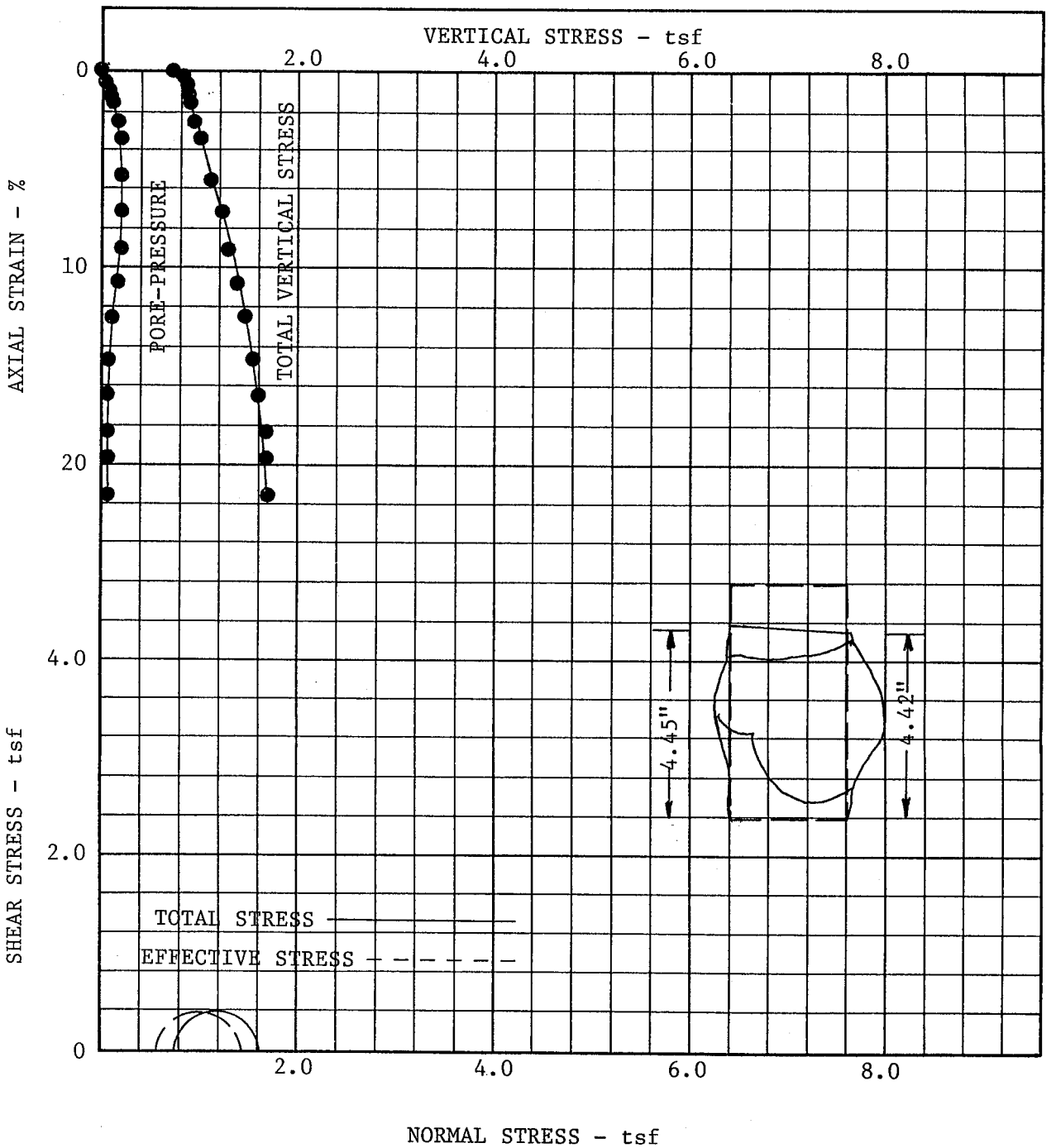
BORING: B-15 SAMPLE: 4 SECTION I DEPTH: 48.6' to 50.6'

MATERIAL: Soft to medium-stiff brown mottled with gray silty clay, some fine sand, trace medium sand, many lenses of silt.

INITIAL MOISTURE CONTENT: 29% UNIT WET WEIGHT: 122 pcf

FINAL MOISTURE CONTENT: 26% UNIT DRY WEIGHT: 95 pcf

SIZE: 5.60" x 2.87" Diam.



PLATE

.580"
.579"
.079"

TRIAXIAL COMPRESSION TEST DATA and COMPUTATION SHEET

Project: _____ Job: P-160 F Date: 6/13-15/89

Boring: B-15 Sample: 4 I Depth: 48.6' to 50.6'

Material: _____

Circ. 9.08"
Height: 5.60" Dia. 2.87" Area 6.489 in²
Volume: 595.46 cm³
Wet Wt. of Sple: 1166.0 gms.
UWW : 122.2 pcf
UDW : 94.9 pcf
Vol. Change cc: —
Type of Test: CU, SAT.
Proving Ring : 22.13

Moisture Content	Before Test	After Test
Can - Dish No.	—	J-1
Wet Wt. Sple + Can	1166.0	1138.2
Dry Wt. Sple + Can	—	—
Wt. of Can	—	—
Wt. of Dry Soil	905.8	905.8
Wt. of Water	260.2	232.4
% Moisture	28.7	25.7

ΔH=.079" 5.52"

Conf Press t s f	Dial Defl.	% Strain	1 - Strain	Avr. Area	Load Dial Reading	Load lbs	Shearing Strength psi	Shearing Strength t s f	Tot. Vert. Stress tsf
0.72	0	.0000	1.0000	6.31	0			0.00	0.72
	25	.0045	.9955	6.34	33			0.12	0.84
	50	.0091	.9909	6.37	47			0.16	0.88
	75	.0136	.9864	6.40	58			0.20	0.92
	100	.0181	.9819	6.43	70			0.24	0.96
	25	.0226	.9774	6.46	78			0.27	0.99
	50	.0272	.9728	6.49	88			0.30	1.02
	75	.0317	.9683	6.52	102?			0.35	1.07
	200	.0362	.9638	6.55	102			0.35	1.07
	50	.0453	.9547	6.61	120			0.40	1.12
	300	.0543	.9457	6.67	139			0.46	1.18
	50	.0634	.9366	6.74	152			0.50	1.22
	400	.0725	.9275	6.80	160			0.52	1.24
	50	.0815	.9185	6.87	185			0.60	1.32
	500	.0906	.9094	6.94	192			0.62	1.34
	50	.0996	.9004	7.01	204			0.65	1.37
	600	.1087	.8913	7.08	220			0.69	1.41
	50	.1178	.8822	7.15	238			0.74	1.46
	700	.1268	.8732	7.23	255			0.79	1.51
	50	.1359	.8641	7.30	268			0.82	1.54
	800	.1449	.8551	7.38	283			0.86	1.58
	50	.1540	.8460	7.46	289			0.86	1.58
	900	.1630	.8370	7.54	298			0.88	1.60
	50	.1721	.8279	7.62	307			0.90	1.62
	1000	.1812	.8188	7.71	311			0.90	1.62
	50	.1902	.8098	7.79	325			0.93	1.65
	1100	.1993	.8007	7.88	334			0.95	1.67
	50	.2083	.7917	7.97	345			0.97	1.69
	1200	.2174	.7826	8.06	353			0.98	1.70

TRIAXIAL SHEAR TEST
(with pore pressure measurement)

PROJECT: _____ JOB: P-160 F DATE: 6/15/89

BORING: B-15 SAMPLE: 4 I DEPTH: 48.6'-50.6'

MATERIAL: _____

	BEFORE	AFTER
MOISTURE CONTENT:	28.7%	25.7%

CHAMBER PRESSURE (σ_{ch}) 80 psi, BACK PRESSURE (σ_b) 70 psi

CONFINING PRESSURE (σ_c) 0.72 tsf, INITIAL PORE PRESSURE (u_i) 70.0 psi

Dial Defl. Inch $\times 10^{-3}$	% Strain	Total Pore Pressure psi	Excess Pore Pressure		Total Axial Stress tsf	Effective Axial Stress tsf	Effective Radial Stress tsf	Deviator Stress tsf	
			psi	tsf					
δ	ϵ	u_t	$u_t - u_i$	u	σ_a	$\sigma_a - u$	$\sigma_r - u$	$\sigma_a - \sigma_r$	
0	0.00	70.0	0.00	0.00	0.72	0.72	0.72	0.00	
25	0.45	71.1	1.1	0.08	0.84	0.76	0.64	0.12	
50	0.91	71.6	1.6	0.12	0.88	0.76	0.60	0.16	
75	1.36	72.1	2.1	0.15	0.92	0.77	0.57	0.20	
100	1.81	72.5	2.5	0.18	0.96	0.78	0.54	0.24	
25	2.26	72.6	2.6	0.19	0.99	0.80	0.53	0.27	
50	2.72	72.7	2.7	0.19	1.02	0.83	0.53	0.30	
75	3.17	72.8	2.8	0.20	1.07	0.87	0.52	0.35	
200	3.62	72.9	2.9	0.21	1.07	0.86	0.51	0.35	
50	4.53	73.0	3.0	0.22	1.12	0.90	0.50	0.40	
300	5.43	73.1	3.1	0.22	1.18	0.96	0.50	0.46	
50	6.34	73.1	3.1	0.22	1.22	1.00	0.50	0.50	
400	7.25	73.0	3.0	0.22	1.24	1.02	0.50	0.52	
50	8.15	73.1	3.1	0.22	1.32	1.10	0.50	0.60	
500	9.06	73.1	3.1	0.22	1.34	1.12	0.50	0.62	
50	9.96	73.0	3.0	0.22	1.37	1.15	0.50	0.65	
600	10.87	72.9	2.9	0.21	1.41	1.20	0.51	0.69	
50	11.78	72.8	2.8	0.20	1.46	1.26	0.52	0.74	
700	12.68	72.7	2.7	0.19	1.51	1.32	0.53	0.79	0.43 + 0.72 = 1.15
50	13.59	72.6	2.6	0.19	1.54	1.35	0.53	0.82	
800	14.49	72.5	2.5	0.18	1.58	1.40	0.54	0.86	
50	15.40	72.1	2.1	0.15	1.58	1.43	0.57	0.86	0.45 + 0.72 = 1.17
900	16.30	72.0	2.0	0.14	1.60	1.46	0.58	0.88	
50	17.21	71.9	1.9	0.14	1.62	1.48	0.58	0.90	
1000	18.12	71.8	1.8	0.13	1.62	1.49	0.59	0.90	
50	19.02	71.8	1.8	0.13	1.65	1.52	0.59	0.93	
1100	19.93	71.6	1.6	0.12	1.67	1.55	0.60	0.95	
50	20.83	71.7	1.7	0.12	1.69	1.57	0.60	0.97	
1200	21.74	71.6	1.6	0.12	1.70	1.58	0.60	0.98	

TRIAXIAL COMPRESSION TEST
SATURATED, CONSOLIDATED, UNDRAINED
WITH PORE-PRESSURE MEASUREMENTS

PROJECT: KANAWHA RIVER LANDFILL

LOCATION: CEDAR GROVE, W. VA.

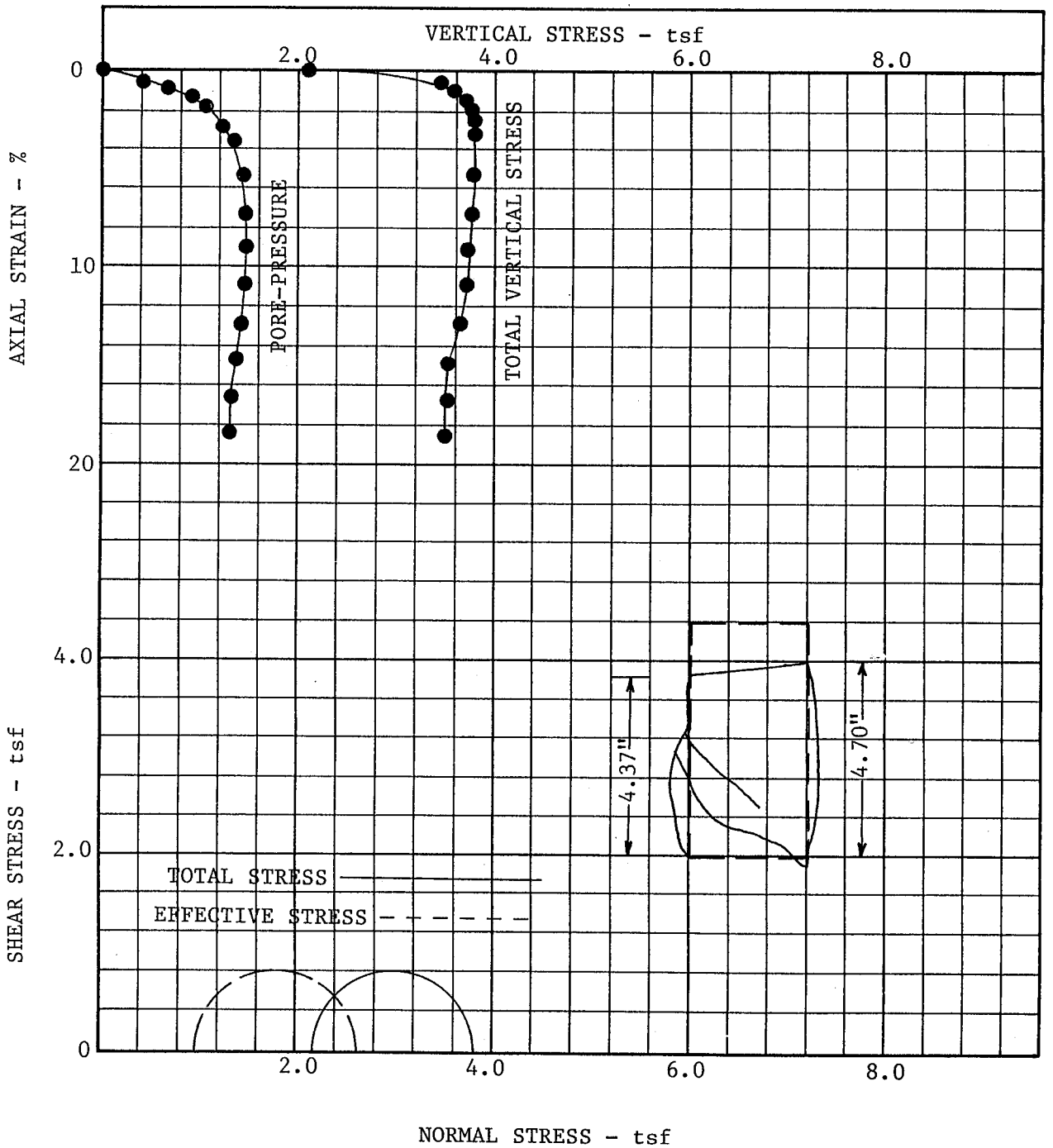
BORING: B-15 SAMPLE: 4 SECTION II DEPTH: 48.6' to 50.6'

MATERIAL: Soft to medium-stiff brown mottled with gray silty clay, some fine sand, trace medium sand, many lenses of silt.

INITIAL MOISTURE CONTENT: 30% UNIT WET WEIGHT: 119 pcf

FINAL MOISTURE CONTENT: 27% UNIT DRY WEIGHT: 91 pcf

SIAZE: 5.60" x 2.87" Diam.



PLATE

.700"
.571
.129"

TRIAXIAL COMPRESSION TEST DATA and COMPUTATION SHEET

Project: _____ Job: P-160 F Date: 6/13-17/89

Boring: B-15 Sample: 4 II Depth: 48.6' - 50.6'

Material: _____

Height: 5.60" Circ. 9.03" Dia. 2.87" Area 6.489 in²

Volume: 595.46 cm³

Wet Wt. of Sple: 1137.0 gms

UWW : 119.2 pcf

UDW : 91.4 pcf

Vol. Change cc: —

Type of Test: CU / SAT

Proving Ring : 2213

Moisture Content	Before Test	After Test
Can - Dish No.	—	T-1
Wet Wt. Sple + Can	1137.0	1102.8
Dry Wt. Sple + Can	—	—
Wt. of Can	—	—
Wt. of Dry Soil	872.1	872.1
Wt. of Water	264.9	230.7
% Moisture	30.4	26.5

B = 9.85/10 = 98.5%

ΔH = .129" 5.47"

Conf Press t s f	Dial Defl.	% Strain	1 - Strain	Avr. Area	Load Dial Reading	Load lbs	Shearing Strength psi	Shearing Strength t s f	Tot. Vert. Stress tsf
2.16	0	.0000	1.0000	6.19	0			0.00	2.16
	25	.0046	.9954	6.22	356			1.28	3.44
	50	.0091	.9909	6.25	402			1.43	3.59
	75	.0137	.9863	6.28	435			1.54	3.70
	100	.0183	.9817	6.31	447			1.58	3.74
	25	.0229	.9771	6.34	454			1.60	3.76
	50	.0274	.9726	6.36	459			1.61	3.77
	75	.0320	.9680	6.39	462			1.61	3.77
	200	.0366	.9634	6.43	465			1.61	3.77
	50	.0457	.9543	6.49	470			1.61	3.77
	300	.0548	.9452	6.55	472			1.61	3.77
	50	.0640	.9360	6.61	474			1.60	3.76
	400	.0731	.9269	6.68	476			1.59	3.75
	50	.0823	.9177	6.75	476			1.57	3.73
	500	.0914	.9086	6.81	475			1.56	3.72
	50	.1005	.8995	6.88	475			1.54	3.70
	600	.1097	.8903	6.95	474			1.52	3.68
	50	.1188	.8812	7.02	472			1.50	3.66
	700	.1280	.8720	7.10	467			1.47	3.63
	50	.1371	.8629	7.17	459			1.43	3.59
	800	.1463	.8537	7.25	455			1.40	3.56
	50	.1554	.8446	7.33	451			1.37	3.53
	900	.1645	.8355	7.41	446			1.34	3.50
	50	.1737	.8263	7.49	442			1.32	3.48
	1000	.1828	.8172	7.57	435			1.28	3.44
	50	.1920	.8080	7.66					
	1100	.2011	.7989	7.75					
	50	.2102	.7898	7.84					
	1200	.2194	.7806	7.93					

TRIAXIAL SHEAR TEST
(with pore pressure measurement)

PROJECT: _____ JOB: P-160 F DATE: 6/17/89

BORING: B-15 SAMPLE: 4 II DEPTH: 48.6' to 50.6'

MATERIAL: _____

	BEFORE	AFTER
MOISTURE CONTENT:	30.4 %	26.5 %

CHAMBER PRESSURE (σ_{cH}) 80 psi, BACK PRESSURE (σ_B) 50 psi

CONFINING PRESSURE (σ_c) 2.16 tsf, INITIAL PORE PRESSURE (u_i) 50.0 psi

Dial Defl. Inch $\times 10^{-3}$	% Strain	Total Pore Pressure psi	Excess Pore Pressure		Total Axial Stress tsf	Effective Axial Stress tsf	Effective Radial Stress tsf	Deviator Stress tsf
			psi	tsf				
δ	ϵ	u_t	$u_t - u_i$	u	σ_a	$\sigma_a - u$	$\sigma_r - u$	$\sigma_a - \sigma_r$
0	.0000	50.0	0.00	0.00	2.16	2.16	2.16	0.00
25	0.46	56.9	6.9	0.50	3.44	2.94	1.66	1.28
50	0.91	60.3	10.3	0.74	3.59	2.85	1.42	1.43
75	1.37	62.9	12.9	0.93	3.70	2.77	1.23	1.54
100	1.83	64.5	14.5	1.04	3.74	2.70	1.12	1.58
25	2.29	66.0	16.0	1.15	3.76	2.61	1.01	1.60
50	2.74	66.9	16.9	1.22	3.77	2.55	0.94	1.61
75	3.20	67.9	17.9	1.29	3.77	2.48	0.87	1.61
200	3.66	68.6	18.6	1.34	3.77	2.43	0.82	1.61
50	4.57	69.5	19.5	1.40	3.77	2.37	0.76	1.61
300	5.48	69.9	19.9	1.43	3.77	2.34	0.73	1.61
50	6.40	70.3	20.3	1.46	3.76	2.30	0.70	1.60
400	7.31	70.6	20.6	1.48	3.75	2.27	0.68	1.59
50	8.23	70.8	20.8	1.50	3.73	2.23	0.66	1.57
500	9.14	70.7	20.7	1.49	3.72	2.23	0.67	1.56
50	10.05	70.7	20.7	1.49	3.70	2.21	0.67	1.54
600	10.97	70.7	20.7	1.49	3.68	2.19	0.67	1.52
50	11.88	70.5	20.5	1.48	3.66	2.18	0.68	1.50
700	12.80	70.1	20.1	1.45	3.63	2.18	0.71	1.47
50	13.71	69.8	19.8	1.43	3.59	2.16	0.73	1.43
800	14.63	69.1	19.1	1.38	3.56	2.18	0.78	1.40
50	15.54	68.7	18.7	1.35	3.53	2.18	0.81	1.37
900	16.45	68.5	18.5	1.33	3.50	2.17	0.83	1.34
50	17.37	68.6	18.6	1.34	3.48	2.14	0.82	1.32
1000	18.28	68.5	18.5	1.33	3.44	2.11	0.83	1.28
50								
1100								
50								
1200								

0.805
2.16
2.965

TRIAXIAL COMPRESSION TEST
SATURATED, CONSOLIDATED, UNDRAINED
WITH PORE-PRESSURE MEASUREMENTS

PROJECT: KANAWHA RIVER LANDFILL

LOCATION: CEDAR GROVE, W. VA.

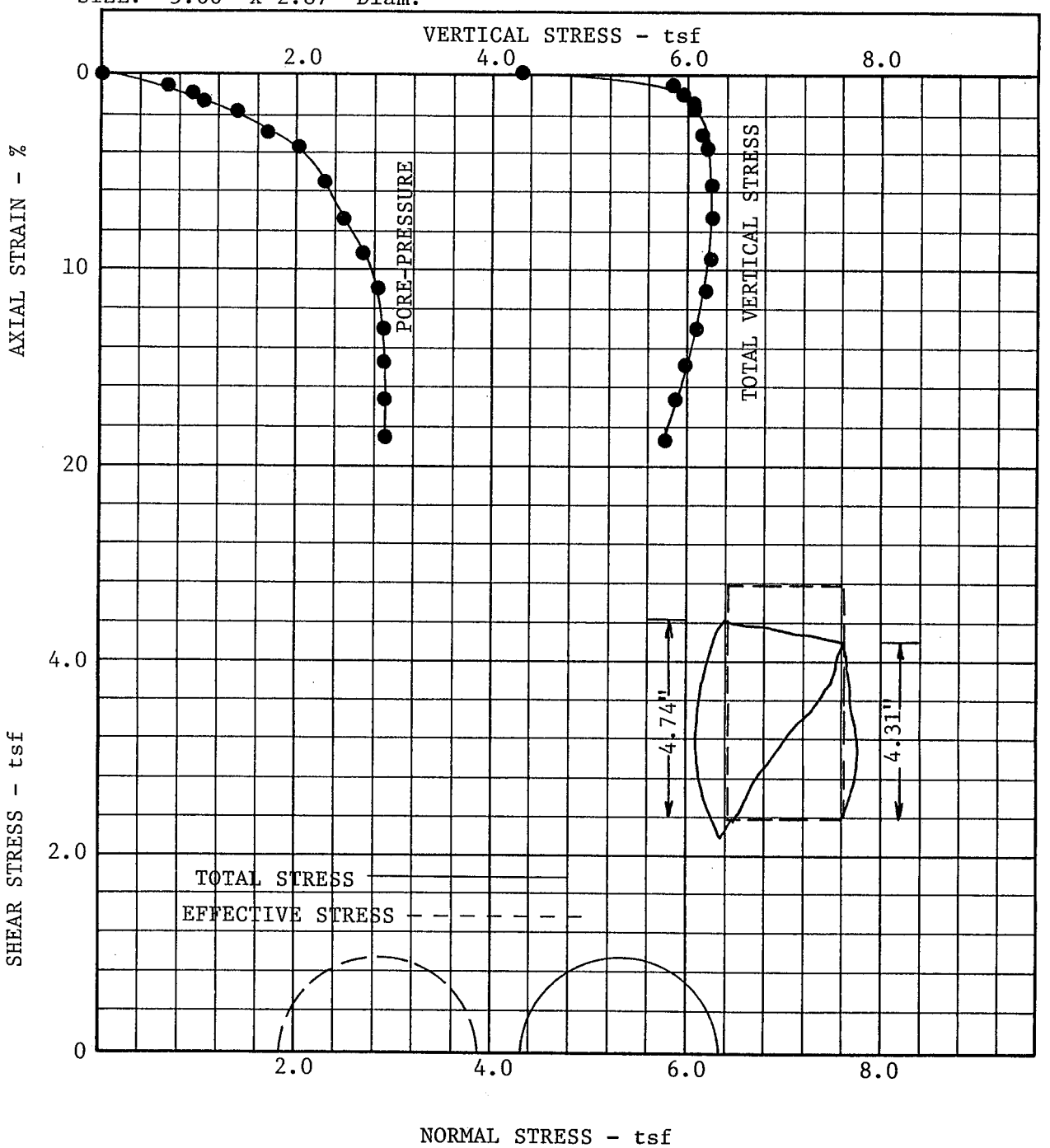
BORING: B-15 SAMPLE: 4 SECTION III DEPTH: 48.6' to 50.6'

MATERIAL: Soft to medium-stiff brown mottled with gray silty clay, some fine sand, trace medium sand, many lenses of sitl.

INITIAL MOISTURE CONTENT: 32% UNIT WET WEIGHT: 118 pcf

FINAL MOISTURE CONTENT: 27% UNIT DRY WEIGHT: 89 pcf

SIZE: 5.60" x 2.87" Diam.



PLATE

.400"
.272
.128

TRIAXIAL COMPRESSION TEST DATA and COMPUTATION SHEET

Project: _____ Job: P-160F Date: 6/15-17/89

Boring: B-15 Sample: 4 III Depth: 48.6'-50.6'

Material: _____

Height: 5.60" Circ. 9.03" Dia. 2.87" Area 6.48 in²

Volume: 595.46 cm³

Wet Wt. of Sple: 1127.8 gms.

UWW : 118.2 Pcf

UDW : 89.3 Pcf

Vol. Change cc: —

Type of Test: CU, SAT.

Proving Ring : 2213

Moisture Content	Before Test	After Test
Can - Dish No.	—	D-1
Wet Wt. Sple + Can	1127.8	1084.7
Dry Wt. Sple + Can	—	—
Wt. of Can	—	—
Wt. of Dry Soil	852.4	852.4
Wt. of Water	275.4	232.3
% Moisture	32.3	27.3

B = 9.8/10 = 98%

ΔH = .128" 5.47"

Conf Press t s f	Dial Defl.	% Strain	1 - Strain	Avr. Area	Load Dial Reading	Load lbs	Shearing Strength psi	Shearing Strength t s f	Tot. Vert. Stress tsf
4.32	0	.0000	1.0000	6.20	0			0.00	4.32
	25	.0046	.9954	6.23	418			1.50	5.82
	50	.0091	.9909	6.26	460			1.64	5.96
	75	.0137	.9863	6.29	480			1.70	6.02
	100	.0183	.9817	6.32	493			1.74	6.06
	25	.0229	.9771	6.35	504			1.83	6.15
	50	.0274	.9726	6.37	507			1.85	6.17
	75	.0320	.9680	6.40	511			1.88	6.20
	200	.0366	.9634	6.44	515			1.90	6.22
	50	.0457	.9543	6.50	522			1.94	6.26
	300	.0548	.9452	6.56	526			1.96	6.28
	50	.0640	.9360	6.62	530			1.97	6.29
	400	.0731	.9269	6.69	532			1.97	6.29
	50	.0823	.9177	6.76	532			1.95	6.27
	500	.0914	.9086	6.82	533			1.94	6.26
	50	.1005	.8995	6.89	533			1.92	6.24
	600	.1097	.8903	6.96	533			1.90	6.22
	50	.1188	.8812	7.04	531			1.86	6.18
	700	.1280	.8720	7.11	528			1.82	6.16
	50	.1371	.8629	7.19	524			1.77	6.09
	800	.1463	.8537	7.26	511			1.65	5.97
	50	.1554	.8446	7.34	511			1.63	5.95
	900	.1645	.8355	7.42	500			1.54	5.86
	50	.1737	.8263	7.50	495			1.48	5.80
	1000	.1828	.8172	7.59	492			1.45	5.77

TRIAXIAL SHEAR TEST
(with pore pressure measurement)

PROJECT: _____ JOB: P-160F DATE: 6/17/89

BORING: B-15 SAMPLE: 4 III DEPTH: 48.6'-50.6'

MATERIAL: _____

	BEFORE	AFTER
MOISTURE CONTENT:	32.3%	27.3%

CHAMBER PRESSURE (σ_{CH}) 80 psi, BACK PRESSURE (σ_B) 20 psi

CONFINING PRESSURE (σ_c) 4.32 tsf, INITIAL PORE PRESSURE (u_i) 20.0 psi

Dial Defl. Inch $\times 10^{-3}$	% Strain	Total Pore Pressure psi	Excess Pore Pressure		Total Axial Stress tsf	Effective Axial Stress tsf	Effective Radial Stress tsf	Deviator Stress tsf
			psi	tsf				
δ	ϵ	u_t	$u_t - u_i$	u	σ_a	$\sigma_a - u$	$\sigma_r - u$	$\sigma_a - \sigma_r$
0	0.0	20.0	0.00	0.00	4.32	4.32	4.32	0.00
25	0.46	29.4	9.4	0.68	5.82	5.14	3.64	1.50
50	0.91	32.9	12.9	0.93	5.96	5.03	3.39	1.64
75	1.37	36.0	16.0	1.15	6.02	4.87	3.17	1.70
100	1.83	39.6	19.6	1.41	6.06	4.65	2.91	1.74
25	2.29	41.8	21.8	1.57	6.15	4.58	2.75	1.83
50	2.74	44.5	24.5	1.76	6.17	4.41	2.56	1.85
75	3.20	46.9	26.9	1.94	6.20	4.26	2.38	1.88
200	3.66	48.2	28.2	2.03	6.22	4.19	2.29	1.90
50	4.57	50.7	30.7	2.21	6.26	4.05	2.11	1.94
300	5.48	52.5	32.5	2.34	6.28	3.94	1.98	1.96
50	6.40	54.0	34.0	2.45	6.29	3.84	1.87	1.97
400	7.31	55.0	35.0	2.52	6.29	3.77	1.80	1.97
50	8.23	56.5	36.5	2.63	6.27	3.64	1.69	1.95
500	9.14	57.3	37.3	2.69	6.26	3.57	1.63	1.94
50	10.05	58.5	38.5	2.77	6.24	3.47	1.55	1.92
600	10.97	59.4	39.4	2.84	6.22	3.38	1.48	1.90
50	11.88	59.8	39.8	2.87	6.18	3.31	1.45	1.86
700	12.80	59.9	39.9	2.87	6.16	3.29	1.45	1.82
50	13.71	60.1	40.1	2.89	6.09	3.20	1.43	1.77
800	14.63	60.0	40.0	2.88	5.97	3.09	1.44	1.65
50	15.54	60.0	40.0	2.88	5.95	3.07	1.44	1.63
900	16.45	60.0	40.0	2.88	5.86	2.98	1.44	1.54
50	17.37	59.9	39.9	2.87	5.80	2.93	1.45	1.48
1000	18.28	59.9	39.9	2.87	5.77	2.90	1.45	1.45
50								
1100								
50								
1200								

0.985
4.32
5.305

L-2

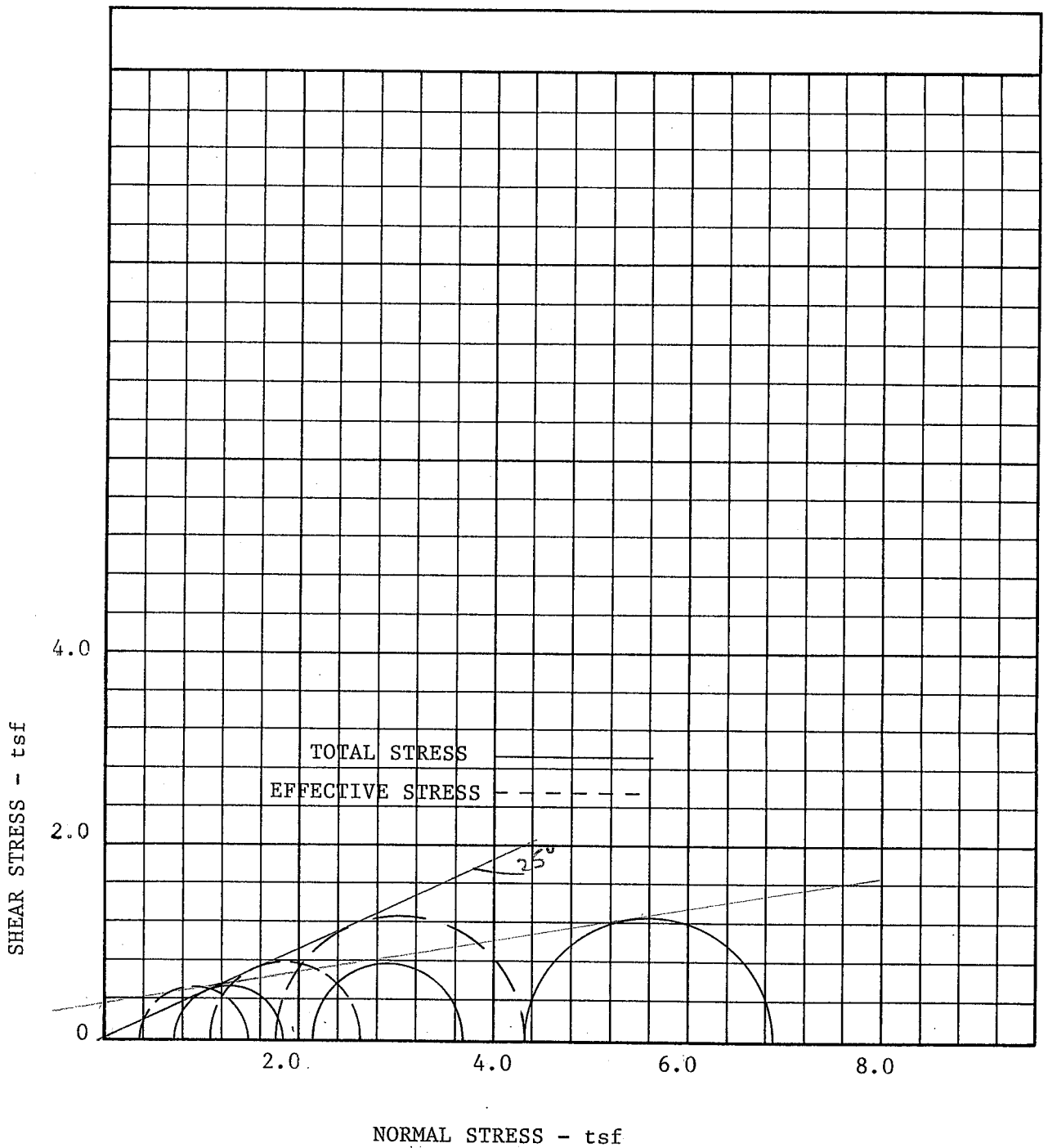
SUMMARY OF TRIAXIAL COMPRESSION TESTS
SATURATED, CONSOLIDATED, UNDRAINED
WITH PORE-PRESSURE MEASUREMENTS

PROJECT: KANAWHA RIVER LANDFILL

LOCATION: CEDAR GROVE, W.VA.

BORING: B-15 SAMPLE: 5 SECTIONS I, II & III DEPTH: 51.6' to 53.6'

MATERIAL: Soft to medium-stiff gray clayey silt inter-bedded with silt and silty clay, some fine sand, trace medium sand, few seams and lenses of fine sand.



PLATE

TRIAXIAL COMPRESSION TEST
SATURATED, CONSOLIDATED, UNDRAINED
WITH PORE-PRESSURE MEASUREMENTS

PROJECT: KANAWHA RIVER LANDFILL

LOCATION: CEDAR GROVE, W. VA.

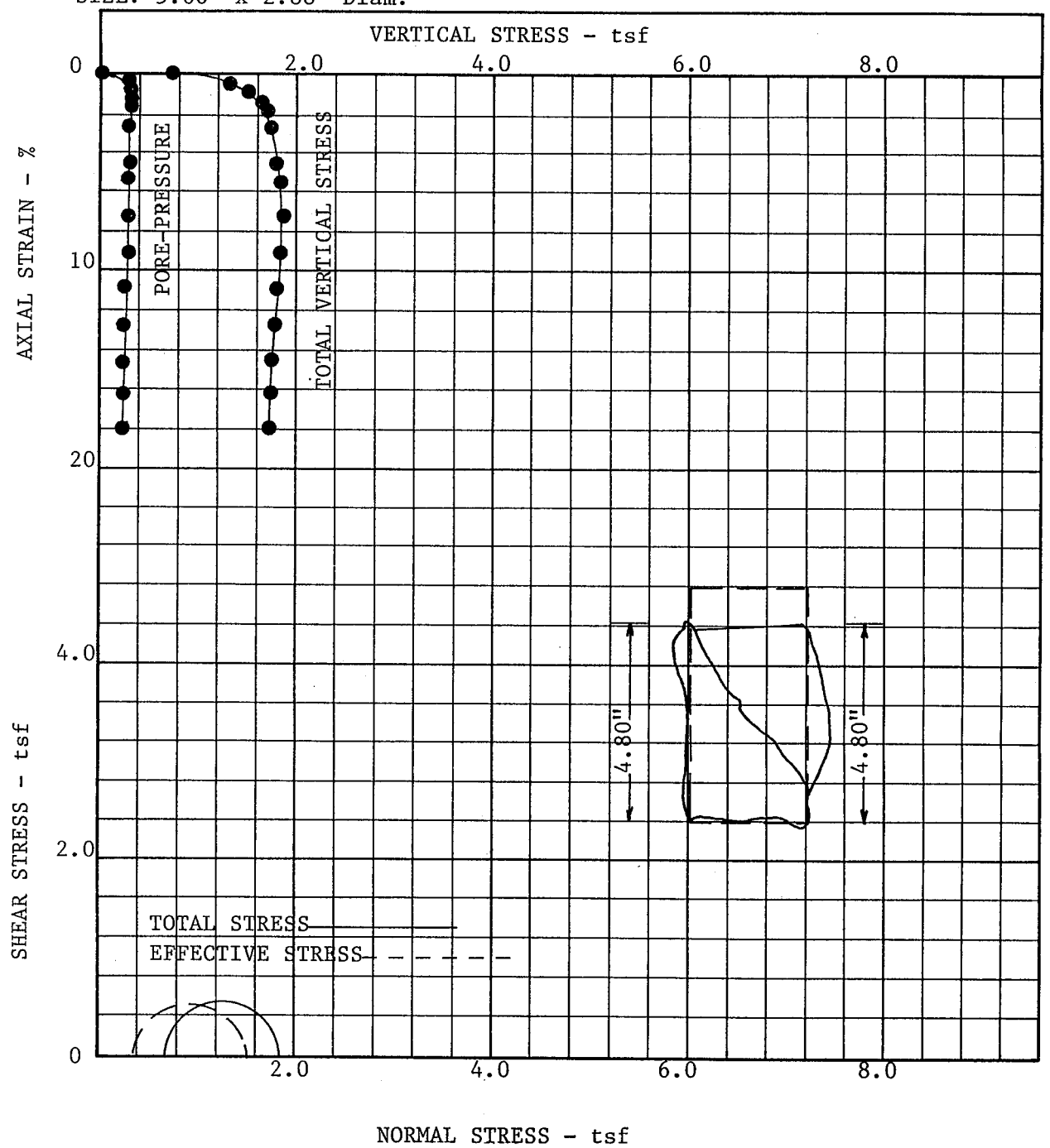
BORING: B-15 SAMPLE: 5 SECTION II DEPTH: 51.6' - 53.6;

MATERIAL: Soft to medium-stiff gray clayey silt inter-bedded with silt and silty clay, some fine sand, trace medium sand, few seams and lenses of fine sand.

INTIAL MOISTURE CONTENT: 28% UNIT WET WEIGHT: 121 pcf

FINAL MOISTURE: 26% UNIT DYR WEIGHT: 94 pcf

SIZE: 5.60" x 2.88" Diam.



PLATE

KEVIN MILLER
15TH FLOOR

1,500
1,455"
.045"

TRIAXIAL COMPRESSION TEST DATA and COMPUTATION SHEET

Project: _____ Job: P-160 Date: 6/6-8/89

Boring: B-15 Sample: 5 II Depth: 51.6' to 53.6'

Material: _____

Height: 5.60" Circ. 9.05" Dia. 2.88" Area 6.518 in²

Volume: 598.10 cm³

Wet Wt. of Sple: 1157.28 gms.

UWW : 120.8 pcf

UDW : 94.2 pcf

Vol. Change cc: —

Type of Test: Cu, SAT

Proving Ring : 2213

Moisture Content	Before Test	After Test
Can - Dish No.	—	B-1
Wet Wt. Sple + Can	1157.28	1138.14
Dry Wt. Sple + Can	—	—
Wt. of Can	—	—
Wt. of Dry Soil	903.06	903.06
Wt. of Water	254.22	235.08
% Moisture	28.2	26.0

ΔH=.045" 5.56" $\frac{.0223 \times D}{A_c}$

Conf Press t s f	Dial Defl.	% Strain	1 - Strain	Avr. Area	Load Dial Reading	Load lbs	Shearing Strength psi	Shearing Strength t s f	Tot. Vert. Stress tsf
0.72	0	.0000	1.0000	6.41	0			0.00	0.72
	25	.0045	.9955	6.44	184			0.64	1.36
	50	.0090	.9910	6.47	235			0.81	1.53
	75	.0135	.9865	6.50	258			0.89	1.61
	100	.0180	.9820	6.53	270			0.92	1.64
	25	.0225	.9775	6.56	293			1.00	1.72
	50	.0270	.9730	6.59	298			1.01	1.73
	75	.0315	.9685	6.62	304			1.02	1.74
	200	.0360	.9640	6.65	313			1.05	1.77
	50	.0450	.9550	6.71	323			1.07	1.79
	300	.0540	.9460	6.78	332			1.09	1.81
	50	.0629	.9371	6.84	341			1.11	1.83
	400	.0719	.9281	6.91	348			1.12	1.84
	50	.0809	.9191	6.97	349			1.12	1.84
	500	.0899	.9101	7.04	350			1.11	1.83
	50	.0989	.9011	7.11	355			1.11	1.83
	600	.1079	.8921	7.19	352			1.09	1.81
	50	.1169	.8831	7.26	352			1.08	1.80
	700	.1259	.8741	7.33	351			1.07	1.79
	50	.1349	.8651	7.41	354			1.07	1.79
	800	.1439	.8561	7.49	357			1.06	1.78
	50	.1529	.8471	7.57	355			1.05	1.77
	900	.1619	.8381	7.65	353			1.03	1.75
	50	.1709	.8291	7.73	352			1.02	1.74
	1000	.1799	.8201	7.82	351			1.00	1.72
	50	.1888	.8112	7.90	350			0.99	1.71
	1100	.1978	.8022						
	50	.2068	.7932						
	1200	.2158	.7842						

TRIAXIAL SHEAR TEST
(with pore pressure measurement)

PROJECT: _____ JOB: P-160 DATE: 6/8/89

BORING: B-15 SAMPLE: S III DEPTH: 51.6' to 53.6'

MATERIAL: _____

	BEFORE	AFTER
MOISTURE CONTENT:	28.2%	26.0 %

CHAMBER PRESSURE (σ_{cH}) 80.0 psi, BACK PRESSURE (σ_B) 70.0 psi

CONFINING PRESSURE (σ_c) 0.72 tsf, INITIAL PORE PRESSURE (u_i) 70.0 psi

Dial Defl. Inch $\times 10^{-3}$	% Strain	Total Pore Pressure psi	Excess Pore Pressure		Total Axial Stress tsf	Effective Axial Stress tsf	Effective Radial Stress tsf	Deviator Stress tsf
			psi	tsf				
δ	ϵ	u_t	$u_t - u_i$	u	σ_a	$\sigma_a - u$	$\sigma_r - u$	$\sigma_a - \sigma_r$
0	.0000	70.0	0.00	0.00	0.72	0.72	0.72	0.00
25	.0045	74.9	4.9	0.35	1.36	1.01	0.37	0.64
50	.0090	75.1	5.1	0.37	1.53	1.16	0.35	0.81
75	.0135	75.1	5.1	0.37	1.61	1.24	0.35	0.89
100	.0180	75.1	5.1	0.37	1.64	1.27	0.35	0.92
25	.0225	75.2	5.2	0.37	1.72	1.35	0.35	1.00
50	.0270	74.9	4.9	0.35	1.73	1.38	0.37	1.01
75	.0315	74.9	4.9	0.35	1.74	1.39	0.37	1.02
200	.0360	75.6	5.6	0.40X	1.77	1.37X	0.32X	1.05
50	.0450	75.1	5.1	0.37	1.79	1.42	0.35	1.07
300	.0540	74.8	4.8	0.35	1.81	1.46	0.37	1.09
50	.0629	74.8	4.8	0.35	1.83	1.48	0.37	1.11
400	.0719	75.0	5.0	0.36	1.84	1.48	0.36	1.12
50	.0809	75.0	5.0	0.36	1.84	1.48	0.36	1.12
500	.0899	74.9	4.9	0.35	1.83	1.48	0.37	1.11
50	.0989	74.9	4.9	0.35	1.83	1.48	0.37	1.11
600	.1079	74.7	4.7	0.34	1.81	1.47	0.38	1.09
50	.1169	74.4	4.4	0.32	1.80	1.48	0.40	1.08
700	.1259	74.2	4.2	0.30	1.79	1.49	0.42	1.07
50	.1349	74.2	4.2	0.30	1.79	1.49	0.42	1.07
800	.1439	74.1	4.1	0.30	1.78	1.48	0.42	1.06
50	.1529	74.0	4.0	0.29	1.77	1.48	0.43	1.05
900	.1619	73.7	3.7	0.27	1.75	1.48	0.45	1.03
50	.1709	73.6	3.6	0.26	1.74	1.48	0.46	1.02
1000	.1799	73.6	3.6	0.26	1.72	1.46	0.46	1.00
50	.1888	73.4	3.4	0.24	1.71	1.47	0.48	0.99
1100								
50								
1200								

0.56
0.72
1.28

TRIAXIAL COMPRESSION TEST
SATURATED, CONSOLIDATED, UNDRAINED
WITH PORE-PRESSURE MEASUREMENTS

PROJECT: KANAWHA RIVER LANDFILL

LOCATION: CEDAR GROVE, W. VA.

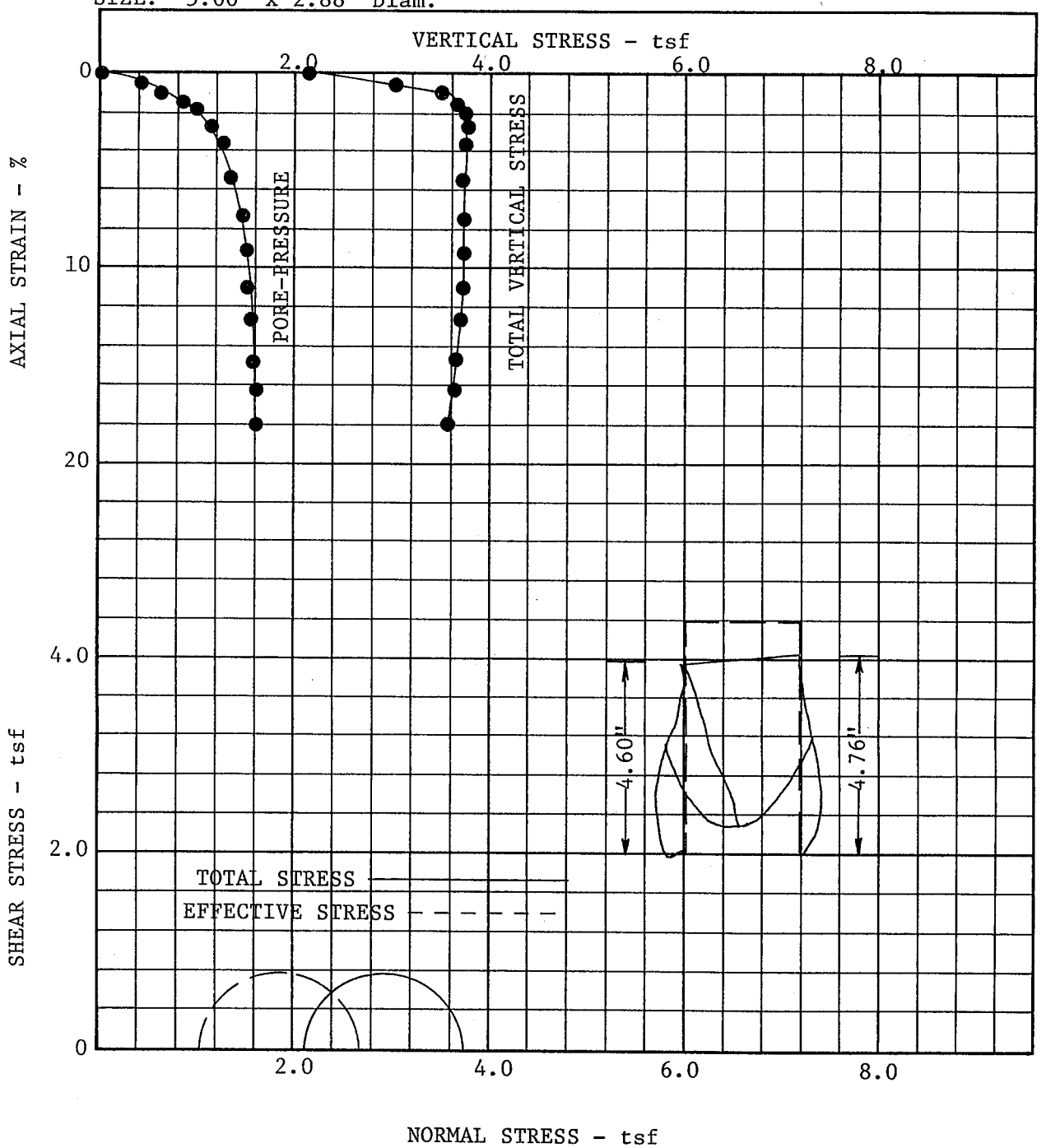
BORING: B-15 SAMPLE: 5 SECTION III DEPTH: 51.6' to 53.6'

MATERIAL: Soft to medium-stiff gray clayey silt in inter-bedded with silt and silty clay, some fine sand, trace medium sand, few seams and lenses of fine sand.

INITIAL MOISTURE CONTENT: 29% UNIT WET WEIGHT: 121 pcf

FINAL MOISTURE CONTENT: 26% UNIT DRY WEIGHT: 94 pcf

SIZE: 5.60" x 2.88" Diam.



PLATE

.500"
.543"
1043"

TRIAXIAL COMPRESSION TEST DATA and COMPUTATION SHEET

Project: _____ Job: P-160 E Date: 6/6-8/89

Boring: B-15 Sample: S III Depth: 51.6' to 53.6'

Material: _____

Height: 5.60" Circ. 9.06" Dia. 2.88" Area 6.53 IN²

Volume: 599.42 cm³

Wet Wt. of Sple: 1159.36 gms.

UWW : 120.7 Pcf

UDW : 93.9 Pcf

Vol. Change cc: —

Type of Test: Cū, SAT

Proving Ring : 2213

Moisture Content	Before Test	After Test
Can - Dish No.	—	S-1
Wet Wt. Sple + Can	1159.36	1134.70
Dry Wt. Sple + Can	—	—
Wt. of Can	—	—
Wt. of Dry Soil	901.34	901.34
Wt. of Water	258.02	233.36
% Moisture	28.6	25.9

ΔH=.043" 5.56"

D= 9.8/10 = 98%

Conf Press t s f	Dial Defl.	% Strain	1 - Strain	Avr. Area	Load Dial Reading	Load lbs	Shearing Strength psi	Shearing Strength t s f	Tot. Vert. Stress tsf
2.16	0	.0000	1.0000	6.43	0			0.00	2.16
	25	.0045	.9955	6.46	259			0.89	3.05
	50	.0090	.9910	6.49	384			1.32	3.48
	75	.0135	.9865	6.52	425			1.45	3.61
	100	.0180	.9820	6.55	454			1.55	3.71
	25	.0225	.9775	6.58	462			1.57	3.73
	50	.0270	.9730	6.61	465			1.57	3.73
	75	.0315	.9685	6.64	467			1.57	3.73
	200	.0360	.9640	6.67	462			1.54	3.70
	50	.0450	.9550	6.73	461			1.53	3.69
	300	.0540	.9460	6.80	461			1.51	3.67
	50	.0629	.9371	6.86	473			1.54	3.70
	400	.0719	.9281	6.93	485			1.56	3.72
	50	.0809	.9191	7.00	485			1.55	3.71
	500	.0899	.9101	7.07	494			1.56	3.72
	50	.0989	.9011	7.14	494			1.54	3.70
	600	.1079	.8921	7.21	492			1.52	3.68
	50	.1169	.8831	7.28	499			1.53	3.69
	700	.1259	.8741	7.36	492			1.49	3.65
	50	.1349	.8651	7.43	496			1.49	3.65
	800	.1439	.8561	7.51	491			1.46	3.62
	50	.1529	.8471	7.59	494			1.45	3.61
	900	.1619	.8381	7.67	499			1.45	3.61
	50	.1709	.8291	7.76	496			1.43	3.59
	1000	.1799	.8201	7.84	490			1.39	3.55
	50	.1888	.8112	7.93					
	1100	.1978	.8022	8.02					
	50	.2068	.7932	8.11					
	1200	.2158	.7842	8.20					

TRIAXIAL SHEAR TEST
(with pore pressure measurement)

PROJECT: _____ JOB: P-160 F DATE: 6/8/89

BORING: B-15 SAMPLE: 5 III DEPTH: 51.6'-53.6'

MATERIAL: _____

	BEFORE	AFTER
MOISTURE CONTENT:	28.6%	25.9%

CHAMBER PRESSURE (σ_{cH}) 80.0 psi, BACK PRESSURE (σ_B) 50.0 psi

CONFINING PRESSURE (σ_c) 2.16 tsf, INITIAL PORE PRESSURE (u_i) 50.0 psi

Dial Defl. Inch $\times 10^{-3}$	% Strain	Total Pore Pressure psi	Excess Pore Pressure		Total Axial Stress tsf	Effective Axial Stress tsf	Effective Radial Stress tsf	Deviator Stress tsf
			psi	tsf				
δ	ϵ	u_t	$u_t - u_i$	u	σ_a	$\sigma_a - u$	$\sigma_r - u$	$\sigma_a - \sigma_r$
0	.0000	50.0	0.00	0.00	2.16	2.16	2.16	0.00
25	.0045	55.7	5.7	0.41	3.05	2.64	1.75	0.89
50	.0090	58.6	8.6	0.62	3.48	2.86	1.54	1.32
75	.0135	61.4	11.4	0.82	3.61	2.79	1.34	1.45
100	.0180	63.8	13.8	0.99	3.71	2.72	1.17	1.55
25	.0225	64.9	14.9	1.07	3.73	2.66	1.09	1.57
50	.0270	65.9	15.9	1.14	3.73	2.59	1.02	1.57
75	.0315	66.8	16.8	1.21	3.73	2.52	0.95	1.57
200	.0360	67.4	17.4	1.25	3.70	2.45	0.91	1.54
50	.0450	68.3	18.3	1.32	3.69	2.37	0.84	1.53
300	.0540	68.9	18.9	1.36	3.67	2.31	0.80	1.51
50	.0629	69.5	19.5	1.40	3.70	2.30	0.76	1.54
400	.0719	70.3	20.3	1.46	3.72	2.26	0.70	1.56
50	.0809	70.6	20.6	1.48	3.71	2.23	0.68	1.55
500	.0899	70.9	20.9	1.50	3.72	2.22	0.66	1.56
50	.0989	70.9	20.9	1.50	3.70	2.20	0.66	1.54
600	.1079	71.1	21.1	1.52	3.68	2.16	0.64	1.52
50	.1169	71.4	21.4	1.54	3.69	2.15	0.62	1.53
700	.1259	71.4	21.4	1.54	3.65	2.11	0.62	1.49
50	.1349	71.6	21.6	1.56	3.65	2.09	0.60	1.49
800	.1439	71.9	21.9	1.58	3.62	2.04	0.58	1.46
50	.1529	71.9	21.9	1.58	3.61	2.03	0.58	1.45
900	.1619	72.2	22.2	1.60	3.61	2.01	0.56	1.45
50	.1709	72.0	22.0	1.58	3.59	2.01	0.58	1.43
1000	.1799	72.1	22.1	1.59	3.55	1.96	0.57	1.39
50								
1100								
50								
1200								

0.785
2.16
2.945

TRIAXIAL COMPRESSION TEST
SATURATED, CONSOLIDATED, UNDRAINED
WITH PORE-PRESSURE MEASUREMENTS

PROJECT: KANAWHA RIVER LANDFILL

LOCATION: CEDAR GROVE, W. VA.

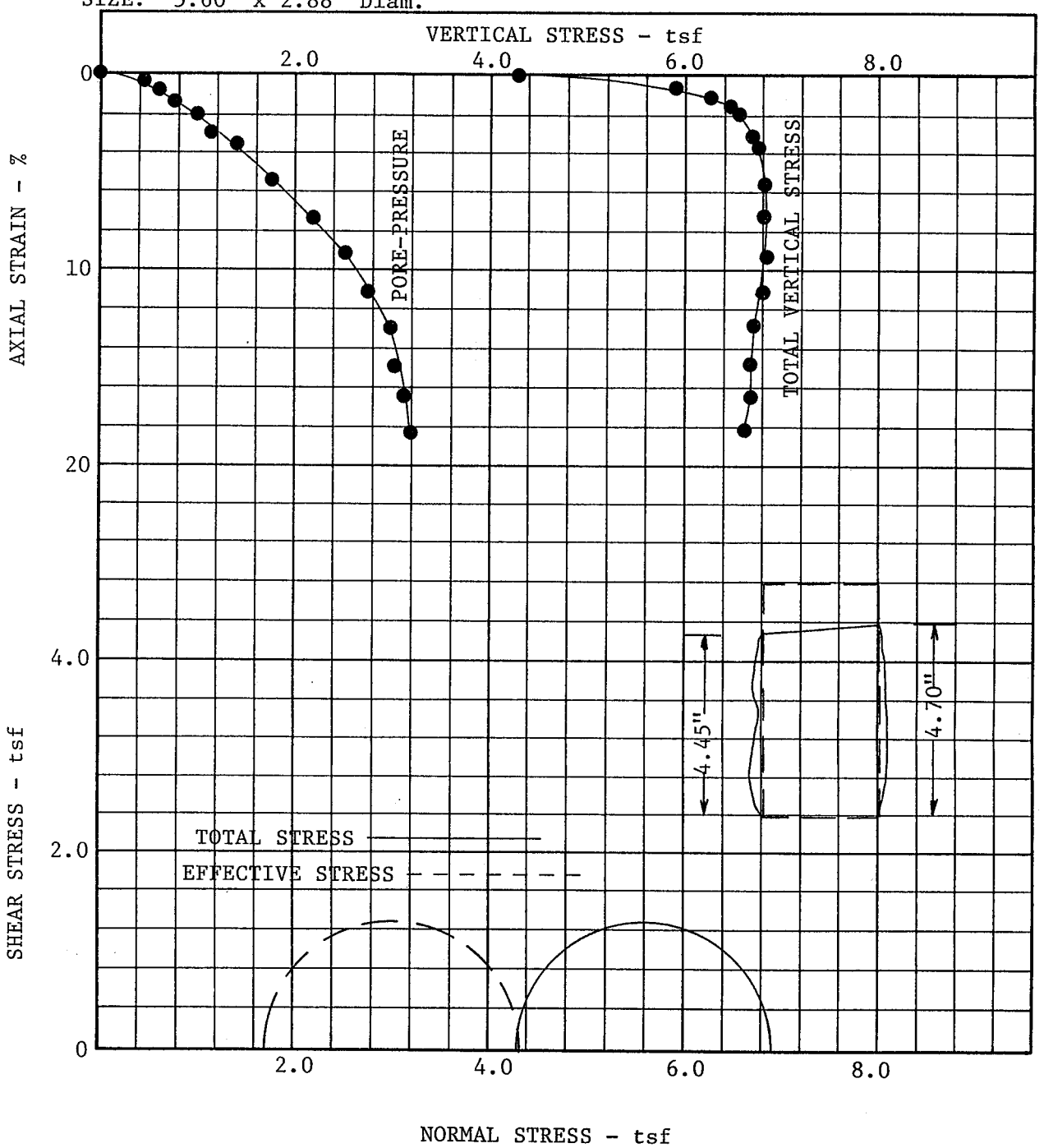
BORING: B-15 SAMPLE: 5 SECTION I DEPTH: 51.6' to 53.6'

MATERIAL: Soft to medium-stiff gray clayey silt interbedded with silt and silty clay, some fine sand, trace medium sand, few seams and lenses of fine sand.

INITIAL MOISTURE CONTENT: 28% UNIT WET WEIGHT: 121 PCF

FINAL MOISTURE CONTENT: 23% UNIT DRY WEIGHT: 95 pcf

SIZE: 5.60" x 2.88" Diam.



PLATE

.1008
.527"
.1073"

TRIAXIAL COMPRESSION TEST DATA and COMPUTATION SHEET

Project: _____ Job: P-160 "E" Date: 6/8-13/89

Boring: B-15 Sample: 5 I Depth: 52.6'-53.6'

Material: _____

Height: 5.60" Circ. 9.05" Dia. 2.88" Area 6.518 in²

Volume: 598.10 cm³

Wet Wt. of Sple: 1162.4 gms.

UWW : 121.3 pcf

UDW : 94.9 pcf

Vol. Change cc: —

Type of Test: CU, SAT

Proving Ring : 2213

Moisture Content	Before Test	After Test
Can - Dish No.	—	L-1
Wet Wt. Sple + Can	1162.4	1116.2
Dry Wt. Sple + Can	—	—
Wt. of Can	—	—
Wt. of Dry Soil	909.2	909.2
Wt. of Water	253.2	207.0
% Moisture	27.8	22.8

B = 9.9/10 = 99%

ΔH = .073" 5.53"

Conf Press t s f	Dial Defl.	% Strain	1 - Strain	Avr. Area	Load Dial Reading	Load lbs	Shearing Strength psi	Shearing Strength t s f	Tot. Vert. Stress tsf
4.32	0	.0000	1.0000	6.35	0			0.00	4.32
	25	.0045	.9955	6.38	458			1.60	5.92
	~~50~~	.0090	.9910	6.41	521			1.96	6.28
	75	.0136	.9864	6.44	541			2.12	6.44
	100	.0181	.9819	6.47	556			2.24	6.56
	25	.0226	.9774	6.50	564			2.30	6.62
	50	.0271	.9729	6.53	573			2.36	6.68
	~~75~~	.0316	.9684	6.56	575			2.37	6.69
	200	.0362	.9638	6.59	583			2.43	6.75
	50	.0452	.9548	6.65	590			2.46	6.78
	300	.0542	.9458	6.71	595			2.48	6.80
	50	.0633	.9367	6.78	600			2.50	6.82
	400	.0723	.9277	6.84	604			2.51	6.83
	50	.0814	.9186	6.91	610			2.53	6.85
	500	.0904	.9096	6.98	617			2.56	6.88
	50	.0995	.9005	7.05	614			2.51	6.83
	600	.1085	.8915	7.12	615			2.49	6.81
	50	.1175	.8825	7.20	613			2.45	6.77
	700	.1266	.8734	7.27	612			2.42	6.74
	50	.1356	.8644	7.35	611			2.39	6.71
	800	.1447	.8553	7.42	618			2.41	6.73
	50	.1537	.8463	7.50	614			2.36	6.68
	900	.1627	.8373	7.58	617			2.36	6.68
	50	.1718	.8282	7.67	617			2.33	6.65
	1000	.1808	.8192	7.75	610			2.25	6.57

TRIAXIAL SHEAR TEST
(with pore pressure measurement)

PROJECT: _____ JOB: P-160 F DATE: 6/13/89

BORING: B-15 SAMPLE: 5 I DEPTH: 51.6'-53.6'

MATERIAL: _____

	BEFORE	AFTER
MOISTURE CONTENT:	27.8%	22.8%

CHAMBER PRESSURE (σ_{cH}) 80 psi, BACK PRESSURE (σ_B) 20 psi

CONFINING PRESSURE (σ_c) 4.32 tsf, INITIAL PORE PRESSURE (u_i) 20 psi

Dial Defl. Inch $\times 10^{-3}$	% Strain	Total Pore Pressure psi	Excess Pore Pressure		Total Axial Stress tsf	Effective Axial Stress tsf	Effective Radial Stress tsf	Deviator Stress tsf
			psi	tsf				
δ	ϵ	u_t	$u_t - u_i$	u	σ_a	$\sigma_a - u$	$\sigma_r - u$	$\sigma_a - \sigma_r$
0	0	20.0	0.00	0.00	4.32	4.32	4.32	0.00
25	0.45	26.1	6.1	0.44	5.92	5.48	3.88	1.60
50	0.90	28.9	8.9	0.64	6.28	5.64	3.68	1.96
75	1.36	31.0	11.0	0.79	6.44	5.65	3.53	2.12
100	1.81	33.0	13.0	0.94	6.56	5.62	3.38	2.24
25	2.26	34.8	14.8	1.07	6.62	5.55	3.25	2.30
50	2.71	36.3	16.3	1.17	6.68	5.51	3.15	2.36
75	3.16	38.1	18.1	1.30	6.69	5.39	3.02	2.37
200	3.62	39.8	19.8	1.43	6.75	5.32	2.89	2.43
50	4.52	42.1	22.1	1.59	6.78	5.19	2.73	2.46
300	5.42	44.7	24.7	1.78	6.80	5.02	2.54	2.48
50	6.33	47.9	27.9	2.01	6.82	4.81	2.31	2.50
400	7.23	50.9	30.9	2.22	6.83	4.61	2.10	2.51
50	8.14	53.1	33.1	2.38	6.85	4.47	1.94	2.53
500	9.04	55.6	35.6	2.56	6.88	4.32	1.76	2.56
50	9.95	57.7	37.7	2.71	6.83	4.12	1.61	2.51
600	10.85	58.8	38.8	2.79	6.81	4.02	1.53	2.49
50	11.75	60.4	40.4	2.91	6.77	3.86	1.41	2.45
700	12.66	61.1	41.1	2.96	6.74	3.78	1.36	2.42
50	13.56	62.1	42.1	3.03	6.71	3.68	1.29	2.39
800	14.47	62.7	42.7	3.07	6.73	3.66	1.25	2.41
50	15.37	63.1	43.1	3.10	6.68	3.58	1.22	2.36
900	16.27	63.6	43.6	3.14	6.68	3.54	1.18	2.36
50	17.18	64.0	44.0	3.17	6.65	3.48	1.15	2.33
1000	18.08	64.4	44.4	3.20	6.57	3.37	1.12	2.25
50								
1100								
50								
1200								

1.28
4.32
5.60

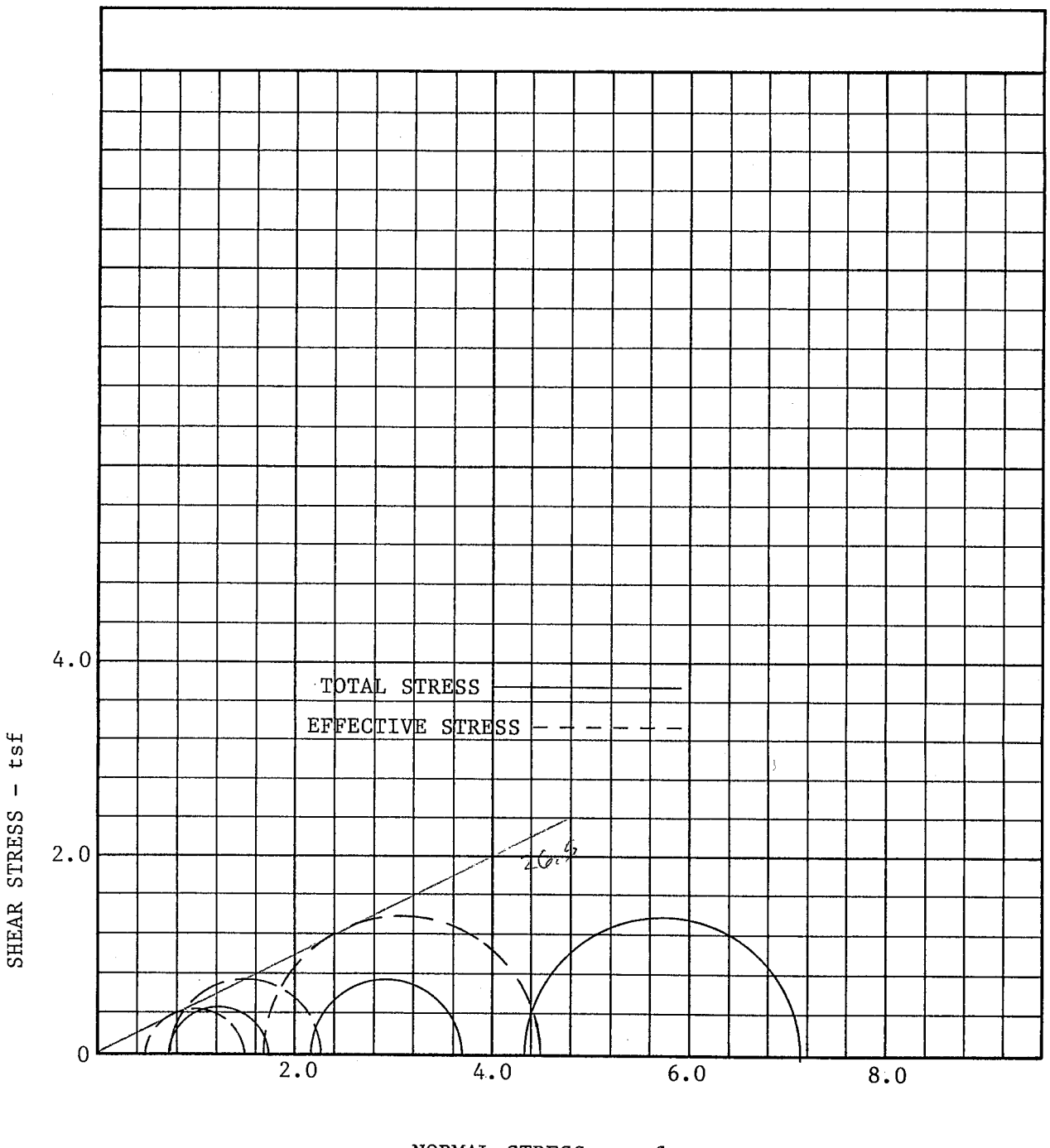
SUMMARY OF TRIAXIAL COMPRESSION TESTS
SATURATED, CONSOLIDATED, UNDRAINED
WITH PORE-PRESSURE MEASUREMENTS

PROJECT: KANAWHA RIVER LANDFILL

LOCATION: CEDAR GROVE, W. VA.

BORING: B-16 SAMPLE: 7 SECTION I, II, III DEPTH: 45.0' to 47.0'

MATERIAL: Soft to medium-stiff brown mottled with gray clayey silt, little fine sand, few seams of fine sand.



PLATE

TRIAXIAL COMPRESSION TEST
SATURATED, CONSOLIDATED, UNDRAINED
WITH PORE-PRESSURE MEASUREMENTS

PROJECT: KANAWHA RIVER LANDFILL

LOCATION: CEDAR GROVE, W. VA.

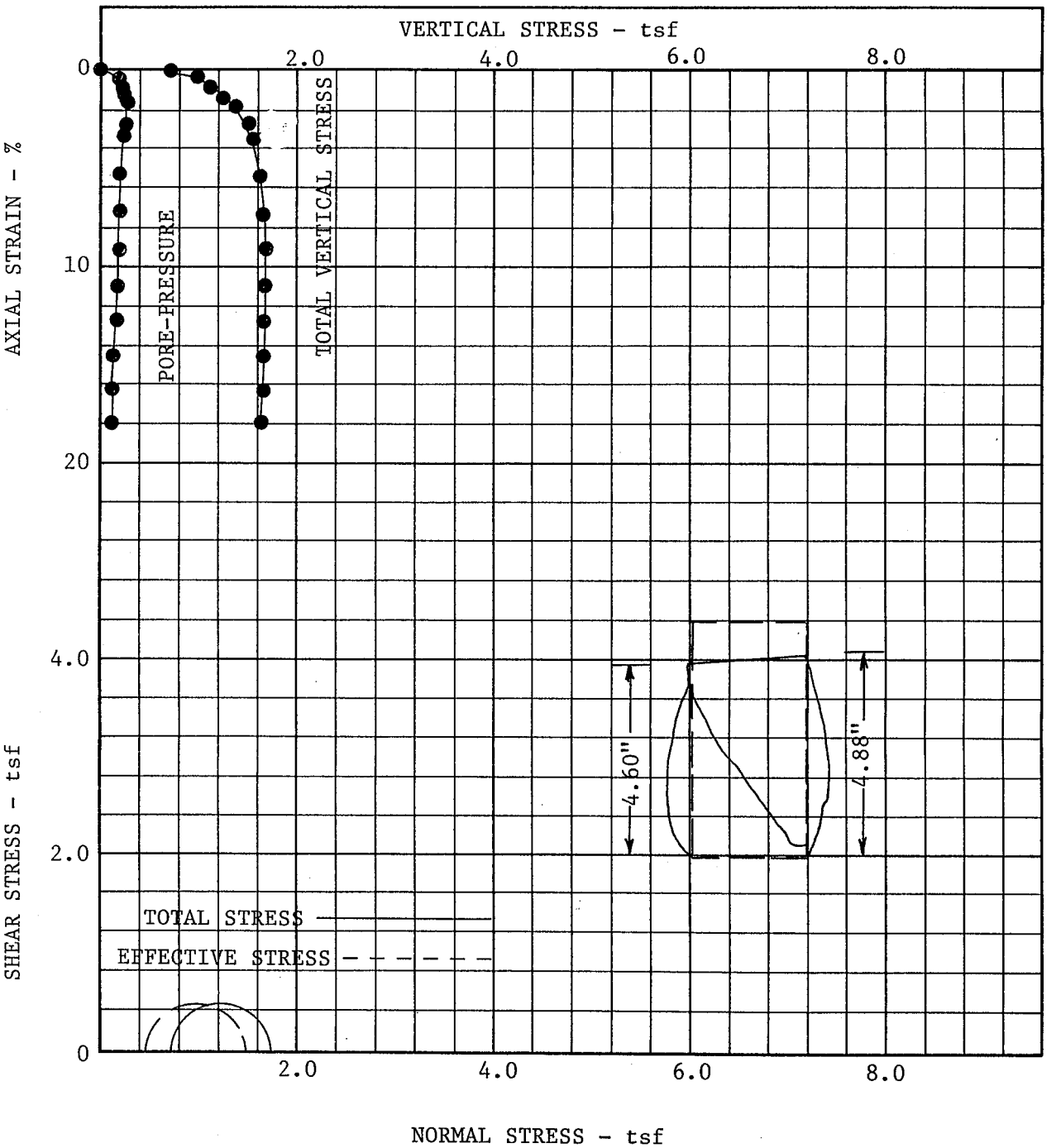
BORING: B-16 SAMPLE: 7 SECTION I DEPTH: 45.0' to 47.0'

MATERIAL: Soft to medium-stiff brown mottled with gray clayey silt, little fine sand, few seams of fine sand.

INITIAL MOISTURE CONTENT: 28% UNIT WET WEIGHT: 121 pcf

FINAL MOISTURE CONTENT: 27% UNIT DRY WEIGHT: 95 pcf

SIZE: 5.60' x 2.87" Diam.



PLATE

.400"
.360"
.040"

TRIAXIAL COMPRESSION TEST DATA and COMPUTATION SHEET

Project: _____ Job: P-160F Date: 6/20-22/89

Boring: B-16 Sample: 7 I Depth: 45.0'-47.0'

Material: _____

Height: 5.60" Circ. 9.03" Dia. 2.87" Area 6.489in²

Volume: 595.46 cm³

Wet Wt. of Sple: 1156.0 gms.

UWW : 121.2 pcf

UDW : 94.7 pcf

Vol. Change cc: —

Type of Test: Cū, SAT.

Proving Ring : 2213

Moisture Content	Before Test	After Test
Can - Dish No.	—	T-1
Wet Wt. Sple + Can	1156.0	1144.6
Dry Wt. Sple + Can	—	—
Wt. of Can	—	—
Wt. of Dry Soil	903.2	903.2
Wt. of Water	252.8	241.4
% Moisture	28.0	26.7

$B_s = 99/100 = 99\%$

ΔH=.040" 5.56"

Conf Press t s f	Dial Defl.	% Strain	1 - Strain	Avr. Area	Load Dial Reading	Load lbs	Shearing Strength psi	Shearing Strength t s f	Tot. Vert. Stress tsf
0.72	0	.0000	1.0000	6.40	0			0.00	0.72
	25	.0045	9955	6.43	85			0.29	1.01
	50	.0090	9910	6.46	131			0.45	1.17
	75	.0135	9865	6.49	168			0.58	1.30
	100	.0180	.9820	6.52	200			0.68	1.40
	25	.0225	.9775	6.55	215			0.73	1.45
	50	.0270	.9730	6.58	230			0.78	1.50
	75	.0315	.9685	6.61	243			0.82	1.54
	200	.0360	.9640	6.64	254			0.85	1.57
	50	.0450	.9550	6.70	268			0.89	1.61
	300	.0540	.9460	6.77	278			0.92	1.64
	50	.0629	.9371	6.83	289			0.94	1.66
	400	.0719	.9281	6.90	298			0.96	1.68
	50	.0809	.9191	6.96	306			0.98	1.70
	500	.0899	.9101	7.03	311			0.99	1.71
	50	.0989	.9011	7.10	312			0.98	1.70
	600	.1079	.8921	7.17	317			0.99	1.71
	50	.1169	.8831	7.25	318			0.98	1.70
	700	.1259	.8741	7.32	321			0.98	1.70
	50	.1349	.8651	7.40	325			0.98	1.70
	800	.1439	.8561	7.48	327			0.97	1.69
	50	.1529	.8471	7.56	328			0.97	1.69
	900	.1619	.8381	7.64	325			0.95	1.67
	50	.1709	.8291	7.72	321			0.93	1.65
	1000	.1799	.8201	7.80	316			0.90	1.62
	50								
	1100								
	50								
	1200								

TRIAXIAL SHEAR TEST
(with pore pressure measurement)

PROJECT: _____ JOB: P-160F DATE: 6/22/89

BORING: B-16 SAMPLE: 7 I DEPTH: 45.0 to 47.0'

MATERIAL: _____

	BEFORE	AFTER
MOISTURE CONTENT:	28.0%	26.7%

CHAMBER PRESSURE (σ_{CH}) 80 psi, BACK PRESSURE (σ_B) 70 psi

CONFINING PRESSURE (σ_c) 0.72 tsf, INITIAL PORE PRESSURE (u_i) 70.0 psi

Dial Defl. Inch $\times 10^{-3}$	% Strain	Total Pore Pressure psi	Excess Pore Pressure		Total Axial Stress tsf	Effective Axial Stress tsf	Effective Radial Stress tsf	Deviator Stress tsf
			psi	tsf				
δ	ϵ	u_t	$u_t - u_i$	u	σ_a	$\sigma_a - u$	$\sigma_r - u$	$\sigma_a - \sigma_r$
0	0	70.0	0.00	0.00	0.72	0.72	0.72	0.00
25	0.45	73.0	3.0	0.22	1.01	0.79	0.50	0.29
50	0.90	73.5	3.5	0.25	1.17	0.92	0.47	0.45
75	1.35	73.7	3.7	0.27	1.30	1.03	0.45	0.58
100	1.80	73.9	3.9	0.28	1.40	1.12	0.44	0.68
25	2.25	73.8	3.8	0.27	1.45	1.18	0.45	0.73
50	2.70	73.6	3.6	0.26	1.50	1.24	0.46	0.78
75	3.15	73.6	3.6	0.26	1.54	1.28	0.46	0.82
200	3.60	73.5	3.5	0.25	1.57	1.32	047	0.85
50	4.50	73.4	3.4	0.24	1.61	1.37	0.48	0.89
300	5.40	73.3	3.3	0.24	1.64	1.40	048	0.92
50	6.29	73.2	3.2	0.23	1.66	1.43	0.49	0.94
400	7.19	73.1	3.1	0.22	1.68	1.46	0.50	0.96
50	8.09	73.1	3.1	0.22	1.70	1.48	0.50	0.98
500	8.99	73.0	3.0	0.22	1.71	1.49	0.50	0.99
50	9.89	72.9	2.9	0.21	1.70	1.49	0.51	0.98
600	10.79	72.8	2.8	0.20	1.71	1.51	0.52	0.99
50	11.69	72.7	2.7	0.19	1.70	1.51	0.53	0.98
700	12.59	72.6	2.6	0.19	1.70	1.51	0.53	0.98
50	13.49	72.5	2.5	0.18	1.70	1.52	0.54	0.98
800	14.39	72.3	2.3	0.17	1.69	1.52	0.55	0.97
50	15.29	72.1	2.1	0.15	1.69	1.54	0.57	0.97
900	16.19	72.0	2.0	0.14	1.67	1.53	0.58	0.95
50	17.09	71.9	1.9	0.14	1.65	1.51	0.58	0.93
1000	17.99	71.8	1.8	0.13	1.62	1.49	0.59	0.90
50								
1100								
50								
1200								

0.495
0.72
1.215

TRIAXIAL COMPRESSION TEST
SATURATED, CONSOLIDATED, UNDRAINED
WITH PORE-PRESSURE MEASUREMENTS

PROJECT: KANAWHA RIVER LANDFILL

LOCATION: CEDAR GROVE, W. VA.

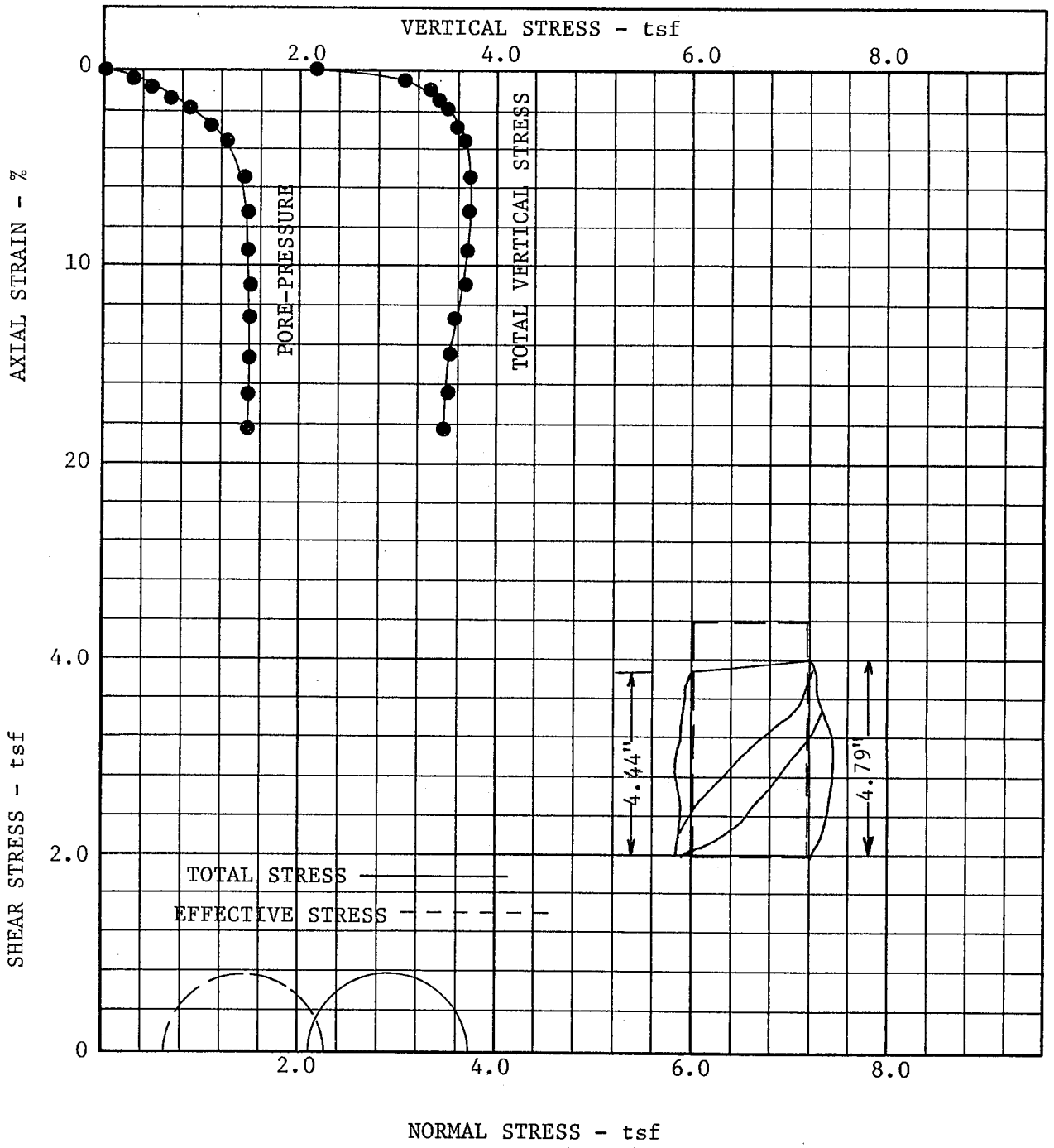
BORING: B-16 SAMPLE: 7 SECTION II DEPTH: 45.0' to 47.0'

MATERIAL: Soft to medium-stiff brown mottled with gray clayey silt, little fine sand, few seams of fine sand.

INITIAL MOISTURE CONTENT: 29% UNIT WET WEIGHT: 121 pcf

FINAL MOISTURE CONTENT: 26% UNIT DRY WEIGHT: 94 pcf

SIZE: 5.60" x 2.87" Diam.



PLATE

.800
.728"
.072"

TRIAXIAL COMPRESSION TEST DATA and COMPUTATION SHEET

Project: _____ Job: P-160 F Date: 6/20-22/89

Boring: B-16 Sample: 7 II Depth: 450'-470'

Material: _____

Height: 5.60" Circ. 9.03" Dia. 2.87" Area 6.489 in²

Volume: 595.46 cm³

Wet Wt. of Sple: 1149.3 gms.

UWW : 120.5 pcf

UDW : 93.5 pcf

Vol. Change cc: —

Type of Test: Cu, SAT

Proving Ring : 2213

Moisture Content	Before Test	After Test
Can - Dish No.	—	T-1
Wet Wt. Sple + Can	1149.3	1124.2
Dry Wt. Sple + Can	—	—
Wt. of Can	—	—
Wt. of Dry Soil	891.8	891.8
Wt. of Water	257.5	232.4
% Moisture	28.9	26.1

B = 9.95/10.0 = 0.995

ΔH=.072" 5.53"

Conf Press t s f	Dial Defl.	% Strain	1 - Strain	Avr. Area	Load Dial Reading	Load lbs	Shearing Strength psi	Shearing Strength t s f	Tot. Vert. Stress tsf
2.16	0	.0000	1.0000	6.32	0			0.00	2.16
	25	.0045	.9955	6.35	282			0.99	3.15
	50	.0090	.9910	6.38	336			1.17	3.33
	75	.0136	.9864	6.41	367			1.28	3.44
	100	.0181	.9819	6.44	386			1.34	3.50
	25	.0226	.9774	6.47	404			1.39	3.55
	50	.0271	.9729	6.50	418			1.43	3.59
	75	.0316	.9684	6.53	426			1.45	3.61
	200	.0362	.9638	6.56	432			1.49	3.65
	50	.0452	.9548	6.62	447			1.51	3.67
	300	.0542	.9458	6.68	454			1.52	3.68
	50	.0633	.9367	6.75	459			1.52	3.68
	400	.0723	.9277	6.81	460			1.51	3.67
	50	.0814	.9186	6.88	463			1.50	3.66
	500	.0904	.9096	6.95	462			1.48	3.64
	50	.0995	.9005	7.02	466			1.48	3.64
	600	.1085	.8915	7.09	463			1.46	3.62
	50	.1175	.8825	7.16	465			1.45	3.61
	700	.1266	.8734	7.24	462			1.42	3.58
	50	.1356	.8644	7.31	445			1.36	3.52
	800	.1447	.8553	7.39	456			1.38	3.54
	50	.1537	.8463	7.47	459			1.37	3.53
	900	.1627	.8373	7.55	456			1.35	3.51
	50	.1718	.8282	7.63	454			1.33	3.49
	1000	.1808	.8192	7.71	450			1.30	3.46

TRIAXIAL SHEAR TEST
(with pore pressure measurement)

PROJECT: _____ JOB: P-160F DATE: 6/22/89

BORING: B-16 SAMPLE: 7 II DEPTH: 45.0' to 47.0'

MATERIAL: _____

	BEFORE	AFTER
MOISTURE CONTENT:	28.9%	26.1%

CHAMBER PRESSURE (σ_{cH}) 80 psi, BACK PRESSURE (σ_B) 50 psi

CONFINING PRESSURE (σ_c) 2.16 tsf, INITIAL PORE PRESSURE (u_i) 50.0 psi

Dial Defl. Inch $\times 10^{-3}$	% Strain	Total Pore Pressure psi	Excess Pore Pressure		Total Axial Stress tsf	Effective Axial Stress tsf	Effective Radial Stress tsf	Deviator Stress tsf
			psi	tsf				
δ	ϵ	u_t	$u_t - u_i$	u	σ_a	$\sigma_a - u$	$\sigma_r - u$	$\sigma_a - \sigma_r$
0	0	50.0	0.00	0.00	2.16	2.16	2.16	0.00
25	0.45	55.0	5.0	0.36	3.15	2.79	1.80	0.99
50	0.90	57.2	7.2	0.52	3.33	2.81	1.64	1.17
75	1.36	60.0	10.0	0.72	3.44	2.72	1.44	1.28
100	1.81	62.5	12.5	0.90	3.50	2.60	1.26	1.34
25	2.26	64.6	14.6	1.05	3.55	2.50	1.11	1.39
50	2.71	66.0	16.0	1.15	3.59	2.44	1.01	1.43
75	3.16	67.0	17.0	1.22	3.61	2.39	0.94	1.45
200	3.62	67.9	17.9	1.29	3.65	2.36	0.87	1.49
50	4.52	69.1	19.1	1.38	3.67	2.29	0.78	1.51
300	5.42	70.0	20.0	1.44	3.68	2.24	0.72	1.52
50	6.33	70.6	20.6	1.48	3.68	2.20	0.68	1.52
400	7.23	71.0	21.0	1.51	3.67	2.16	0.65	1.51
50	8.14	71.5	21.5	1.55	3.66	2.11	0.61	1.50
500	9.04	71.6	21.6	1.56	3.64	2.08	0.60	1.48
50	9.95	71.8	21.8	1.57	3.64	2.07	0.59	1.48
600	10.85	71.9	21.9	1.58	3.62	2.04	0.58	1.46
50	11.75	71.8	21.8	1.57	3.61	2.04	0.59	1.45
700	12.66	71.7	21.7	1.56	3.58	2.02	0.60	1.42
50	13.56	71.7	21.7	1.56	3.52	1.96	0.60	1.36
800	14.47	71.8	21.8	1.57	3.54	1.97	0.59	1.38
50	15.37	71.9	21.9	1.58	3.53	1.95	0.58	1.37
900	16.27	71.8	21.8	1.57	3.51	1.94	0.59	1.35
50	17.18	71.6	21.6	1.56	3.49	1.93	0.60	1.33
1000	18.08	71.5	21.5	1.55	3.46	1.91	0.61	1.30
50								
1100								
50								
1200								

0.76
2.16
2.92

TRIAXIAL COMPRESSION TEST
SATURATED, CONSOLIDATED, UNDRAINED
WITH PORE-PRESSURE MEASUREMENTS

PROJECT: KANAWHA RIVER LANDFILL

LOCATION: CEDAR GROVE, W. VA.

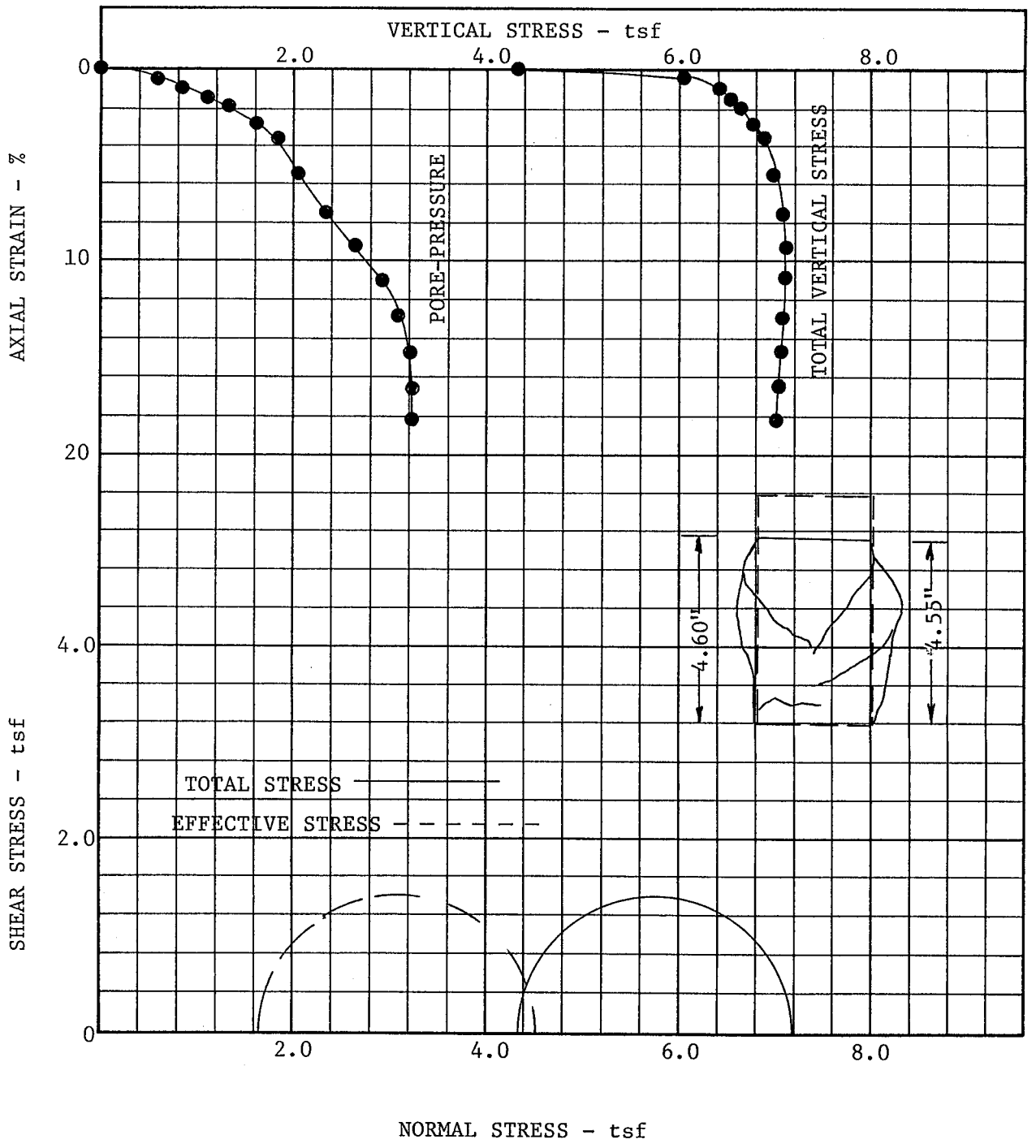
BORING: B-16 SAMPLE: 7 SECTION III DEPTH: 45.0' to 47.0'

MATERIAL: Soft to medium-stiff brown mottled with gray clayey silt, little fine sand, few seams of fine sand.

INITIAL MOISTURE CONTENT: 27% UNIT WET WEIGHT: 122 pcf

FINAL MOSITURE CONTENT: 23% UNIT DRY WEIGHT: 96 pcf

SIZE: 5.60' x 2.87' Diam.



PLATE

.600"
1670"
.1070"

TRIAXIAL COMPRESSION TEST DATA and COMPUTATION SHEET

Project: _____ Job: P-160 F Date: 6/20-2[redacted]

Boring: B-16 Sample: 7 III Depth: 45.0'-47.0'

Material: _____

Height: 5.60" Circ. 9.03" Dia. 2.87" Area 6.489 IN²

Volume: 595.46 cm³

Wet Wt. of Sple: 1164.7 gms.

UWW : 122.1 pcf

UDW : 96.1 pcf

Vol. Change cc: —

Type of Test: CU, SAT

Proving Ring : 2213

Moisture Content	Before Test	After Test
Can - Dish No.	—	L-1
Wet Wt. Sple + Can	1164.7	1129.9
Dry Wt. Sple + Can	—	—
Wt. of Can	—	—
Wt. of Dry Soil	916.9	916.9
Wt. of Water	247.8	213.0
% Moisture	27.0	23.2

B = 99/100 = 99%

ΔH = .070" 5.53"

Conf Press t s f	Dial Defl.	% Strain	1 - Strain	Avr. Area	Load Dial Reading	Load lbs	Shearing Strength psi	Shearing Strength t s f	Tot. Vert. Stress tsf
4.32	0	.0000	1.0000	6.33	0			0	4.32
	25	.0045	.9955	6.36	495			1.74	6.06
	50	.0090	.9910	6.39	535			2.09	6.41
	75	.0136	.9864	6.42	553			2.23	6.55
	100	.0181	.9819	6.45	566			2.33	6.65
	25	.0226	.9774	6.48	575			2.40	6.72
	50	.0271	.9729	6.51	582			2.45	6.77
	75	.0316	.9684	6.54	589			2.49	6.81
	200	.0362	.9638	6.57	595			2.53	6.85
	50	.0452	.9548	6.63	609			2.63	6.95
	300	.0542	.9458	6.69	613			2.64	6.96
	50	.01033	.9367	6.76	624			2.70	7.02
	400	.0723	.9277	6.82	631			2.73	7.05
	50	.0814	.9186	6.89	641			2.79	7.11
	500	.0904	.9096	6.96	649			2-82	7.14
	50	.0995	.9005	7.03	651			2.81	7.13
	600	.1085	.8915	7.10	657			2.83	7.15
	50	.1175	.8825	7.17	658			2.81	7.13
	700	.1266	.8734	7.25	657			2.77	7.09
	50	.1356	.8644	7.32	658			2.75	7.07
	800	.1447	.8553	7.40	665			2.77	7.09
	50	.1537	.8463	7.48	672			2.79	7.11
	900	.1627	.8373	7.56	668			2.74	7.06
	50	.1718	.8282	7.64	665			2.69	7.01
	1000	.1808	.8192	7.73	660			2.62	6.94
	50	.1899	.8101	7.81					
	1100	.1989	.8011	7.90					
	50	.2080	.7920	7.99					
	1200	.2170	.7830	8.08					

TRIAXIAL SHEAR TEST
(with pore pressure measurement)

PROJECT: _____ JOB: P-160F DATE: 6/23/89

BORING: B-16 SAMPLE: 7 III DEPTH: 45.0' to 47.0'

MATERIAL: _____

	BEFORE	AFTER
MOISTURE CONTENT:	27.0%	23.2%

CHAMBER PRESSURE (σ_{CH}) 80 psi, BACK PRESSURE (σ_B) 20 psi

CONFINING PRESSURE (σ_c) 4.32 tsf, INITIAL PORE PRESSURE (u_i) 20.0 psi

Dial Defl. Inch $\times 10^{-3}$	% Strain	Total Pore Pressure psi	Excess Pore Pressure		Total Axial Stress tsf	Effective Axial Stress tsf	Effective Radial Stress tsf	Deviator Stress tsf	
			psi	tsf					
δ	ϵ	u_t	$u_t - u_i$	u	σ_a	$\sigma_a - u$	$\sigma_r - u$	$\sigma_a - \sigma_r$	
0	0	20.0	0.00	0.00	4.32	4.32	4.32	0.00	
25	0.45	28.3	8.3	0.60	6.06	5.46	3.72	1.74	
50	0.90	31.5	11.5	0.83	6.41	5.58	3.49	2.09	
75	1.36	35.7	15.7	1.13	6.55	5.42	3.19	2.23	
100	1.81	38.3	18.3	1.32	6.65	5.33	3.00	2.33	
25	2.26	40.5	20.5	1.48	6.72	5.24	2.84	2.40	
50	2.71	42.2	22.2	1.60	6.77	5.17	2.72	2.45	
75	3.16	44.0	24.0	1.73	6.81	5.08	2.59	2.49	
200	3.62	46.0	26.0	1.87	6.85	4.98	2.45	2.53	
50	4.52	47.2	27.2	1.96	6.95	4.99	2.36	2.63	
300	5.42	48.6	28.6	2.06	6.96	4.90	2.26	2.64	
50	6.33	51.0	31.0	2.23	7.02	4.79	2.09	2.70	1.41 4.32 5.73
400	7.23	53.2	33.2	2.39	7.05	4.66	1.93	2.73	
50	8.14	55.4	35.4	2.55	7.11	4.56	1.77	2.79	
500	9.04	56.8	36.8	2.65	7.14	4.49	1.67	2.82	
50	9.95	59.3	39.3	2.83	7.13	4.30	1.49	2.81	1.415 4.32 5.735
600	10.85	60.8	40.8	2.94	7.15	4.21	1.38	2.83	
50	11.75	62.2	42.2	3.04	7.13	4.09	1.28	2.81	
700	12.66	62.9	42.9	3.09	7.09	4.00	1.23	2.77	
50	13.56	63.6	43.6	3.14	7.07	3.93	1.18	2.75	
800	14.47	64.5	44.5	3.20	7.09	3.89	1.12	2.77	
50	15.37	64.8	44.8	3.23	7.11	3.88	1.09	2.79	
900	16.27	64.9	44.9	3.23	7.06	3.83	1.09	2.74	
50	17.18	65.0	45.0	3.24	7.01	3.77	1.08	2.69	
1000	18.08	65.1	45.1	3.25	6.94	3.69	1.07	2.62	
50									
1100									
50									
1200									

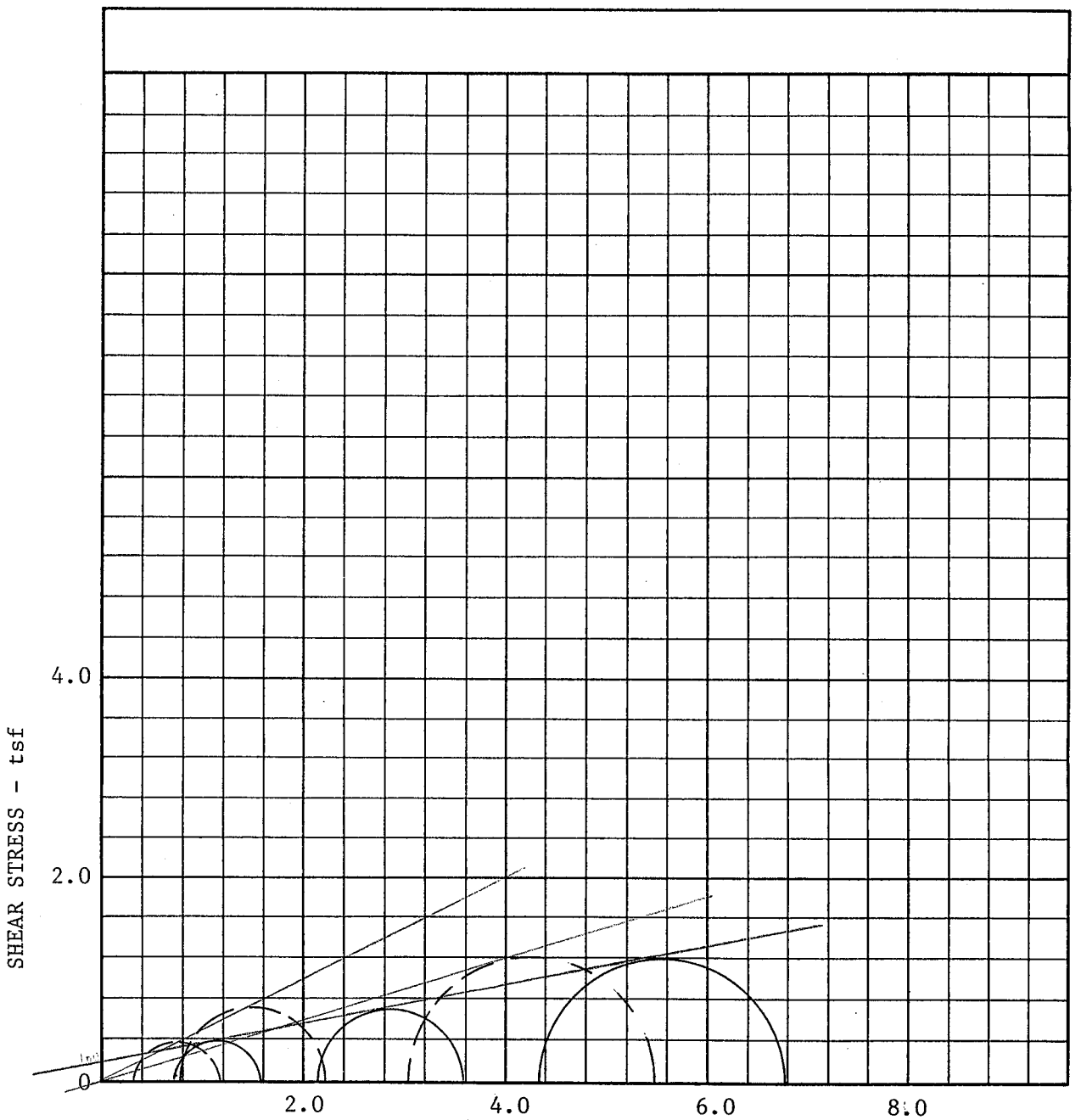
SUMMARY OF TRIAXIAL COMPRESSION TESTS
SATURATED CONSOLIDATED, UNDRAINED
WITH PORE-PRESSURE MEASUREMENTS

PROJECT: KANAWHA RIVER LANDFILL

LOCATION: CEDAR GROVE, W. VA.

BORING: B-16 SAMPLE: 8 SECTIONS I, II, III DEPTH: 4.8' to 48.0' 50.0

MATERIAL: Soft to medium-stiff brown mottled with gray clayey silt, little fine sand, trace medium sand, few seams of silt.



PLATE

TRIAXIAL COMPRESSION TEST
SATURATED, CONSOLIDATED, UNDRAINED
WITH PORE-PRESSURE MEASUREMENTS

PROJECT: KANAWHA RIVER LANDFILL

LOCATION: CEDAR GROVE, W. VA.

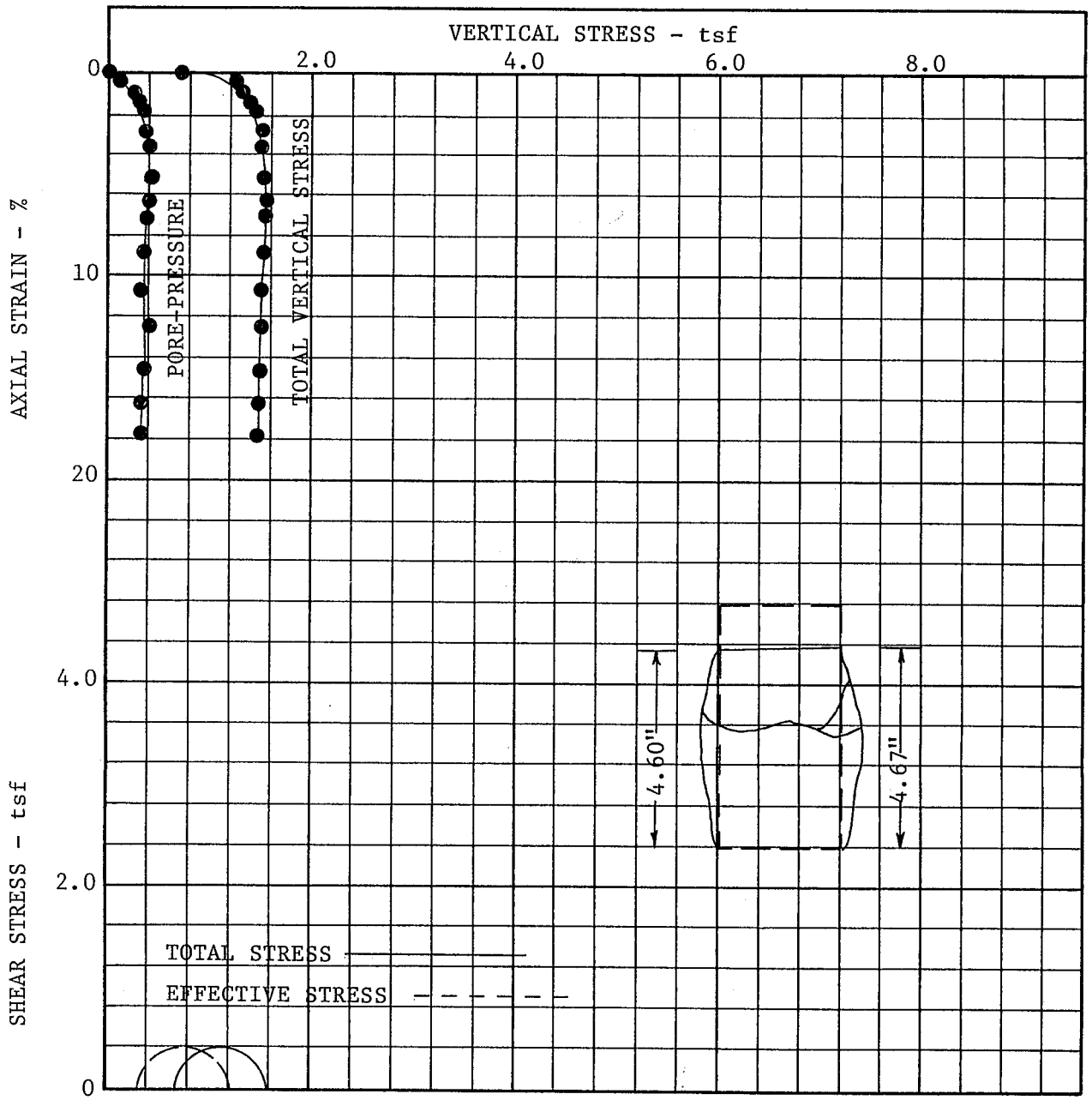
BORING: B-16 SAMPLE: 8 SECTION I DEPTH: 48.0' to 50.0'

MATERIAL: Soft to medium-stiff brown mottled with gray clayey silt, little fine sand, trace medium sand, few lenses of silt.

INITIAL MOISTURE CONTENT: 29% UNIT WET WEIGHT: 121 pcf

FINAL MOISTURE CONTENT: 27% UNIT DRY WEIGHT: 94 pcf

SIZE: 5.60" x 2.87" Diam.



PLATE

.500"
.489"
.011"

TRIAXIAL COMPRESSION TEST DATA and COMPUTATION SHEET

Project: _____ Job: P-160F Date: 6/8-12/89

Boring: B-16 Sample: 8 I Depth: 48.0'-50.0'

Material: _____

Circ. 9.03"

Height: 5.60" Dia. 2.87" Area 6.489 in²

Volume: 595.46 cm³

Wet Wt. of Sple: 1153.46 gms.

UWW : 120.9 pcf

UDW : 93.9 pcf

Vol. Change cc: —

Type of Test: Cū, SAT.

Proving Ring: 2213

Moisture Content	Before Test	After Test
Can - Dish No.	—	L-1
Wet Wt. Sple + Can	1153.46	1140.48
Dry Wt. Sple + Can	—	—
Wt. of Can	—	—
Wt. of Dry Soil	895.64	895.64
Wt. of Water	257.82	244.84
% Moisture	28.8	27.3

ΔH=.011" 5.59"

D = 9.9/10 = 99%

Conf Press t s f	Dial Defl.	% Strain	1 - Strain	Avr. Area	Load Dial Reading	Load lbs	Shearing Strength psi	Shearing Strength t s f	Tot. Vert. Stress tsf
0.72"	0	.0000	1.0000	6.46	0			0.00	0.72
	25	.0045	.9955	6.49	150			0.52	1.24
	50	.0089	.9911	6.52	175			0.60	1.32
	75	.0134	.9866	6.55	195			0.66	1.38
	100	.0179	.9821	6.58	214			0.73	1.45
	25	.0224	.9776	6.61	228			0.77	1.49
	50	.0268	.9732	6.64	233			0.78	1.50
	75	.0313	.9687	6.67	220			0.74	1.46
	200	.0358	.9642	6.70	227			0.76	1.48
	50	.0447	.9553	6.76	234			0.77	1.49
	300	.0537	.9463	6.83	252			0.82	1.54
	50	.0626	.9374	6.89	263			0.85	1.57
	400	.0716	.9284	6.96	263			0.84	1.56
	50	.0805	.9195	7.02	262			0.83	1.55
	500	.0894	.9106	7.09	269			0.85	1.57
	50	.0984	.9016	7.17	258			0.80	1.52
	600	.1073	.8927	7.24	256			0.79	1.51
	50	.1163	.8837	7.31	268			0.82	1.54
	700	.1252	.8748	7.38	279			0.84	1.56
	50	.1342	.8658	7.46	269			0.80	1.52
	800	.1431	.8569	7.54	263			0.78	1.50
	50	.1521	.8479	7.62	270			0.79	1.51
	900	.1610	.8390	7.70	276			0.80	1.52
	50	.1699	.8301	7.78	275			0.79	1.51
	1000	.1789	.8211	7.87	273			0.77	1.49

TRIAXIAL SHEAR TEST
(with pore pressure measurement)

PROJECT: _____ JOB: P-160F DATE: 6/12/89

BORING: B-16 SAMPLE: B I DEPTH: 48.0'-50.0'

MATERIAL: _____

	BEFORE	AFTER
MOISTURE CONTENT:	28.8%	27.3%

CHAMBER PRESSURE (σ_{cH}) 80 psi, BACK PRESSURE (σ_B) 70 psi

CONFINING PRESSURE (σ_c) 0.72 tsf, INITIAL PORE PRESSURE (u_i) 70 psi

Dial Defl. Inch $\times 10^{-3}$	% Strain	Total Pore Pressure psi	Excess Pore Pressure		Total Axial Stress tsf	Effective Axial Stress tsf	Effective Radial Stress tsf	Deviator Stress tsf	
			psi	tsf					
δ	ϵ	u_t	$u_t - u_i$	u	σ_a	$\sigma_a - u$	$\sigma_r - u$	$\sigma_a - \sigma_r$	
0	.0000	70.0	0.00	0.00	0.72	0.72	0.72	0.00	
25	.0045	72.4	2.4	0.17	1.24	1.07	0.55	0.52	
50	.0089	73.9	3.9	0.28	1.32	1.04	0.44	0.60	
75	.0134	74.3	4.3	0.31	1.38	1.07	0.41	0.66	
100	.0179	74.7	4.7	0.34	1.45	1.11	0.38	0.73	0.39 0.72 1.11
25	.0224	75.2	5.2	0.37	1.49	1.12	0.35	0.77	
50	.0268	75.3	5.3	0.38	1.50	1.12	0.34	0.78	
75	.0313	75.1	5.1	0.37	1.46	1.09	0.35	0.74	
200	.0358	75.5	5.5	0.40	1.48	1.08	0.32	0.76	
50	.0447	75.8	5.8	0.42	1.49	1.07	0.30	0.77	0.425 0.72 1.145
300	.0537	75.7	5.7	0.41	1.54	1.13	0.31	0.82	
50	.0626	75.6	5.6	0.40	1.57	1.17	0.32	0.85	
400	.0716	75.4	5.4	0.39	1.52	1.17	0.33	0.84	
50	.0805	75.4	5.4	0.39	1.55	1.16	0.33	0.83	
500	.0894	75.2	5.2	0.37	1.57	1.20	0.35	0.85	
50	.0984	75.1	5.1	0.37	1.52	1.15	0.35	0.80	
600	.1073	75.0	5.0	0.36	1.51	1.15	0.36	0.79	
50	.1163	74.9	4.9	0.35	1.54	1.19	0.37	0.82	
700	.1252	75.5	5.5	0.40	1.56	1.16	0.32	0.84	
50	.1342	75.1	5.1	0.37	1.52	1.15	0.35	0.80	
800	.1431	74.9	4.9	0.35	1.50	1.15	0.37	0.78	
50	.1521	74.8	4.8	0.35	1.51	1.16	0.37	0.79	
900	.1610	74.6	4.6	0.33	1.52	1.19	0.39	0.80	
50	.1699	74.4	4.4	0.32	1.51	1.19	0.40	0.79	
1000	.1789	74.2	4.2	0.30	1.49	1.19	0.42	0.77	
50									
1100									
50									
1200									

TRIAXIAL COMPRESSION TEST
SATURATED, CONSOLIDATED, UNDRAINED
WITH PORE-PRESSURE MEASUREMENTS

PROJECT: KANAWHA RIVER LANDFILL

LOCATION: CEDAR GROVE, W. VA.

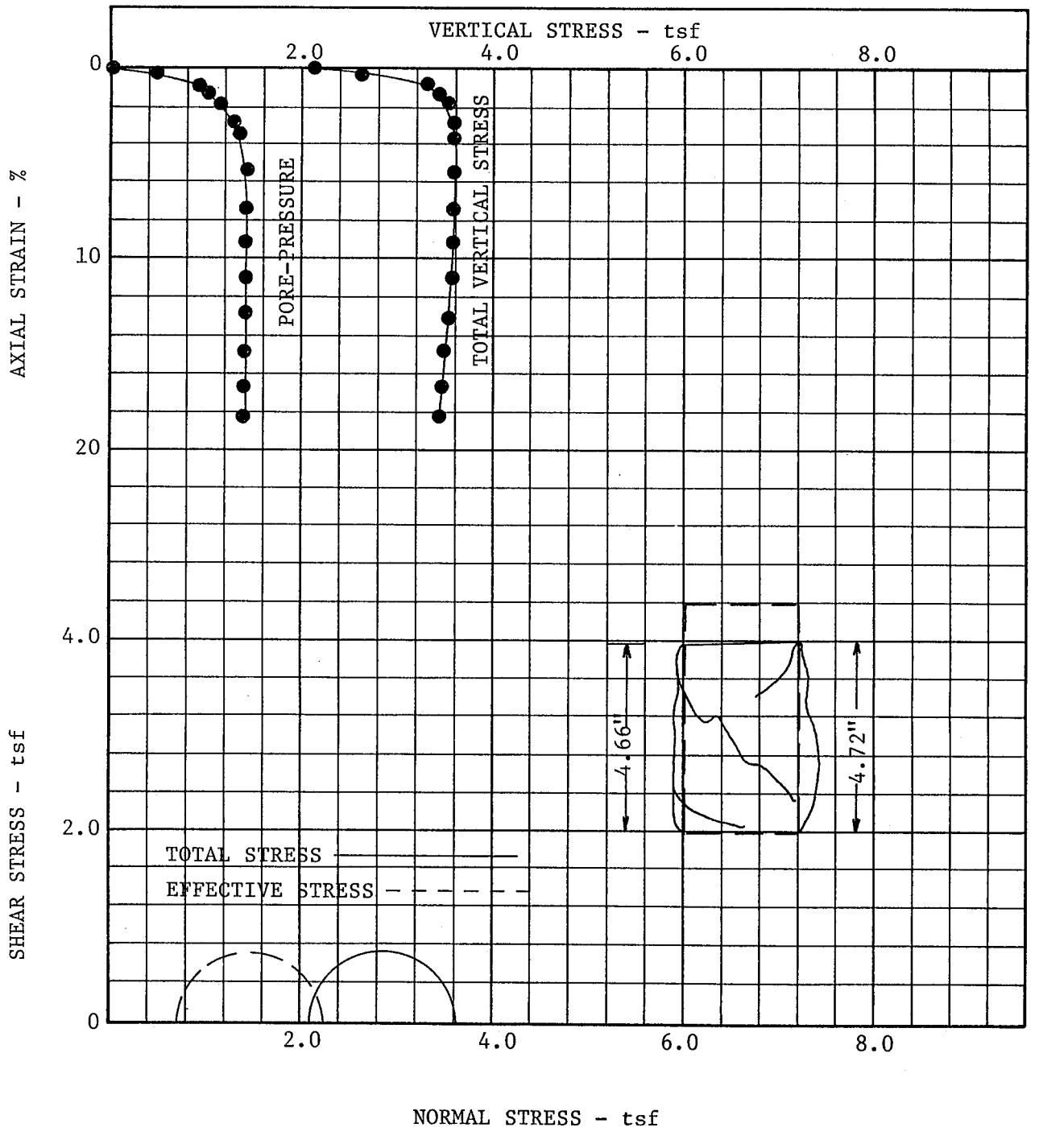
BORING: B-16 SAMPLE: 8 SECTION II DEPTH: 48.0' to 50.0'

MATERIAL: Soft to medium-stiff brown mottled with gray clayey silt, little fine sand, trace medium sand, few lenses of silt.

INITIAL MOISTURE CONTENT: 27% UNIT WET WEIGHT: 123 pcf

FINAL MOISTURE CONTENT: 24% UNIT DRY WEIGHT: 97 pcf

SIZE: 5.60" x 2.87" Diam.



PLATE

.400"
.320"
.080"

TRIAXIAL COMPRESSION TEST DATA and COMPUTATION SHEET

Project: _____ Job: P-160 F Date: 6/8-12/89

Boring: B-16 Sample: 8 II Depth: 48.0'-50.0'

Material: _____

Height: 5.60" Circ. 9.03" Dia. 2.87" Area 6.489 IN²

Volume: 595.46 cm³

Wet Wt. of Sple: 1172.38 gms.

UWW : 122.9 pcf

UDW : 97.1 pcf

Vol. Change cc: —

Type of Test: Cū, SAT.

Proving Ring : 2213

Moisture Content	Before Test	After Test
Can - Dish No.	—	B-1
Wet Wt. Sple + Can	1172.38	1144.90
Dry Wt. Sple + Can	—	—
Wt. of Can	—	—
Wt. of Dry Soil	926.32	926.32
Wt. of Water	246.06	218.58
% Moisture	26.6	23.6

Δlt = .080" 5.52"

Conf Press t s f	Dial Defl.	% Strain	1 - Strain	Avr. Area	Load Dial Reading	Load lbs	Shearing Strength psi	Shearing Strength t s f	Tot. Vert. Stress tsf
2.16	0	.0000	1.0000	6.30	0			0.00	2.16
	25	.0045	.9955	6.33	122			0.43	2.59
	50	.0091	.9909	6.36	317			0.11	3.27
	75	.0136	.9864	6.39	372			1.30	3.46
	100	.0181	.9819	6.42	392			1.36	3.52
	25	.0226	.9774	6.45	403			1.39	3.55
	50	.0272	.9728	6.48	409			1.41	3.57
	75	.0317	.9683	6.51	414			1.42	3.58
	200	.0362	.9638	6.54	418			1.43	3.59
	50	.0453	.9547	6.60	422			1.43	3.59
	300	.0543	.9457	6.66	427			1.43	3.59
	50	.0634	.9366	6.73	433			1.43	3.59
	400	.0725	.9275	6.79	435			1.43	3.59
	50	.0815	.9185	6.86	436			1.42	3.58
	500	.0906	.9094	6.93	436			1.40	3.56
	50	.0996	.9004	7.00	439			1.40	3.56
	600	.1087	.8913	7.07	439			1.38	3.54
	50	.1178	.8822	7.14	438			1.37	3.53
	700	.1268	.8732	7.21	434			1.34	3.50
	50	.1359	.8641	7.29	433			1.32	3.48
	800	.1449	.8551	7.37	432			1.31	3.47
	50	.1540	.8460	7.45	435			1.30	3.46
	900	.1630	.8370	7.53	437			1.29	3.45
	50	.1721	.8279	7.61	436			1.28	3.44
	1000	.1812	.8188	7.69	435			1.26	3.42
	50								
	1600								
	50								
	1200								

TRIAXIAL SHEAR TEST
(with pore pressure measurement)

PROJECT: _____ JOB: P-160 F DATE: 6/12/89

BORING: B-16 SAMPLE: B II DEPTH: 48.0'-50.0'

MATERIAL: _____

	BEFORE	AFTER
MOISTURE CONTENT:	26.6 %	23.6 %

CHAMBER PRESSURE (σ_{CH}) 80 psi, BACK PRESSURE (σ_B) 50 psi

CONFINING PRESSURE (σ_c) 2.16 tsf, INITIAL PORE PRESSURE (u_i) 50 psi

Dial Defl. Inch $\times 10^{-3}$	% Strain	Total Pore Pressure psi	Excess Pore Pressure psi	Excess Pore Pressure tsf	Total Axial Stress tsf	Effective Axial Stress tsf	Effective Radial Stress tsf	Deviator Stress tsf
δ	ϵ	u_t	$u_t - u_i$	u	σ_a	$\sigma_a - u$	$\sigma_r - u$	$\sigma_a - \sigma_r$
0	.00000	50.0	0.00	0.00	2.16	2.16	2.16	0.00
25	0.45	57.0	7.0	0.50	2.59	2.09	1.66	0.43
50	0.91	62.7	12.7	0.91	3.27	2.36	1.25	1.11
75	1.36	64.8	14.8	1.07	3.46	2.39	1.09	1.30
100	1.81	66.3	16.3	1.17	3.52	2.35	0.99	1.36
25	2.26	67.3	17.3	1.25	3.55	2.30	0.91	1.39
50	2.72	67.9	17.9	1.29	3.57	2.28	0.87	1.41
75	3.17	68.5	18.5	1.33	3.58	2.25	0.83	1.42
200	3.62	69.0	19.0	1.37	3.59	2.22	0.79	1.43
50	4.53	69.5	19.5	1.40	3.59	2.19	0.76	1.43
300	5.43	69.9	19.9	1.43	3.59	2.16	0.73	1.43
50	6.34	70.1	20.1	1.45	3.59	2.14	0.71	1.43
400	7.25	70.2	20.2	1.45	3.59	2.14	0.71	1.43
50	8.15	70.2	20.2	1.45	3.58	2.13	0.71	1.42
500	9.06	70.2	20.2	1.45	3.56	2.11	0.71	1.90
50	9.96	70.5	20.5	1.48	3.56	2.08	0.68	1.40
600	10.87	70.4	20.4	1.47	3.54	2.07	0.69	1.38
50	11.78	70.3	20.3	1.46	3.53	2.07	0.70	1.37
700	12.68	70.1	20.1	1.45	3.50	2.05	0.71	1.34
50	13.59	70.0	20.0	1.44	3.48	2.04	0.72	1.32
800	14.49	69.9	19.9	1.43	3.47	2.04	0.73	1.31
50	15.40	70.0	20.0	1.44	3.46	2.02	0.72	1.30
900	16.30	70.0	20.0	1.44	3.45	2.01	0.72	1.29
50	17.21	69.5	19.5	1.40	3.44	2.04	0.76	1.28
1000	18.12	69.2	19.2	1.38	3.42	2.04	0.78	1.26
50								
1100								
50								
1200								

0.715
2.16
2.875

TRIAXIAL COMPRESSION TEST
SATURATED, CONSOLIDATED, UNDRAINED
WITH PORE-PRESSURE MEASUREMENTS

PROJECT: KANAWHA RIVER LANDFILL

LOCATION: CEDAR GROVE, W. VA.

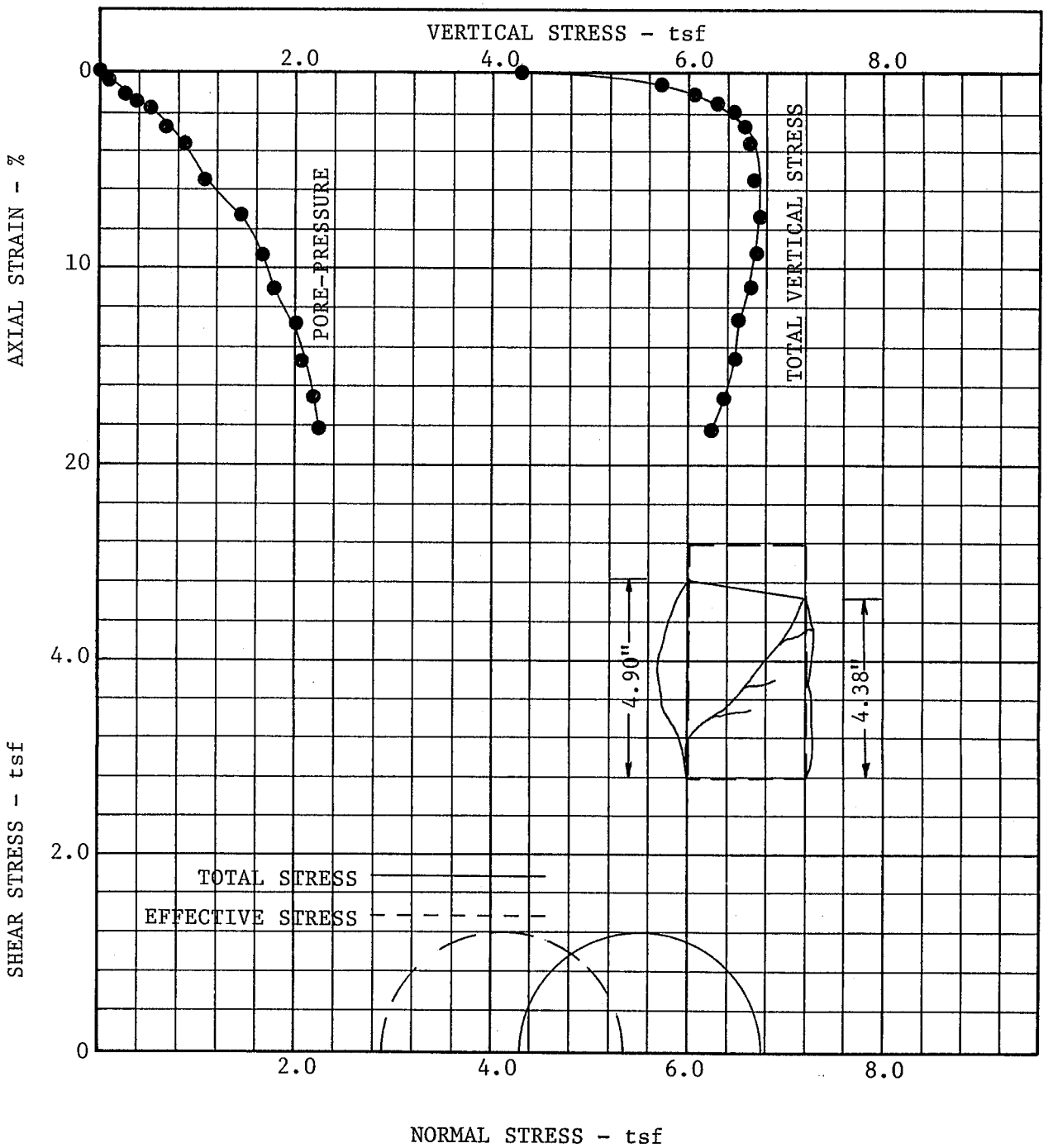
BORING: B-16 SAMPLE: 8 SECTION III DEPTH: 48.0' to 50.0'

MATERIAL: Soft to medium-stiff brown mottled with gray clayey silt, little fine sand, trace medium sand, few seams of silt.

INITIAL MOISTURE CONTENT: 27% UNIT WET WEIGHT: 122 pcf

FINAL MOISTURE CONTENT: 23% UNIT DRY WEIGHT: 96 pcf

SIZE: 5.60" x 2.87" Diam.



PLATE

1400"
.303"
.097"

TRIAXIAL COMPRESSION TEST DATA and COMPUTATION SHEET

Project: _____ Job: P-160 F Date: 6/12-15/89

Boring: B-16 Sample: 8 III Depth: 48.0' to 50.0'

Material: _____

Height: 5.60" Circ. 9.03" Dia. 2.87" Area 6.489 IN²

Volume: 595.46 cm³

Wet Wt. of Sple: 1166.36 gms.

UWW : 122.3 pcf

UDW : 96.4 pcf

Vol. Change cc: —

Type of Test: CU, SAT.

Proving Ring : .2213

Moisture Content	Before Test	After Test
Can - Dish No.	—	B-1
Wet Wt. Sple + Can	1166.36	1126.10
Dry Wt. Sple + Can	—	—
Wt. of Can	—	—
Wt. of Dry Soil	918.90	918.90
Wt. of Water	247.46	207.20
% Moisture	26.9	22.5

ΔH=.097" 5.50"

Conf Press t s f	Dial Defl.	% Strain	1 - Strain	Avr. Area	Load Dial Reading	Load lbs	Shearing Strength psi	Shearing Strength t s f	Tot. Vert. Stress tsf
4.32	0	.0000	1.0000	6.27	0			0.00	4.32
	25	.0045	.9955	6.30	392			1.39	5.71
	50	.0091	.9909	6.33	501			1.81	6.13
	75	.0136	.9864	6.36	527			2.03	6.35
	100	.0182	.9818	6.39	541			2.14	6.46
	25	.0227	.9773	6.42	552			2.22	6.54
	50	.0273	.9727	6.45	558			2.26	6.58
	75	.0318	.9682	6.48	564			2.30	6.62
	200	.0364	.9636	6.51	568			2.33	6.65
	50	.0455	.9545	6.57	575			2.37	6.69
	300	.0545	.9455	6.63	581			2.39	6.71
	50	.0636	.9364	6.70	585			2.40	6.72
	400	.0727	.9273	6.76	590			2.42	6.74
	50	.0818	.9182	6.83	592			2.41	6.73
	500	.0909	.9091	6.90	590			2.37	6.69
	50	.1000	.9000	6.97	590			2.35	6.67
	600	.1091	.8909	7.04	591			2.33	6.65
	50	.1182	.8818	7.11	575			2.19	6.51
	700	.1273	.8727	7.18	574			2.16	6.48
	50	.1364	.8636	7.26	582			2.19	6.51
	800	.1455	.8545	7.34	577			2.13	6.45
	50	.1545	.8455	7.42	571			2.06	6.38
	900	.1636	.8364	7.50	569			2.03	6.35
	50	.1727	.8273	7.58	564			1.97	6.29
	1000	.1818	.8182	7.66	560			1.92	6.24

TRIAXIAL SHEAR TEST
(with pore pressure measurement)

PROJECT: _____ JOB: P-160F DATE: 6/15/89

BORING: B-11 SAMPLE: B III DEPTH: 48.0'-50.0'

MATERIAL: _____

	BEFORE	AFTER
MOISTURE CONTENT:	26.9%	22.5%

CHAMBER PRESSURE (σ_{ch}) 80 psi, BACK PRESSURE (σ_b) 20 psi

CONFINING PRESSURE (σ_c) 4.32 tsf, INITIAL PORE PRESSURE (u_i) 20 psi

Dial Defl. Inch $\times 10^{-3}$	% Strain	Total Pore Pressure psi	Excess Pore Pressure psi	Excess Pore Pressure tsf	Total Axial Stress tsf	Effective Axial Stress tsf	Effective Radial Stress tsf	Deviator Stress tsf
δ	ϵ	u_t	$u_t - u_i$	u	σ_a	$\sigma_a - u$	$\sigma_r - u$	$\sigma_a - \sigma_r$
0	0	20.0	0.00	0.00	4.32	4.32	4.32	0.00
25	0.45	22.0	2.0	.14	5.71	4.57	4.18	1.39
50	0.91	24.0	4.0	.29	6.13	5.84	4.03	1.81
75	1.36	25.5	5.5	.40	6.35	5.95	3.92	2.03
100	1.82	27.0	7.0	.50	6.46	5.96	3.82	2.14
25	2.27	28.5	8.5	.61	6.54	5.93	3.71	2.22
50	2.73	29.9	9.9	.71	6.58	5.87	3.61	2.26
75	3.18	31.0	11.0	.79	6.62	5.83	3.53	2.30
200	3.64	32.3	12.3	.89	6.65	5.76	3.43	2.38
50	4.55	34.0	14.0	1.01	6.69	5.68	3.31	2.37
300	5.45	36.1	16.1	1.16	6.71	5.55	3.16	2.39
50	6.36	38.0	18.0	1.30	6.72	5.42	3.02	2.40
400	7.27	40.0	20.0	1.44	6.74	5.30	2.88	2.42
50	8.18	41.9	21.9	1.58	6.73	5.15	2.74	2.41
500	9.09	43.5	23.5	1.69	6.69	5.00	2.63	2.37
50	10.00	44.5	24.5	1.76	6.67	4.91	2.56	2.35
600	10.91	45.6	25.6	1.84	6.65	4.81	2.48	2.33
50	11.82	46.6	26.6	1.92	6.51	4.59	2.40	2.19
700	12.73	47.9	27.9	2.01	6.48	4.47	2.31	2.16
50	13.64	48.6	28.6	2.06	6.51	4.45	2.26	2.19
800	14.55	49.5	29.5	2.12	6.45	4.33	2.20	2.13
50	15.45	50.0	30.0	2.16	6.38	4.22	2.16	2.06
900	16.36	50.5	30.5	2.20	6.35	4.15	2.12	2.03
50	17.27	50.9	30.9	2.22	6.29	4.07	2.10	1.97
1000	18.18	51.1	31.1	2.24	6.24	4.00	2.08	1.92
50								
1100								
50								
1200								

1.21
4.32
5.53

JOB NO. _____ DATE: May 13, 05

PROJECT KANAWHA RIVER FLY ASH LANDFILL

LOCATION: _____

SOURCE OF MATERIAL FA-B17 DEPTH 41.9 ft.

DESCRIPTION OF MATERIAL FLY ASH

ASTM DESCRIPTION SILT ML

MAX. DRY DENSITY, pcf		OPTIMUM MOISTURE, %	
SPECIFIC GRAVITY	2.34		
SAMPLE HGT., mm	144.990	SAMPLE DIA., mm	72.100
CHAMBER PRESSURE, psi	70.0	BACK PRESSURE, psi	40.0
B-PARAMETER	1.00	EFFECTIVE PRESSURE, psi	30.0
INITIAL HEAD, mm	4633.0		

	BEFORE	AFTER
WATER CONTENT, %	33.0	33.0
WET DENSITY, pcf	110.6	
DRY DENSITY, pcf	83.2	
SATURATION, %	102.10	
VOID RATIO	0.7567	

PERMEABILITY COEFFICIENT K, cm/sec 1.13E-05

FLEXIBLE-MEMBRANE PERMEABILITY TEST

American Electric Power Service Corp.

Groveport, Ohio

AEP

JOB NO. _____ DATE: Jun 3, 05

PROJECT KANAWHA RIVER FLY ASH LANDFILL

LOCATION: _____

SOURCE OF MATERIAL FA-B18 DEPTH 52.0 ft.

DESCRIPTION OF MATERIAL _____

ASTM DESCRIPTION LEAN CLAY CL

MAX. DRY DENSITY, pcf		OPTIMUM MOISTURE, %	
SPECIFIC GRAVITY	2.64		
SAMPLE HGT., mm	148.030	SAMPLE DIA., mm	70.590
CHAMBER PRESSURE, psi	92.0	BACK PRESSURE, psi	50.0
B-PARAMETER	1.00	EFFECTIVE PRESSURE, psi	42.0
INITIAL HEAD, mm	4768.7		

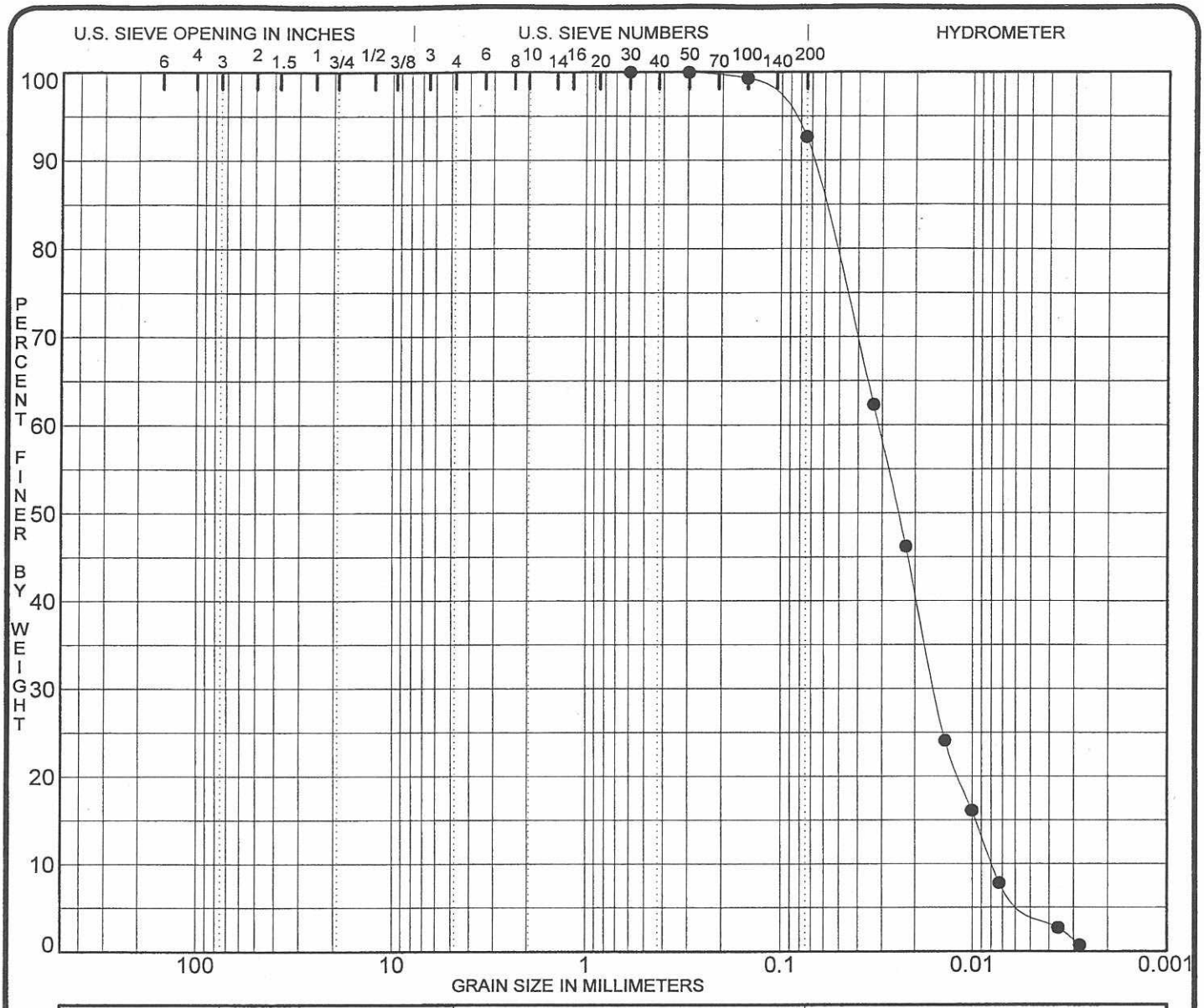
	BEFORE	AFTER
WATER CONTENT, %	34.8	27.7
WET DENSITY, pcf	118.7	
DRY DENSITY, pcf	88.1	
SATURATION, %	105.37	
VOID RATIO	0.8714	

PERMEABILITY COEFFICIENT K, cm/sec 6.61E-09

FLEXIBLE-MEMBRANE PERMEABILITY TEST

American Electric Power Service Corp.

Groveport, Ohio



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
●	FA-B17	41.9			NP	NP	NP	2.34
			SILT ML					
			FLY ASH					

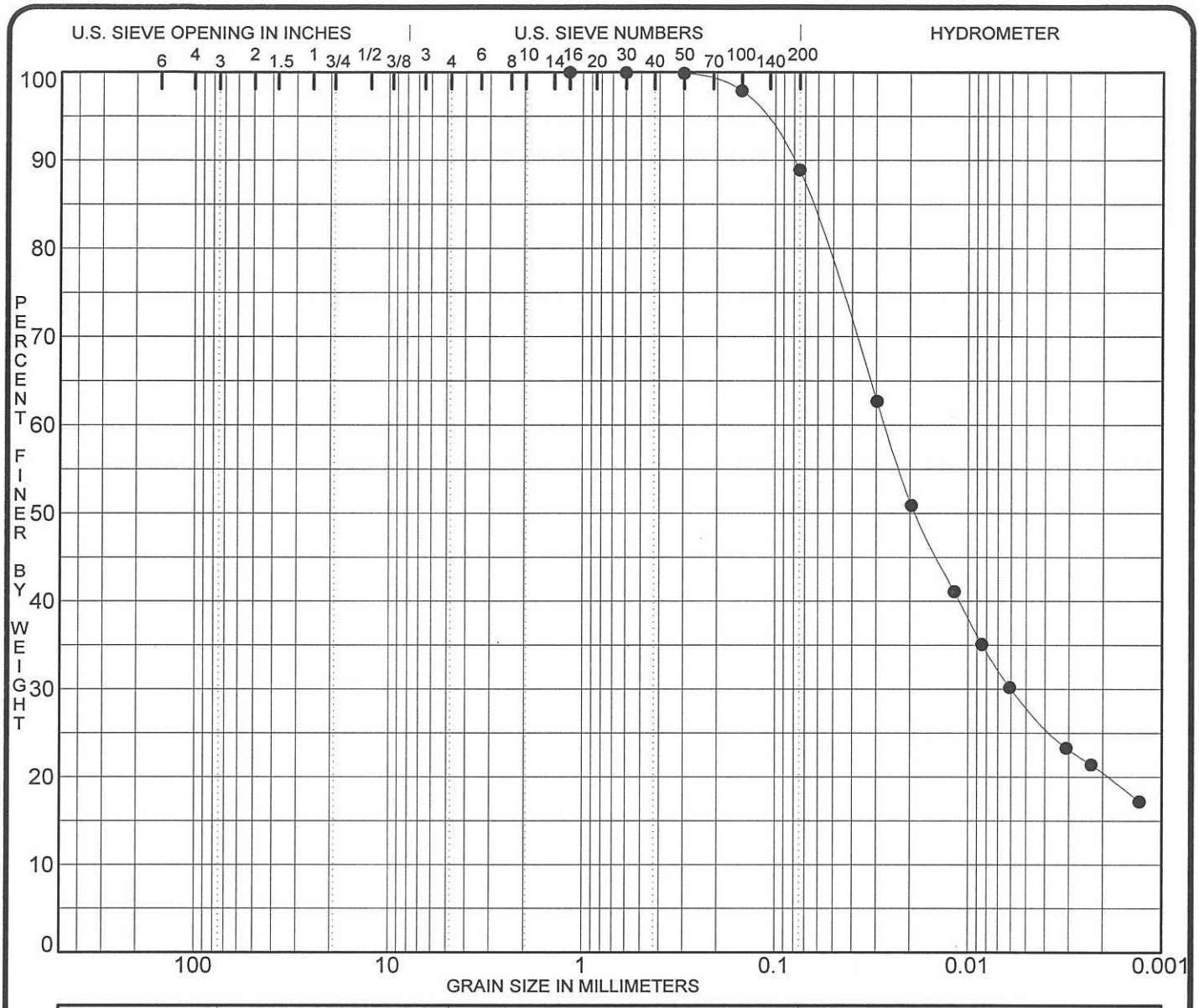
	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	%<.002
●	FA-B17	41.9	0.600	0.032	0.016	0.008	0.0	7.3	92.7	

PROJECT KANAWHA RIVER FLY ASH LANDFILL - JOB NO.

DATE 5/13/05

GRADATION CURVES

American Electric Power Service Corp.
Groveport, OH 43125



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
● FA-B17	56.9			32.5	20.7	11.8	2.68
		LEAN CLAY CL					
		SILTY CLAY					

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	%<.002
● FA-B17	56.9	1.180	0.027	0.006		0.0	11.1	88.9	20.4

PROJECT KANAWHA RIVER FLY ASH LANDFILL -

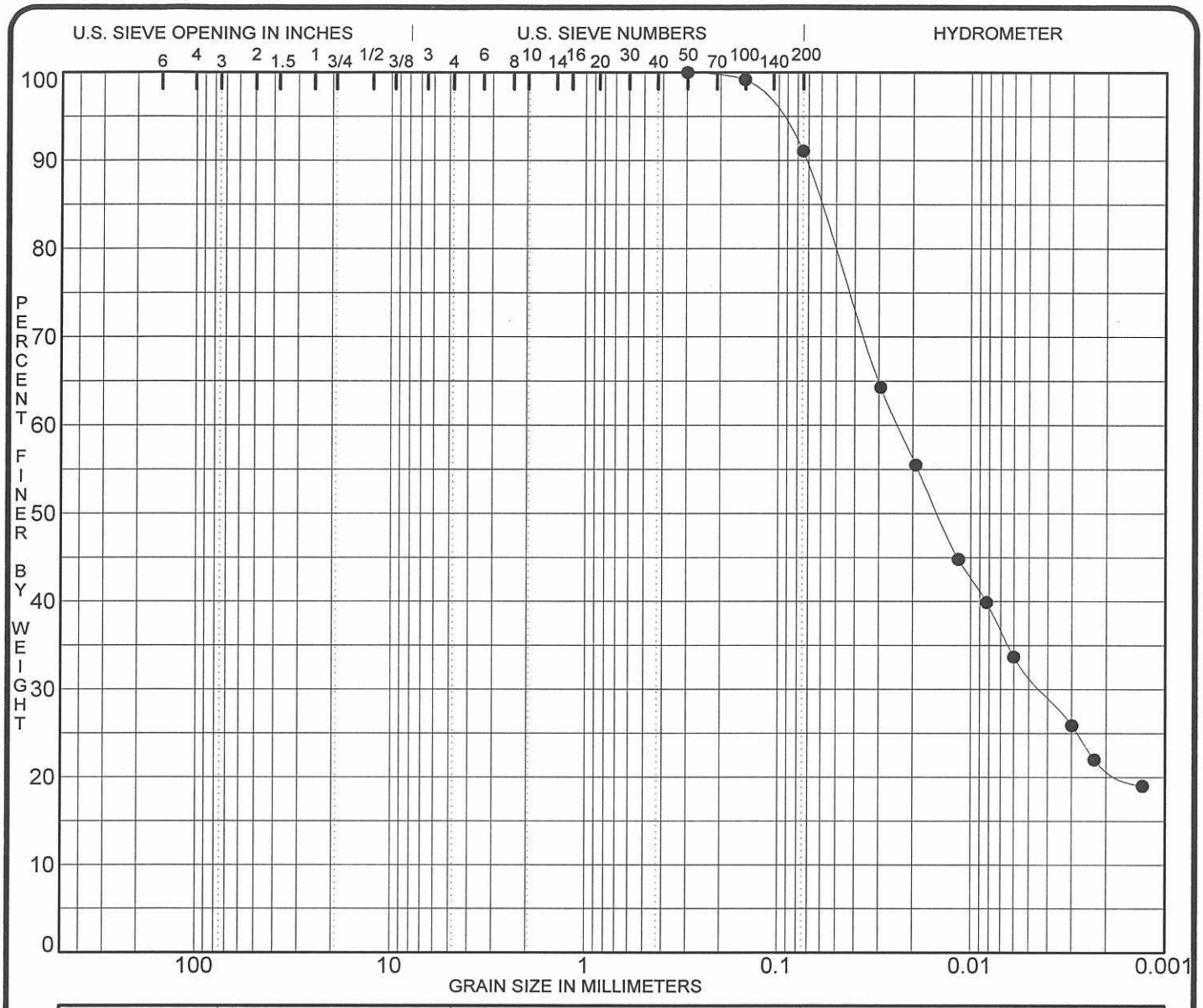
JOB NO.

DATE 6/3/05

GRADATION CURVES

American Electric Power Service Corp.

Groveport, OH 43125



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
●	**FA-B17**	**66.9**			**35.3**	**21.3**	**14.0**	**2.67**
			LEAN CLAY CL					
			GRAY CLAY					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	%<.002
●	**FA-B17**	**66.9**	**0.300**	**0.024**	**0.004**		**0.0**	**9.0**	**91.0**	**21.3**

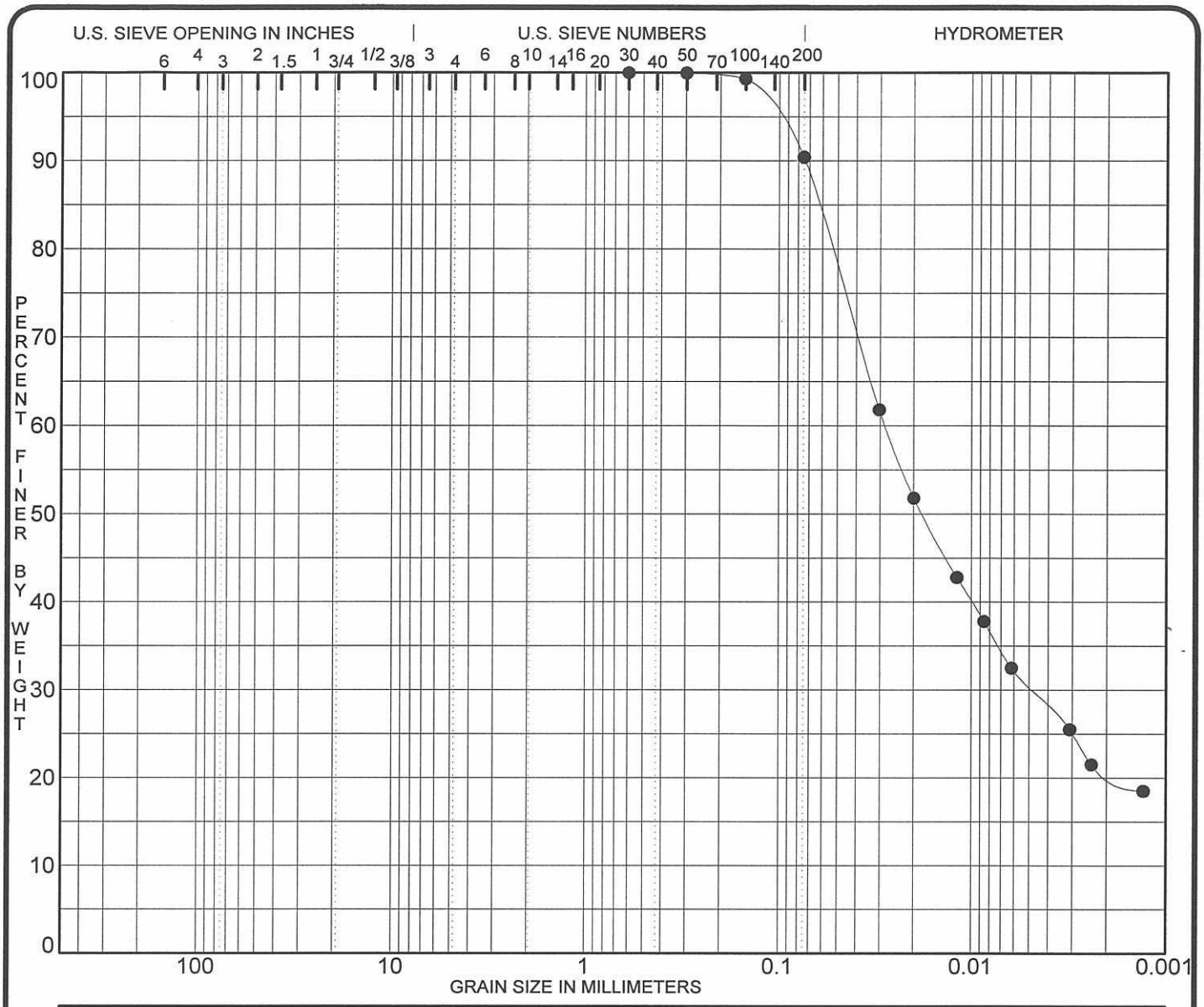
PROJECT **KANAWHA RIVER FLY ASH LANDFILL -** JOB NO.

DATE **6/3/05**

GRADATION CURVES

American Electric Power Service Corp.

Groveport, OH 43125



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
●	FA-B18	52.0			36.7	22.3	14.3	2.64
			LEAN CLAY CL					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	%<.002
●	FA-B18	52.0	0.600	0.028	0.005		0.0	9.6	90.4	20.6

PROJECT KANAWHA RIVER FLY ASH LANDFILL - JOB NO.

DATE 6/3/05

GRADATION CURVES

American Electric Power Service Corp.

Groveport, OH 43125

CIVIL LABORATORY
AMERICAN ELECTRIC POWER
4001 BIXBY ROAD
GROVEPORT, OHIO 43125
(614) 836-4205

AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

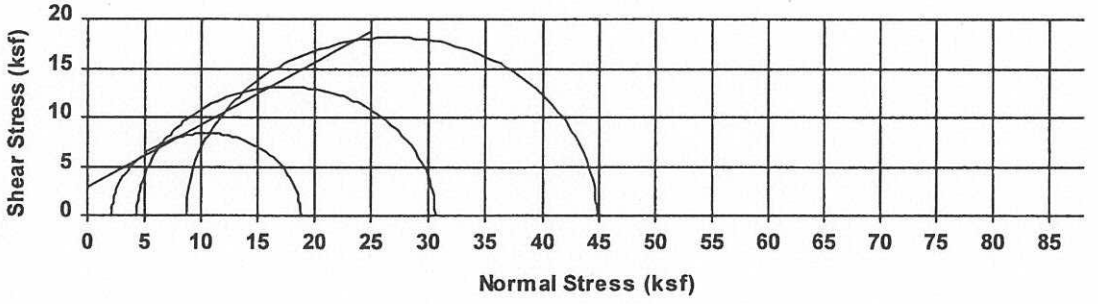
Sample No: **9572**

Material Description: Shelby Tube - Boring FA-B17; 41.9' - 43.9' Fly Ash

Point Designation	Initial Conditions			Final Conditions			
	Water Content, %	Dry Density, pcf	Degree of Saturation	Water Content, %	Confining Stress, (ksf)	Deviator Stress	Induced Pore Pressure (ksf)
A	35.0%	80.5	100.7%	34.48%	2.16	16.63	-5.59
B	33.0%	83.2	102.1%	33.0%	4.32	26.23	-6.58
C	29.7%	87.5	103.9%	30.1%	8.64	36.24	-6.47

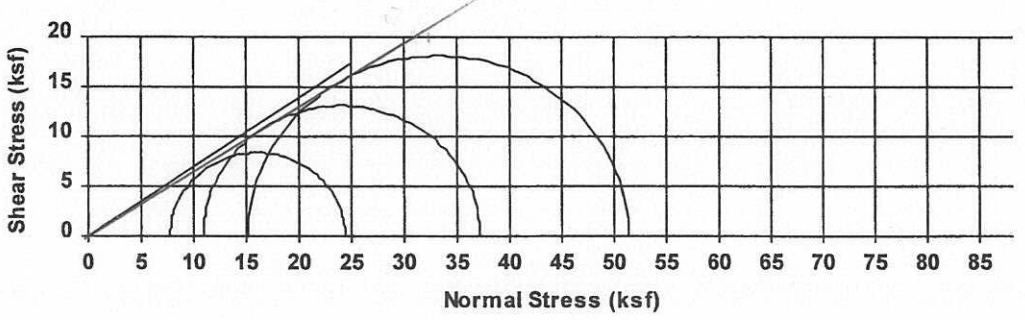
Point Designation	Axial Strain, %	q, (ksf)	Effective Stresses, (ksf)			Total Stresses, (ksf)		
			Major, (ksf)	Minor, (ksf)	p', (ksf)	Major, (ksf)	Minor, (ksf)	p, (ksf)
A	14.0%	8.32	24.38	7.75	16.06	18.79	2.16	10.48
B	8.5%	13.12	37.13	10.90	24.02	30.55	4.32	17.44
C	7.5%	18.12	51.34	15.11	33.22	44.88	8.64	26.76

Total Stress Envelope



ϕ: 32.6 °
c : 2.84 ksf

Effective Stress Envelope



ϕ ': 34.8 °
c' : 0.00 ksf

Report Date: Friday, May 13, 2005

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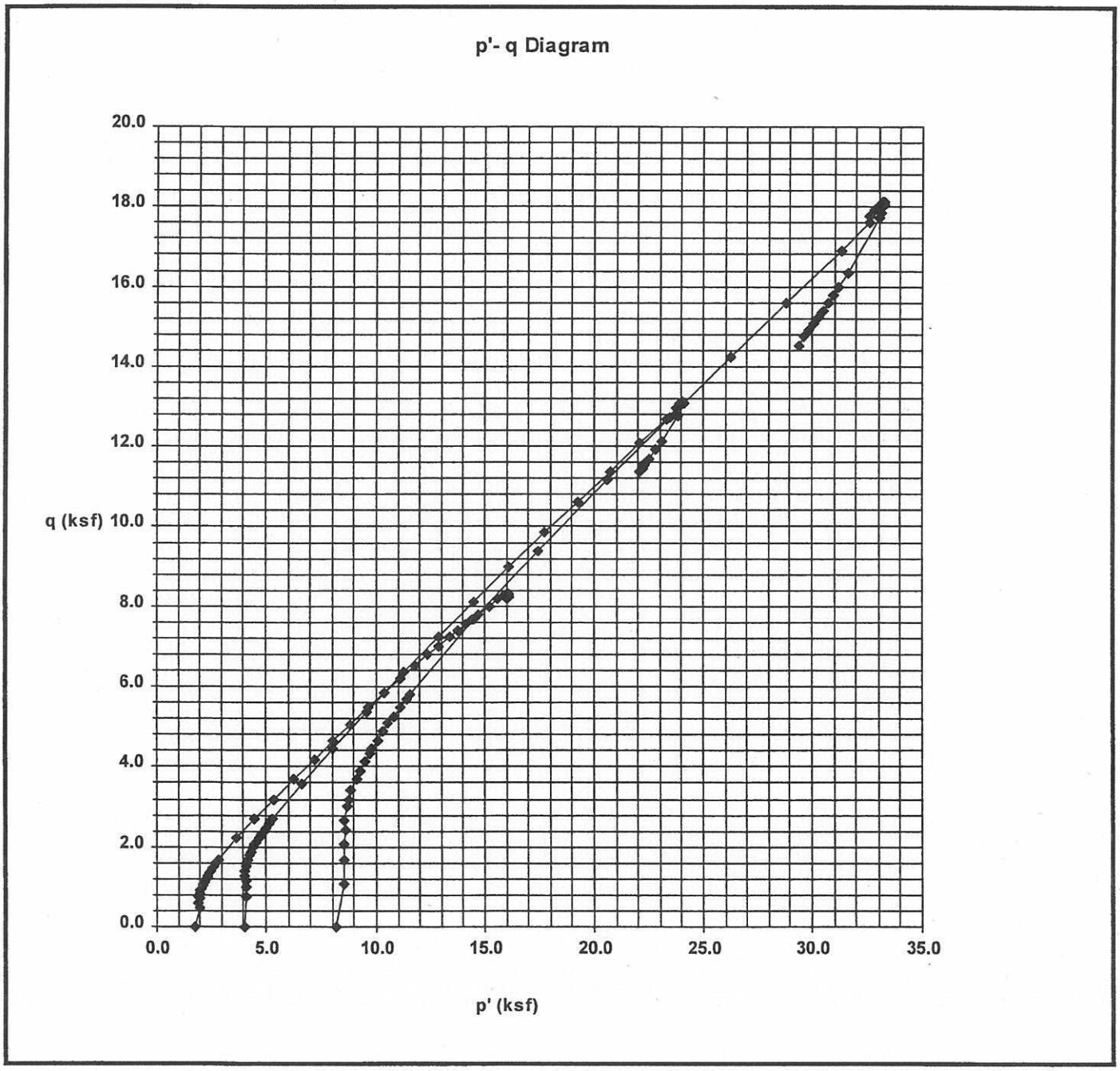
AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9572**



Report Date: Friday, May 13, 2005

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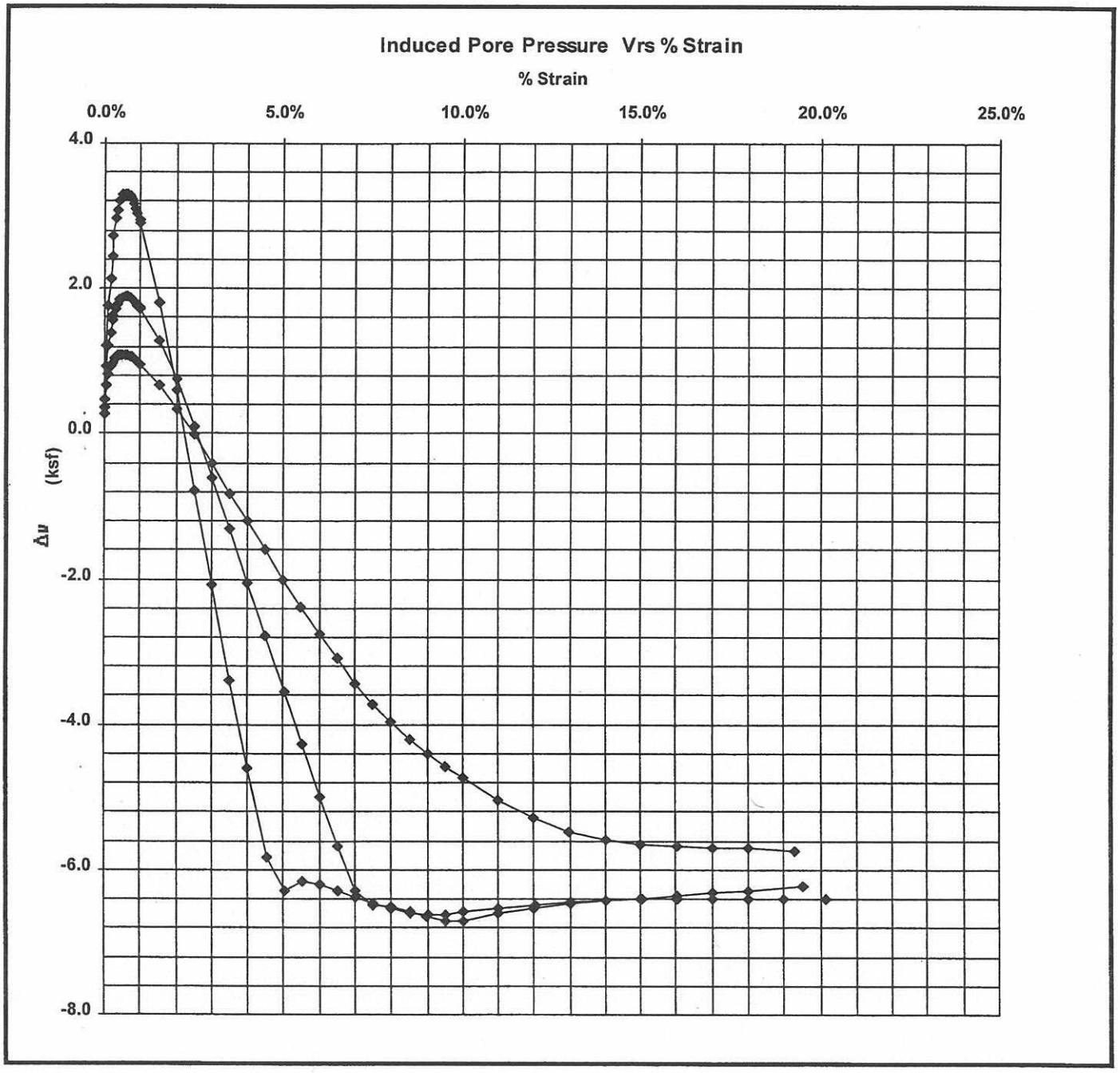
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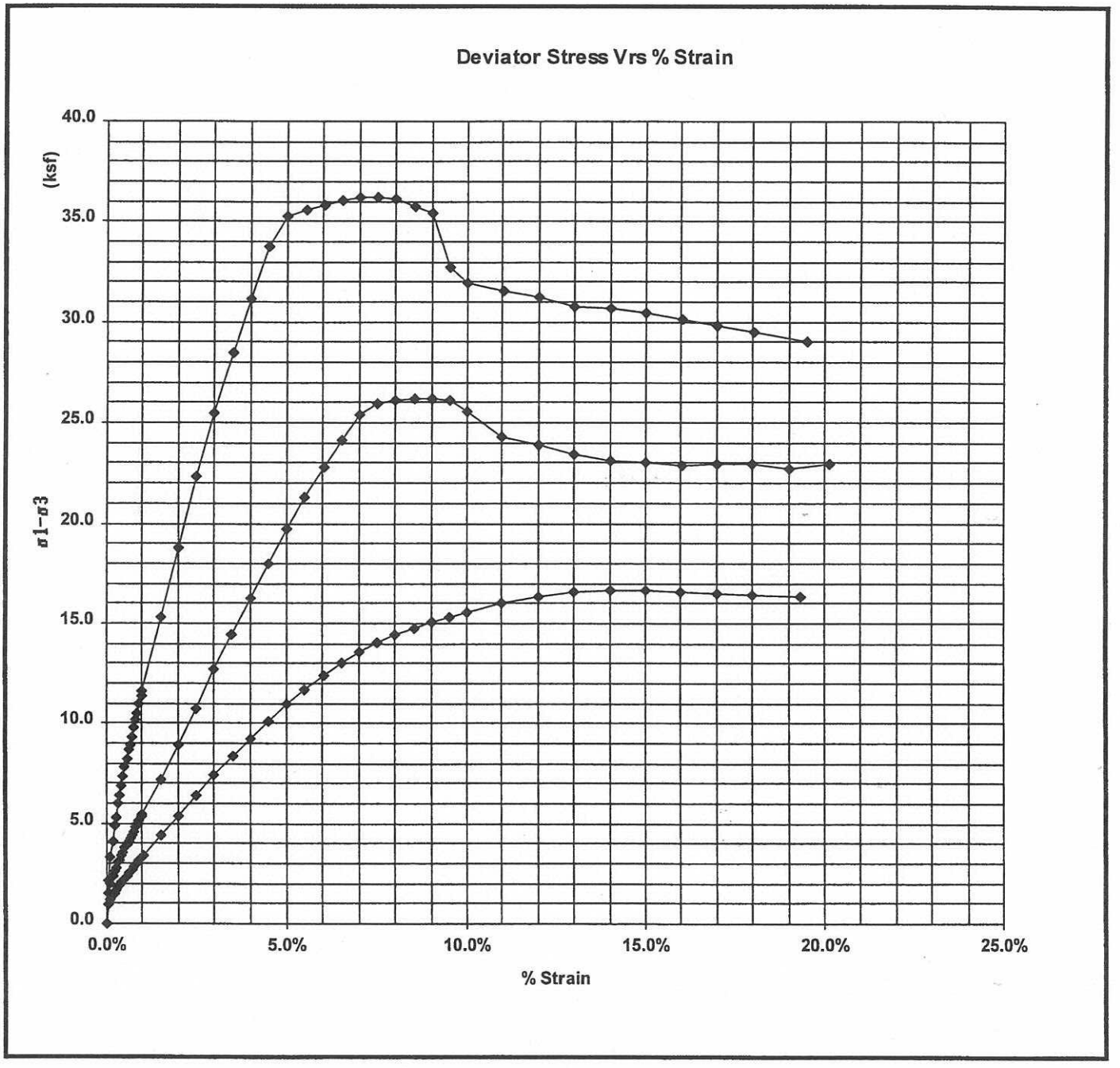
AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9572**



Report Date: Friday, May 13, 2005

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AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9572**

Point: **A**

Material Description: Shelby Tube - Boring FA-B17; 41.9' - 43.9' Fly Ash

Moisture Determination ASTM D2216

	Before Testing	After Testing
Tare No.	R	R
Mass of Container and Wet Specimen (Mcws), grams	1261.86	1257.42
Mass of Container and Oven Dry Specimen (Mcs), grams	988.33	988.33
Mass of Container (Mc), grams	207.86	207.86
Mass of Water (Mw), grams:	273.53	269.09
Mass of Solid Particles (Ms), grams:	780.47	780.47
Moisture Content (w), %	35.05%	34.48%

Initial Condition of Specimen

	(1)	(2)	(3)	Average
Diameter Measurements, Inches:	2.829	2.836	2.838	2.834
Height Measurements, Inches:	5.853	5.851	5.853	5.852

Initial Volume of Specimen (Vo), In.3:	36.92
Dry Mass of Specimen After Testing, (Md), grams:	780.47
Dry Unit Weight, (γ d) pcf:	80.52
Specific Gravity of the Solids, (G):	2.34
Volume of Solids, (Vs), Cu. In.:	20.3536
Height of Solids,(Hs),In.:	3.2259
Void Ratio Before Consolidation (Eo):	0.8142
Intitail Degree of Saturation: (So)	100.73%

Saturation - ASTM D4767 Section 8.2

Dial Indicator Reading Prior to Saturation (Rb:) In.	0
Cell Pressure After Saturation, psi:	45.00
Back Presssure After Saturation After, psi:	40.00
Pore Pressure B Parameter :	1
Dial Indicator Reading After Saturation, (Ra) In.:	0
Change in Height during Saturation, (Delta Hs) In.	0
Change In Volume of Specimen during Saturation (Delta Vsat), In.3:	0.000

Report Date: Friday, May 13, 2005

CIVIL LABORATORY
AMERICAN ELECTRIC POWER
4001 BIXBY ROAD
GROVEPORT, OHIO 43125
(614) 836-4205

AEP AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9572**

Point: **A**

Consolidation- ASTM D2435, Section 11.5:

Sample No:	T:	Burette 2:	Burette3:	Rc:
9572	0	24	23.8	0
9572	0.25	22.7	22.4	
9572	0.5	22.6	22.3	
9572	1	22.5	22.2	
9572	2	22.4	22.2	
9572	4	22.3	22.1	
9572	8	22.3	22.1	
9572	15	22.3	22.1	0.005
9572	30	22.2	22.1	0.006
9572	60	22.2	22	0.007
9572	120	22.1	22	0.007
9572	240	22	22	0.007
9572	440	22	22	0.007
9572	1440	22	22	0.009

Specimen Height After Consolidation, (Hc), In.: 5.84

Volume Change During Consolidation (Delta Vc), In.3: 0.23

Cross-Sectional Area of Specimen After Consolidation (Ac), In.2: 6.28

Triaxial Compression Testing
ASTM D 4767

Sample Depth: 41.9 ft.

Cell Pressure: 55 psi

Back Pressure: 40 psi

Confining Pressure: 15 psi

Strain Rate: 0.006 in./min.

Specimen Height After Consolidation, (Hc), In.: 5.84

Correction for Vert Displacement, In.: 0

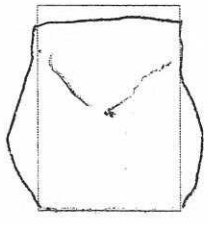
Load due to Friction and Uplift: 13.3 lbs.

Correction for Filter Paper: 0

Thickness of Membrane (tm), In.: 0.012

$\sigma 1-\sigma 3=$	Deviator Stress at Failure, ksf:	16.63
$\sigma 3$ f=	Effective Consolidation Stress at Failure, ksf:	2.16
$\sigma 1=$	Total Major Principal Stress at Failure:	18.79
σ '3f= $\sigma 3-\Delta \upsilon=$	Effective Minor Principal Stress at Failure,ksf:	7.75
σ '1f=	Effective Major Principal Stress at Failure, ksf:	24.38
	Axial Strain at Failure:	14.00%

Failure Sketch



Report Date: Friday, May 13, 2005

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AEP
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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9572**

Point: **A**

Pa: Applied Force	Vertical Displacement Reading In. :	Pore Pressure psi:	Axial Strain (E1):	(P) - Force Adj for U and F lbs:	Corrected Vertical Displac In. :	Correction for Membrane ksf:	(A) Area In.2:	(σ1−σ3) Deviator Stress ksf:	[Δu] Induced Pore Water Pressure ksf:	σ3 Effective Consolidation Stress ksf	σ1 Total Major Principal Stress ksf	σ3 ' Effective Minor Principal Stress ksf	σ1 ' Effective Major Principal Stress ksf	p'	q
13.3	0.000	42.5	0.00%	0.0	0.000	0.00000	6.279	0.00	0.3600	2.16	2.16	1.80	1.80	1.80	0.00
54.7	0.003	44.6	0.05%	41.4	0.003	0.00025	6.283	0.95	0.6624	2.16	3.11	1.50	2.45	1.97	0.47
65.3	0.006	45.7	0.10%	52.0	0.006	0.00050	6.286	1.19	0.8208	2.16	3.35	1.34	2.53	1.93	0.60
76.1	0.010	46.4	0.17%	62.8	0.010	0.00084	6.290	1.44	0.9216	2.16	3.60	1.24	2.68	1.96	0.72
80.1	0.012	46.8	0.21%	66.8	0.012	0.00100	6.292	1.53	0.9792	2.16	3.69	1.18	2.71	1.94	0.76
85.9	0.015	47.2	0.26%	72.6	0.015	0.00126	6.296	1.66	1.0368	2.16	3.82	1.12	2.78	1.95	0.83
91.9	0.018	47.2	0.31%	78.6	0.018	0.00151	6.299	1.80	1.0368	2.16	3.96	1.12	2.92	2.02	0.90
97.6	0.021	47.5	0.36%	84.3	0.021	0.00176	6.302	1.92	1.0800	2.16	4.08	1.08	3.00	2.04	0.96
103.2	0.024	47.5	0.41%	89.9	0.024	0.00201	6.305	2.05	1.0800	2.16	4.21	1.08	3.13	2.11	1.03
108.0	0.027	47.5	0.46%	94.7	0.027	0.00226	6.309	2.16	1.0800	2.16	4.32	1.08	3.24	2.16	1.08
111.7	0.029	47.5	0.50%	98.4	0.029	0.00243	6.311	2.24	1.0800	2.16	4.40	1.08	3.32	2.20	1.12
118.8	0.033	47.5	0.56%	105.5	0.033	0.00276	6.315	2.40	1.0800	2.16	4.56	1.08	3.48	2.28	1.20
123.1	0.036	47.5	0.62%	109.8	0.036	0.00301	6.318	2.50	1.0800	2.16	4.66	1.08	3.58	2.33	1.25
126.7	0.038	47.5	0.65%	113.4	0.038	0.00318	6.321	2.58	1.0800	2.16	4.74	1.08	3.66	2.37	1.29
131.9	0.041	47.4	0.70%	118.6	0.041	0.00343	6.324	2.70	1.0656	2.16	4.86	1.09	3.79	2.44	1.35
137.3	0.044	47.3	0.75%	124.0	0.044	0.00368	6.327	2.82	1.0512	2.16	4.98	1.11	3.93	2.52	1.41
142.4	0.047	47.2	0.80%	129.1	0.047	0.00393	6.330	2.93	1.0368	2.16	5.09	1.12	4.06	2.59	1.47
146.8	0.050	47.0	0.86%	133.5	0.050	0.00418	6.334	3.03	1.0080	2.16	5.19	1.15	4.18	2.67	1.52
151.8	0.053	46.9	0.91%	138.5	0.053	0.00443	6.337	3.14	0.9936	2.16	5.30	1.17	4.31	2.74	1.57
157.4	0.056	46.7	0.96%	144.1	0.056	0.00469	6.340	3.27	0.9648	2.16	5.43	1.20	4.46	2.83	1.63
161.7	0.059	46.6	1.01%	148.4	0.059	0.00494	6.344	3.36	0.9504	2.16	5.52	1.21	4.57	2.89	1.68
209.6	0.088	44.6	1.51%	196.3	0.088	0.00736	6.375	4.43	0.6624	2.16	6.59	1.50	5.92	3.71	2.21
254.1	0.117	42.4	2.00%	240.8	0.117	0.00979	6.408	5.40	0.3456	2.16	7.56	1.81	7.22	4.52	2.70
298.4	0.146	39.9	2.50%	285.1	0.146	0.01222	6.440	6.36	-0.0144	2.16	8.52	2.17	8.54	5.36	3.18
346.0	0.175	37.2	2.99%	332.7	0.175	0.01464	6.473	7.39	-0.4032	2.16	9.55	2.56	9.95	6.26	3.69
392.7	0.205	34.3	3.51%	379.4	0.205	0.01715	6.508	8.38	-0.8208	2.16	10.54	2.98	11.36	7.17	4.19
435.1	0.234	31.6	4.00%	421.8	0.234	0.01958	6.541	9.27	-1.2096	2.16	11.43	3.37	12.64	8.00	4.63
475.7	0.263	28.9	4.50%	462.4	0.263	0.02200	6.575	10.10	-1.5984	2.16	12.26	3.76	13.86	8.81	5.05
516.9	0.292	26.1	5.00%	503.6	0.292	0.02443	6.610	10.95	-2.0016	2.16	13.11	4.16	15.11	9.64	5.47
554.7	0.321	23.4	5.49%	541.4	0.321	0.02686	6.644	11.71	-2.3904	2.16	13.87	4.55	16.26	10.40	5.85
588.8	0.351	20.9	6.01%	575.5	0.351	0.02937	6.681	12.38	-2.7504	2.16	14.54	4.91	17.29	11.10	6.19
621.8	0.380	18.5	6.50%	608.5	0.380	0.03179	6.716	13.01	-3.0960	2.16	15.17	5.26	18.27	11.76	6.51
651.9	0.409	16.2	7.00%	638.6	0.409	0.03422	6.752	13.59	-3.4272	2.16	15.75	5.59	19.17	12.38	6.79
676.6	0.438	14.2	7.50%	663.3	0.438	0.03665	6.788	14.03	-3.7152	2.16	16.19	5.88	19.91	12.89	7.02
699.4	0.467	12.4	7.99%	686.1	0.467	0.03907	6.825	14.44	-3.9744	2.16	16.60	6.13	20.57	13.35	7.22
720.3	0.497	10.8	8.51%	707.0	0.497	0.04158	6.863	14.79	-4.2048	2.16	16.95	6.36	21.16	13.76	7.40
737.9	0.526	9.5	9.00%	724.6	0.526	0.04401	6.901	15.08	-4.3920	2.16	17.24	6.55	21.63	14.09	7.54
754.2	0.555	8.2	9.50%	740.9	0.555	0.04644	6.939	15.33	-4.5792	2.16	17.49	6.74	22.07	14.40	7.67

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Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9572**

Point: **A**

770.0	0.584	7.1	9.99%	756.7	0.584	0.04886	6.977	15.57	-4.7376	2.16	17.73	6.90	22.47	14.68	7.78
800.9	0.643	5.0	11.00%	787.6	0.643	0.05380	7.056	16.02	-5.0400	2.16	18.18	7.20	23.22	15.21	8.01
826.3	0.701	3.3	12.00%	813.0	0.701	0.05865	7.135	16.35	-5.2848	2.16	18.51	7.44	23.79	15.62	8.17
845.8	0.759	2.0	12.99%	832.5	0.759	0.06350	7.217	16.55	-5.4720	2.16	18.71	7.63	24.18	15.91	8.27
860.2	0.818	1.2	14.00%	846.9	0.818	0.06844	7.302	16.63	-5.5872	2.16	18.79	7.75	24.38	16.06	8.32
869.5	0.876	0.8	14.99%	856.2	0.876	0.07329	7.387	16.62	-5.6448	2.16	18.78	7.80	24.42	16.11	8.31
877.6	0.935	0.6	16.00%	864.3	0.935	0.07823	7.476	16.57	-5.6736	2.16	18.73	7.83	24.40	16.12	8.29
884.0	0.993	0.5	16.99%	870.7	0.993	0.08308	7.565	16.49	-5.6880	2.16	18.65	7.85	24.34	16.09	8.25
890.2	1.051	0.4	17.99%	876.9	1.051	0.08793	7.657	16.40	-5.7024	2.16	18.56	7.86	24.27	16.06	8.20
901.8	1.129	0.2	19.32%	888.5	1.129	0.09446	7.783	16.34	-5.7312	2.16	18.50	7.89	24.23	16.06	8.17

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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9572**

Point: **B**

Material Description: Shelby Tube - Boring FA-B17; 41.9' - 43.9' Fly Ash

Moisture Determination ASTM D2216

	Before Testing	After Testing
Tare No.	R-1	R-1
Mass of Container and Wet Specimen (Mcws), grams	1272.83	1272.94
Mass of Container and Oven Dry Specimen (Mcs), grams	1012.49	1012.49
Mass of Container (Mc), grams	223.95	223.95
Mass of Water (Mw), grams:	260.34	260.45
Mass of Solid Particles (Ms), grams:	788.54	788.54
Moisture Content (w), %	33.02%	33.03%

Initial Condition of Specimen

	(1)	(2)	(3)	Average
Diameter Measurements, Inches:	2.837	2.842	2.837	2.839
Height Measurements, Inches:	5.707	5.71	5.708	5.708

Initial Volume of Specimen (Vo), In.3:	36.13
Dry Mass of Specimen After Testing, (Md), grams:	788.54
Dry Unit Weight, (γ d) pcf:	83.15
Specific Gravity of the Solids, (G):	2.34
Volume of Solids, (Vs), Cu. In.:	20.5640
Height of Solids,(Hs),In.:	3.2493
Void Ratio Before Consolidation (Eo):	0.7568
Intitail Degree of Saturation: (So)	102.08%

Saturation - ASTM D4767 Section 8.2

Dial Indicator Reading Prior to Saturation (Rb:) In.	0
Cell Pressure After Saturation, psi:	45.00
Back Presssure After Saturation, psi:	40.00
Pore Pressure B Parameter:	1
Dial Indicator Reading After Saturation, (Ra) In.:	0.004
Change in Height during Saturation, (Delta Hs) In.	0.004
Change In Volume of Specimen during Saturation (Delta Vsat), In.3:	0.076

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Project: **Kanawha River Landfill**

Sample No: **9572**

Point: **B**

Consolidation- ASTM D2435, Section 11.5:

Sample No:	T:	Burette 2:	Burette3:	Rc:
9572	0	23.9	23.9	0.004
9572	0.25	21.4	22	
9572	0.5	21.3	22	
9572	1	21.3	22	
9572	2	21.3	22	
9572	4	21.3	21.9	
9572	8	21.2	21.9	
9572	15	21.2	21.8	0.016
9572	30	21.2	21.7	0.017
9572	60	21.3	21.5	0.017
9572	120	21.4	21.4	0.017
9572	240	21.5	21.3	0.017
9572	440	21.5	21.3	0.017
9572	1440	21.4	21.3	0.018

Specimen Height After Consolidation, (Hc), In.: 5.69

Volume Change During Consolidation (Delta Vc), In.3: 0.31

Cross-Sectional Area of Specimen After Consolidation (Ac), In.2: 6.28

Triaxial Compression Testing ASTM D 4767

Sample Depth: 41.9 ft.

Cell Pressure: 70 psi

Back Pressure: 40 psi

Confining Pressure: 30 psi

Strain Rate: 0.006 In/min.

Specimen Height After Consolidation, (Hc), In.: 5.69

Correction for Vert Displacement, In.: 0

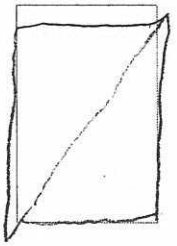
Load due to Friction and Uplift: 15.5 lbs.

Correction for Filter Paper: 0

Thickness of Membrane (tm), In.: 0.012

$\sigma 1-\sigma 3=$	Deviator Stress at Failure, ksf:	26.23
$\sigma 3$ f=	Effective Consolidation Stress at Failure, ksf:	4.32
$\sigma 1=$	Total Major Principal Stress at Failure:	30.55
σ '3f= $\sigma 3-\Delta \upsilon=$	Effective Minor Principal Stress at Failure,ksf:	10.90
σ '1f=	Effective Major Principal Stress at Failure, ksf:	37.13
	Axial Strain at Failure:	8.51%

Failure Sketch



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Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9572**

Point: **B**

Pa: Applied Force	Vertical Displacement Reading In. :	Pore Pressure psi:	Axial Strain (E1):	(P) - Force Adj for U and F lbs:	Corrected Vertical Displac In. :	Correction for Membrane ksf:	(A) Area In.2:	(σ1–σ3) Deviator Stress ksf:	[Δu] Induced Pore Water Pressure ksf:	σ3 Effective Consolidation Stress ksf	σ1 Total Major Principal Stress ksf	σ3 ' Effective Minor Principal Stress ksf	σ1 ' Effective Major Principal Stress ksf	p'	q
15.5	0.000	41.9	0.00%	0.0	0.000	0.00000	6.281	0.00	0.2736	4.32	4.32	4.05	4.05	4.05	0.00
81.7	0.003	46.5	0.05%	66.2	0.003	0.00026	6.284	1.52	0.9360	4.32	5.84	3.38	4.90	4.14	0.76
102.7	0.006	48.5	0.11%	87.2	0.006	0.00052	6.287	2.00	1.2240	4.32	6.32	3.10	5.09	4.09	1.00
117.6	0.009	49.6	0.16%	102.1	0.009	0.00077	6.291	2.34	1.3824	4.32	6.66	2.94	5.27	4.11	1.17
128.5	0.012	50.8	0.21%	113.0	0.012	0.00103	6.294	2.58	1.5552	4.32	6.90	2.76	5.35	4.06	1.29
136.2	0.014	51.4	0.25%	120.7	0.014	0.00120	6.296	2.76	1.6416	4.32	7.08	2.68	5.44	4.06	1.38
148.5	0.018	52.0	0.32%	133.0	0.018	0.00155	6.301	3.04	1.7280	4.32	7.36	2.59	5.63	4.11	1.52
155.2	0.020	52.4	0.35%	139.7	0.020	0.00172	6.303	3.19	1.7856	4.32	7.51	2.53	5.72	4.13	1.59
162.8	0.023	52.8	0.40%	147.3	0.023	0.00198	6.306	3.36	1.8432	4.32	7.68	2.48	5.84	4.16	1.68
172.0	0.026	52.8	0.46%	156.5	0.026	0.00223	6.310	3.57	1.8432	4.32	7.89	2.48	6.05	4.26	1.78
180.9	0.029	53.0	0.51%	165.4	0.029	0.00249	6.313	3.77	1.8720	4.32	8.09	2.45	6.22	4.33	1.89
189.4	0.032	53.1	0.56%	173.9	0.032	0.00275	6.316	3.96	1.8864	4.32	8.28	2.43	6.40	4.41	1.98
197.0	0.035	53.1	0.62%	181.5	0.035	0.00301	6.320	4.13	1.8864	4.32	8.45	2.43	6.57	4.50	2.07
202.1	0.037	53.1	0.65%	186.6	0.037	0.00318	6.322	4.25	1.8864	4.32	8.57	2.43	6.68	4.56	2.12
210.9	0.040	53.0	0.70%	195.4	0.040	0.00344	6.325	4.45	1.8720	4.32	8.77	2.45	6.89	4.67	2.22
218.3	0.043	52.9	0.76%	202.8	0.043	0.00369	6.329	4.61	1.8576	4.32	8.93	2.46	7.07	4.77	2.31
227.1	0.046	52.7	0.81%	211.6	0.046	0.00395	6.332	4.81	1.8288	4.32	9.13	2.49	7.30	4.90	2.40
234.1	0.049	52.5	0.86%	218.6	0.049	0.00421	6.335	4.96	1.8000	4.32	9.28	2.52	7.48	5.00	2.48
243.1	0.052	52.3	0.91%	227.6	0.052	0.00447	6.339	5.17	1.7712	4.32	9.49	2.55	7.71	5.13	2.58
250.4	0.055	52.1	0.97%	234.9	0.055	0.00472	6.342	5.33	1.7424	4.32	9.65	2.58	7.91	5.24	2.66
255.3	0.057	51.9	1.00%	239.8	0.057	0.00490	6.344	5.44	1.7136	4.32	9.76	2.61	8.04	5.33	2.72
334.3	0.086	48.9	1.51%	318.8	0.086	0.00739	6.377	7.19	1.2816	4.32	11.51	3.04	10.23	6.63	3.60
411.1	0.114	45.2	2.00%	395.6	0.114	0.00979	6.409	8.88	0.7488	4.32	13.20	3.57	12.45	8.01	4.44
497.0	0.142	40.7	2.50%	481.5	0.142	0.01220	6.441	10.75	0.1008	4.32	15.07	4.22	14.97	9.60	5.38
587.0	0.171	35.8	3.01%	571.5	0.171	0.01469	6.475	12.69	-0.6048	4.32	17.01	4.92	17.62	11.27	6.35
670.3	0.199	30.9	3.50%	654.8	0.199	0.01710	6.508	14.47	-1.3104	4.32	18.79	5.63	20.10	12.87	7.24
755.1	0.228	25.8	4.01%	739.6	0.228	0.01959	6.543	16.26	-2.0448	4.32	20.58	6.36	22.62	14.49	8.13
838.1	0.256	20.7	4.50%	822.6	0.256	0.02199	6.577	17.99	-2.7792	4.32	22.31	7.10	25.09	16.09	8.99
921.5	0.285	15.4	5.01%	906.0	0.285	0.02448	6.612	19.71	-3.5424	4.32	24.03	7.86	27.57	17.72	9.85
998.2	0.313	10.3	5.50%	982.7	0.313	0.02689	6.646	21.26	-4.2768	4.32	25.58	8.60	29.86	19.23	10.63
1073.8	0.342	5.3	6.01%	1058.3	0.342	0.02938	6.682	22.78	-4.9968	4.32	27.10	9.32	32.09	20.70	11.39
1143.6	0.370	0.6	6.50%	1128.1	0.370	0.03179	6.718	24.15	-5.6736	4.32	28.47	9.99	34.14	22.07	12.08
1207.2	0.399	-3.7	7.01%	1191.7	0.399	0.03428	6.754	25.37	-6.2928	4.32	29.69	10.61	35.99	23.30	12.69
1240.3	0.427	-5.1	7.50%	1224.8	0.427	0.03668	6.790	25.94	-6.4944	4.32	30.26	10.81	36.75	23.78	12.97
1256.0	0.455	-5.2	8.00%	1240.5	0.455	0.03909	6.827	26.13	-6.5088	4.32	30.45	10.83	36.96	23.89	13.06
1268.0	0.484	-5.7	8.51%	1252.5	0.484	0.04158	6.865	26.23	-6.5808	4.32	30.55	10.90	37.13	24.02	13.12
1272.4	0.512	-6.1	9.00%	1256.9	0.512	0.04399	6.902	26.18	-6.6384	4.32	30.50	10.96	37.14	24.05	13.09
1277.3	0.541	-6.5	9.51%	1261.8	0.541	0.04648	6.941	26.13	-6.6960	4.32	30.45	11.02	37.15	24.08	13.07

Report Date: Friday, May 13, 2005

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AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9572**

Point: **B**

1255.6	0.569	-6.6	10.00%	1240.1	0.569	0.04888	6.979	25.54	-6.7104	4.32	29.86	11.03	36.57	23.80	12.77
1207.7	0.626	-5.8	11.00%	1192.2	0.626	0.05378	7.057	24.27	-6.5952	4.32	28.59	10.92	35.19	23.05	12.14
1201.7	0.683	-5.3	12.00%	1186.2	0.683	0.05868	7.137	23.87	-6.5232	4.32	28.19	10.84	34.72	22.78	11.94
1192.8	0.740	-4.9	13.00%	1177.3	0.740	0.06357	7.220	23.42	-6.4656	4.32	27.74	10.79	34.20	22.49	11.71
1191.9	0.797	-4.6	14.01%	1176.4	0.797	0.06847	7.304	23.13	-6.4224	4.32	27.45	10.74	33.87	22.31	11.56
1202.9	0.854	-4.4	15.01%	1187.4	0.854	0.07337	7.390	23.06	-6.3936	4.32	27.38	10.71	33.78	22.25	11.53
1206.7	0.911	-4.4	16.01%	1191.2	0.911	0.07826	7.478	22.86	-6.3936	4.32	27.18	10.71	33.57	22.14	11.43
1228.3	0.968	-4.4	17.01%	1212.8	0.968	0.08316	7.568	22.99	-6.3936	4.32	27.31	10.71	33.71	22.21	11.50
1239.3	1.024	-4.4	18.00%	1223.8	1.024	0.08797	7.659	22.92	-6.3936	4.32	27.24	10.71	33.63	22.17	11.46
1245.2	1.081	-4.4	19.00%	1229.7	1.081	0.09287	7.754	22.74	-6.3936	4.32	27.06	10.71	33.46	22.09	11.37
1274.5	1.146	-4.5	20.14%	1259.0	1.146	0.09845	7.865	22.95	-6.4080	4.32	27.27	10.73	33.68	22.20	11.48

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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9572**

Point: **C**

Material Description: Shelby Tube - Boring FA-B17; 41.9' - 43.9' Fly Ash

Moisture Determination ASTM D2216

	Before Testing	After Testing
Tare No.	R-3	R-3
Mass of Container and Wet Specimen (Mcws), grams	1293.40	1296.46
Mass of Container and Oven Dry Specimen (Mcs), grams	1046.45	1046.45
Mass of Container (Mc), grams	216.30	216.30
Mass of Water (Mw), grams:	246.95	250.01
Mass of Solid Particles (Ms), grams:	830.15	830.15
Moisture Content (w), %	29.75%	30.12%

Initial Condition of Specimen

	(1)	(2)	(3)	Average
Diameter Measurements, Inches:	2.859	2.823	2.838	2.840
Height Measurements, Inches:	5.709	5.706	5.707	5.707

Initial Volume of Specimen (Vo), In.3:	36.15
Dry Mass of Specimen After Testing, (Md), grams:	830.15
Dry Unit Weight, (γ d) pcf:	87.47
Specific Gravity of the Solids, (G):	2.34
Volume of Solids, (Vs), Cu. In.:	21.6492
Height of Solids,(Hs),In.:	3.4175
Void Ratio Before Consolidation (Eo):	0.6700
Intitail Degree of Saturation: (So)	103.89%

Saturation - ASTM D4767 Section 8.2

Dial Indicator Reading Prior to Saturation (Rb:) In.	0
Cell Pressure After Saturation, psi:	45.00
Back Presssure After Saturation, psi:	40.00
Pore Pressure B Parameter :	1
Dial Indicator Reading After Saturation, (Ra) In.:	-0.008
Change in Height during Saturation, (Delta Hs) In.	-0.008
Change In Volume of Specimen during Saturation (Delta Vsat), In.3:	-0.152

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Sample No: **9572**
Point: **C**

Consolidation- ASTM D2435, Section 11.5:

Sample No:	T:	Burette 2:	Burette3:	Rc:
9572	0	24.2	24.1	-0.008
9572	0.25	22.2	19.8	
9572	0.5	22.2	19.8	
9572	1	22.1	19.8	
9572	2	22.1	19.7	
9572	4	22	19.7	
9572	8	22	19.7	
9572	15	21.8	19.9	0.012
9572	30	21.6	20.1	0.012
9572	60	21.2	20.3	0.012
9572	120	21	20.6	0.012
9572	240	20.8	20.7	0.013
9572	440	20.8	20.7	0.013
9572	1440	20.8	20.7	0.013

Specimen Height After Consolidation, (Hc), In.:	5.69
Volume Change During Consolidation (Delta Vc), In.3:	0.41
Cross-Sectional Area of Specimen After Consolidation (Ac), In.2:	6.30

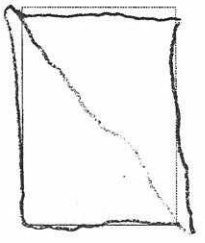
Triaxial Compression Testing ASTM D 4767

Sample Depth:	41.9	ft.
Cell Pressure:	100	psi
Back Pressure:	40	psi
Confining Pressure:	60	psi
Strain Rate:	0.006	In/min.

Specimen Height After Consolidation, (Hc), In.:	5.69	
Correction for Vert Displacement, In.:	0	
Load due to Friction and Uplift:	18.9	lbs.
Correction for Filter Paper:	0	
Thickness of Membrane (tm), In.:	0.012	

	$\sigma 1-\sigma 3=$	Deviator Stress at Failure, ksf:	36.24
	$\sigma 3$ f=	Effective Consolidation Stress at Failure, ksf:	8.64
	$\sigma 1=$	Total Major Principal Stress at Failure:	44.88
σ '3f=	$\sigma 3-\Delta \upsilon=$	Effective Minor Principal Stress at Failure,ksf:	15.11
	σ '1f=	Effective Major Principal Stress at Failure, ksf:	51.34
		Axial Strain at Failure:	7.52%

Failure Sketch



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Sample No: **9572**

Point: **C**

Pa: Applied Force	Vertical Displacement Reading In. :	Pore Pressure psi:	Axial Strain (E1):	(P) - Force Adj for U and F lbs:	Corrected Vertical Displac In. :	Correction for Membrane ksf:	(A) Area In.2:	(σ1–σ3) Deviator Stress ksf:	[Δυ] Induced Pore Water Pressure ksf:	σ3 Effective Consolidation Stress ksf	σ1 Total Major Principal Stress ksf	σ3 ' Effective Minor Principal Stress ksf	σ1 ' Effective Major Principal Stress ksf	p'	q
18.9	0.000	43.2	0.00%	0.0	0.000	0.00000	6.303	0.00	0.4608	8.64	8.64	8.18	8.18	8.18	0.00
113.5	0.003	48.5	0.05%	94.6	0.003	0.00026	6.306	2.16	1.2240	8.64	10.80	7.42	9.58	8.50	1.08
163.7	0.006	52.2	0.11%	144.8	0.006	0.00051	6.310	3.30	1.7568	8.64	11.94	6.88	10.19	8.54	1.65
199.7	0.009	54.9	0.16%	180.8	0.009	0.00077	6.313	4.12	2.1456	8.64	12.76	6.49	10.62	8.56	2.06
233.0	0.012	57.0	0.21%	214.1	0.012	0.00103	6.316	4.88	2.4480	8.64	13.52	6.19	11.07	8.63	2.44
251.0	0.014	58.9	0.25%	232.1	0.014	0.00120	6.319	5.29	2.7216	8.64	13.93	5.92	11.21	8.56	2.64
283.2	0.018	60.6	0.32%	264.3	0.018	0.00154	6.323	6.02	2.9664	8.64	14.66	5.67	11.69	8.68	3.01
299.8	0.020	61.4	0.35%	280.9	0.020	0.00171	6.325	6.39	3.0816	8.64	15.03	5.56	11.95	8.76	3.20
320.3	0.023	62.3	0.40%	301.4	0.023	0.00197	6.329	6.86	3.2112	8.64	15.50	5.43	12.28	8.86	3.43
343.0	0.026	62.4	0.46%	324.1	0.026	0.00223	6.332	7.37	3.2256	8.64	16.01	5.41	12.78	9.10	3.68
362.0	0.029	62.9	0.51%	343.1	0.029	0.00249	6.335	7.80	3.2976	8.64	16.44	5.34	13.14	9.24	3.90
381.5	0.032	62.9	0.56%	362.6	0.032	0.00274	6.339	8.23	3.2976	8.64	16.87	5.34	13.58	9.46	4.12
400.6	0.035	62.9	0.61%	381.7	0.035	0.00300	6.342	8.66	3.2976	8.64	17.30	5.34	14.01	9.67	4.33
412.0	0.037	62.9	0.65%	393.1	0.037	0.00317	6.344	8.92	3.2976	8.64	17.56	5.34	14.26	9.80	4.46
430.4	0.040	62.7	0.70%	411.5	0.040	0.00343	6.348	9.33	3.2688	8.64	17.97	5.37	14.70	10.04	4.67
449.5	0.043	62.4	0.76%	430.6	0.043	0.00368	6.351	9.76	3.2256	8.64	18.40	5.41	15.17	10.29	4.88
467.3	0.046	62.0	0.81%	448.4	0.046	0.00394	6.354	10.16	3.1680	8.64	18.80	5.47	15.63	10.55	5.08
483.1	0.049	61.6	0.86%	464.2	0.049	0.00420	6.358	10.51	3.1104	8.64	19.15	5.53	16.04	10.78	5.25
504.3	0.052	61.0	0.91%	485.4	0.052	0.00446	6.361	10.98	3.0240	8.64	19.62	5.62	16.60	11.11	5.49
520.8	0.055	60.5	0.97%	501.9	0.055	0.00471	6.364	11.35	2.9520	8.64	19.99	5.69	17.04	11.36	5.68
532.0	0.057	60.1	1.00%	513.1	0.057	0.00488	6.367	11.60	2.8944	8.64	20.24	5.75	17.35	11.55	5.80
701.1	0.086	52.6	1.51%	682.2	0.086	0.00737	6.400	15.34	1.8144	8.64	23.98	6.83	22.17	14.50	7.67
859.1	0.114	44.2	2.00%	840.2	0.114	0.00977	6.432	18.80	0.6048	8.64	27.44	8.04	26.84	17.44	9.40
1021.3	0.143	34.6	2.51%	1002.4	0.143	0.01225	6.465	22.31	-0.7776	8.64	30.95	9.42	31.73	20.57	11.16
1168.4	0.171	25.6	3.00%	1149.5	0.171	0.01465	6.498	25.46	-2.0736	8.64	34.10	10.71	36.17	23.44	12.73
1311.3	0.200	16.4	3.51%	1292.4	0.200	0.01714	6.532	28.47	-3.3984	8.64	37.11	12.04	40.51	26.27	14.24
1441.9	0.228	8.0	4.00%	1423.0	0.228	0.01954	6.566	31.19	-4.6080	8.64	39.83	13.25	44.44	28.84	15.59
1569.4	0.257	-0.4	4.51%	1550.5	0.257	0.02202	6.601	33.80	-5.8176	8.64	42.44	14.46	48.26	31.36	16.90
1643.3	0.285	-3.7	5.00%	1624.4	0.285	0.02442	6.635	35.23	-6.2928	8.64	43.87	14.93	50.16	32.55	17.61
1667.8	0.314	-2.8	5.51%	1648.9	0.314	0.02691	6.671	35.57	-6.1632	8.64	44.21	14.80	50.37	32.59	17.78
1689.1	0.342	-3.1	6.01%	1670.2	0.342	0.02931	6.706	35.84	-6.2064	8.64	44.48	14.85	50.68	32.76	17.92
1710.2	0.371	-3.7	6.52%	1691.3	0.371	0.03179	6.742	36.09	-6.2928	8.64	44.73	14.93	51.02	32.98	18.05
1725.7	0.399	-4.3	7.01%	1706.8	0.399	0.03419	6.778	36.23	-6.3792	8.64	44.87	15.02	51.25	33.13	18.11
1735.6	0.428	-4.9	7.52%	1716.7	0.428	0.03668	6.815	36.24	-6.4656	8.64	44.88	15.11	51.34	33.22	18.12
1740.0	0.456	-5.4	8.01%	1721.1	0.456	0.03908	6.852	36.13	-6.5376	8.64	44.77	15.18	51.31	33.24	18.07
1730.0	0.485	-5.8	8.52%	1711.1	0.485	0.04156	6.890	35.72	-6.5952	8.64	44.36	15.24	50.96	33.10	17.86
1725.5	0.513	-6.0	9.01%	1706.6	0.513	0.04396	6.927	35.43	-6.6240	8.64	44.07	15.26	50.70	32.98	17.72
1604.0	0.542	-6.0	9.52%	1585.1	0.542	0.04645	6.966	32.72	-6.6240	8.64	41.36	15.26	47.98	31.62	16.36

Report Date: Friday, May 13, 2005

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Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9572**

Point: **C**

1576.0	0.570	-5.7	10.01%	1557.1	0.570	0.04885	7.004	31.96	-6.5808	8.64	40.60	15.22	47.18	31.20	15.98
1574.3	0.627	-5.3	11.01%	1555.4	0.627	0.05373	7.083	31.57	-6.5232	8.64	40.21	15.16	46.73	30.95	15.78
1574.1	0.684	-5.0	12.01%	1555.2	0.684	0.05862	7.163	31.20	-6.4800	8.64	39.84	15.12	46.32	30.72	15.60
1572.3	0.741	-4.7	13.01%	1553.4	0.741	0.06350	7.246	30.81	-6.4368	8.64	39.45	15.08	45.88	30.48	15.40
1586.2	0.798	-4.6	14.01%	1567.3	0.798	0.06839	7.330	30.72	-6.4224	8.64	39.36	15.06	45.78	30.42	15.36
1592.7	0.855	-4.4	15.01%	1573.8	0.855	0.07327	7.417	30.48	-6.3936	8.64	39.12	15.03	45.52	30.28	15.24
1593.5	0.912	-4.2	16.02%	1574.6	0.912	0.07816	7.505	30.13	-6.3648	8.64	38.77	15.00	45.14	30.07	15.07
1594.3	0.969	-3.9	17.02%	1575.4	0.969	0.08304	7.596	29.78	-6.3216	8.64	38.42	14.96	44.75	29.85	14.89
1598.4	1.026	-3.6	18.02%	1579.5	1.026	0.08792	7.688	29.50	-6.2784	8.64	38.14	14.92	44.41	29.67	14.75
1604.2	1.112	-3.2	19.53%	1585.3	1.112	0.09529	7.833	29.05	-6.2208	8.64	37.69	14.86	43.91	29.39	14.53

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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9573**

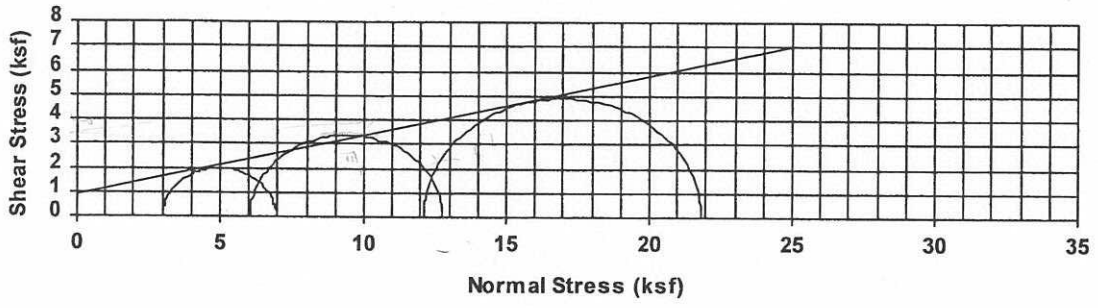
silty clay

Material Description: Shelby Tube - Boring FA-B17; 56.9' - 58.9'

Point Designation	Initial Conditions			Final Conditions			
	Water Content, %	Dry Density, pcf	Degree of Saturation	Water Content, %	Confining Stress, (ksf)	Deviator Stress	Induced Pore Pressure (ksf)
A	30.4%	94.5	106.1%	27.65%	3.024	3.93	1.79
B	30.2%	93.8	103.4%	24.3%	6.048	6.72	3.93
C	30.0%	93.8	102.8%	23.6%	12.096	9.75	8.87

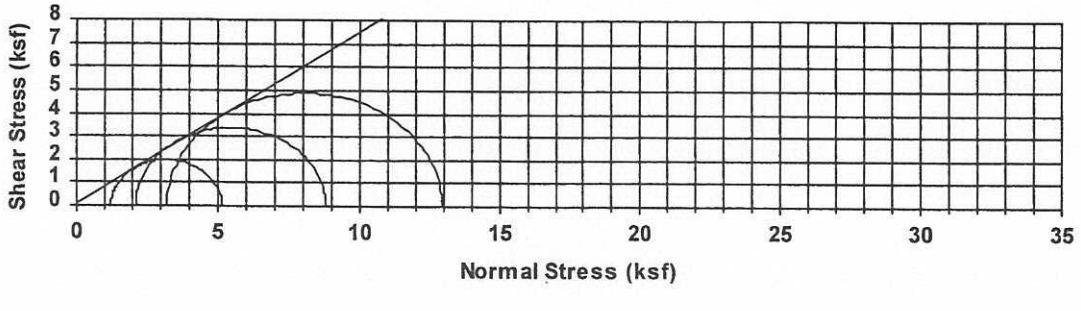
Point Designation	Axial Strain, %	q, (ksf)	Effective Stresses, (ksf)			Total Stresses, (ksf)		
			Major, (ksf)	Minor, (ksf)	p', (ksf)	Major, (ksf)	Minor, (ksf)	p, (ksf)
A	15.0%	1.96	5.16	1.24	3.20	6.95	3.02	4.99
B	13.0%	3.36	8.83	2.12	5.48	12.77	6.05	9.41
C	13.0%	4.88	12.98	3.23	8.10	21.85	12.10	16.97

Total Stress Envelope



ϕ: 13.8 °
c : 0.93 ksf

Effective Stress Envelope



ϕ ' : 36.4 °
c' : 0.10 ksf

Report Date: Friday, May 06, 2005

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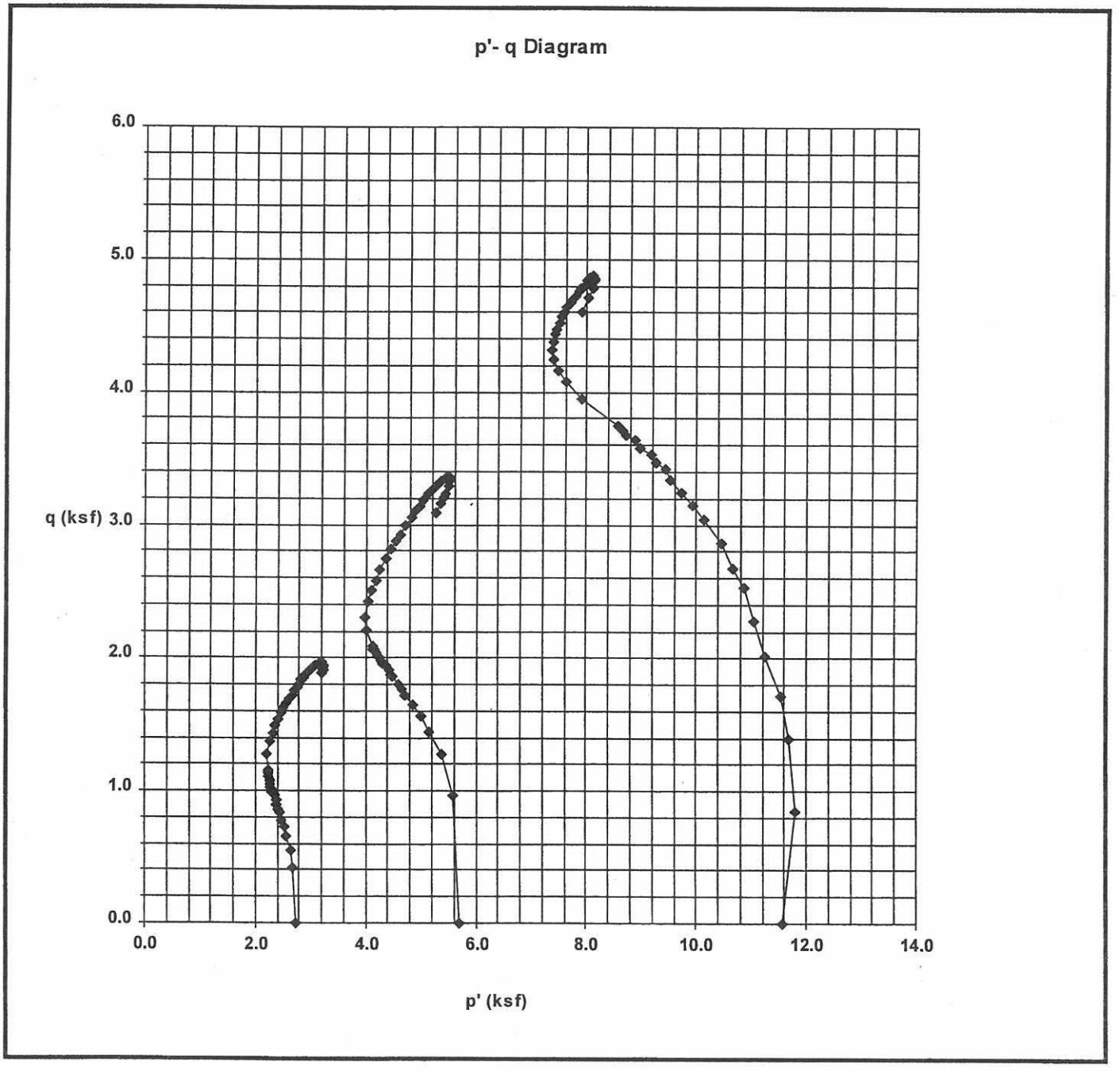
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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9573**



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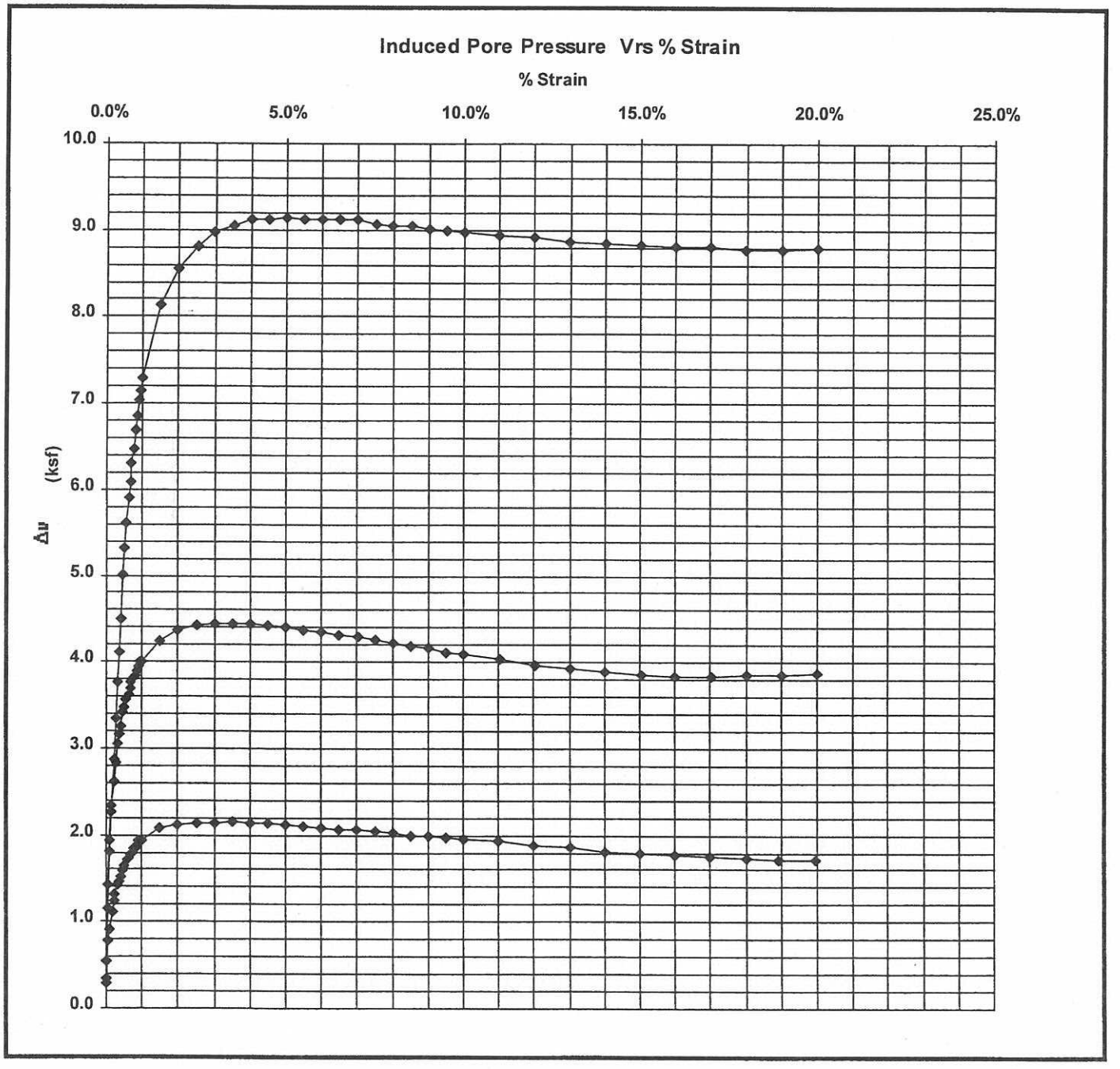
AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9573**



Report Date: Friday, May 06, 2005

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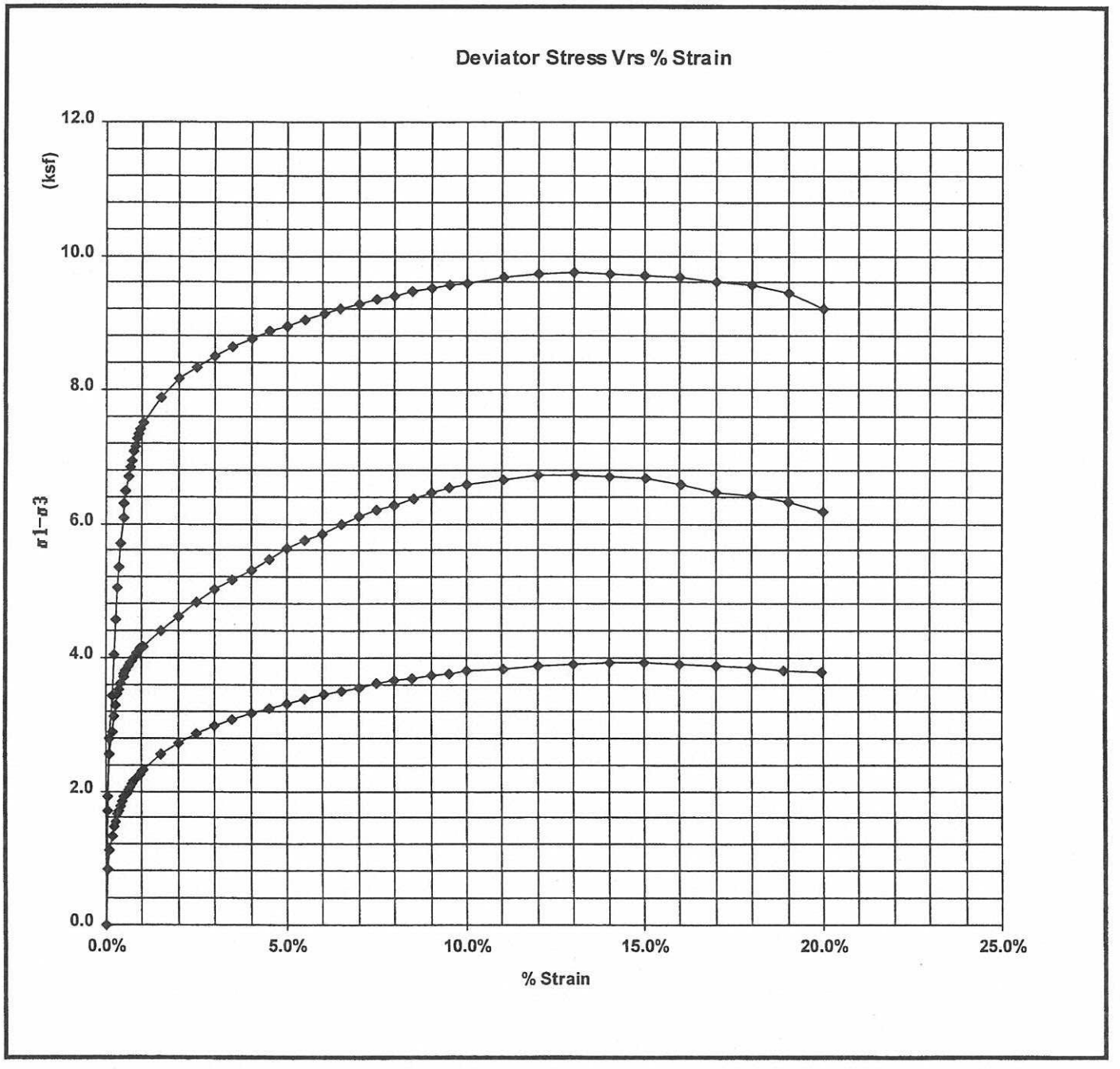
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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9573**

Point: **A**

Material Description: Shelby Tube - Boring FA-B17; 56.9' - 58.9'

Moisture Determination ASTM D2216

	Before Testing	After Testing
Tare No.	T-103	T-103
Mass of Container and Wet Specimen (Mcws), grams	1379.34	1353.54
Mass of Container and Oven Dry Specimen (Mcs), grams	1105.85	1105.85
Mass of Container (Mc), grams	206.90	209.90
Mass of Water (Mw), grams:	273.49	247.69
Mass of Solid Particles (Ms), grams:	898.95	895.95
Moisture Content (w), %	30.42%	27.65%

Initial Condition of Specimen

	(1)	(2)	(3)	Average
Diameter Measurements, Inches:	2.83	2.82	2.845	2.832
Height Measurements, Inches:	5.73	5.745	5.74	5.738

Initial Volume of Specimen (Vo), In.3:	36.14
Dry Mass of Specimen After Testing, (Md), grams:	895.95
Dry Unit Weight, (γ d) pcf:	94.45
Specific Gravity of the Solids, (G):	2.68
Volume of Solids, (Vs), Cu. In.:	20.4009
Height of Solids,(Hs),In.:	3.2395
Void Ratio Before Consolidation (Eo):	0.7714
Intitail Degree of Saturation: (So)	106.05%

Saturation - ASTM D4767 Section 8.2

Dial Indicator Reading Prior to Saturation (Rb:) In.	0
Cell Pressure After Saturation, psi:	45.00
Back Presssure After Saturation After, psi:	40.00
Pore Pressure B Parameter :	0.99
Dial Indicator Reading After Saturation, (Ra) In.:	0.032
Change in Height during Saturation, (Delta Hs) In.	0.032
Change In Volume of Specimen during Saturation (Delta Vsat), In.3:	0.605

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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9573**

Point: **A**

Consolidation- ASTM D2435, Section 11.5:

Sample No:	T:	Burette 2:	Burette3:	Rc:
9573	0	23.7	23.6	0.032
9573	0.25	23.1	22.8	
9573	0.5	22.9	22.6	
9573	1	22.6	22.2	
9573	2	22.2	21.7	
9573	4	21.6	20.9	
9573	8	20.7	19.7	
9573	15	20.2	19	0.059
9573	30	19	17.6	0.064
9573	60	17.9	16.4	0.072
9573	120	17.4	15.8	0.074
9573	240	17.2	15.5	0.076
9573	450	17	15.3	0.076
9573	1420	16.8	15.2	0.077

Specimen Height After Consolidation, (Hc), In.: 5.66

Volume Change During Consolidation (Delta Vc), In.3: 0.93

Cross-Sectional Area of Specimen After Consolidation (Ac), In.2: 6.11

Triaxial Compression Testing ASTM D 4767

Sample Depth: 56.9 ft.

Cell Pressure: 61 psi

Back Pressure: 40 psi

Confining Pressure: 21 psi

Strain Rate: 0.006 in./min.

Specimen Height After Consolidation, (Hc), In.: 5.66

Correction for Vert Displacement, In.: 0

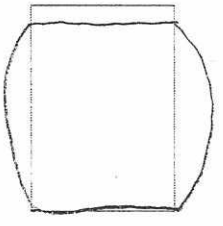
Load due to Friction and Uplift: 15.1 lbs.

Correction for Filter Paper: 0

Thickness of Membrane (tm), In.: 0.012

$\sigma 1-\sigma 3=$	Deviator Stress at Failure, ksf:	3.93
$\sigma 3$ f=	Effective Consolidation Stress at Failure, ksf:	3.02
$\sigma 1=$	Total Major Principal Stress at Failure:	6.95
σ '3f= $\sigma 3-\Delta \upsilon=$	Effective Minor Principal Stress at Failure,ksf:	1.24
σ '1f=	Effective Major Principal Stress at Failure, ksf:	5.16
	Axial Strain at Failure:	15.00%

Failure Sketch



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Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9573**

Point: **A**

Pa: Applied Force	Vertical Displacement Reading In. :	Pore Pressure psi:	Axial Strain (E1):	(P) - Force Adj for U and F lbs:	Corrected Vertical Displac In. :	Correction for Membrane ksf:	(A) Area In.2:	(σ1–σ3) Deviator Stress ksf:	[Δu] Induced Pore Water Pressure ksf:	σ3 Effective Consolidation Stress ksf	σ1 Total Major Principal Stress ksf	σ3 ' Effective Minor Principal Stress ksf	σ1 ' Effective Major Principal Stress ksf	p'	q
15.1	0.000	42.0	0.00%	0.0	0.000	0.00000	6.112	0.00	0.2880	3.02	3.02	2.74	2.74	2.74	0.00
50.7	0.003	45.4	0.05%	35.6	0.003	0.00026	6.115	0.84	0.7776	3.02	3.86	2.25	3.08	2.67	0.42
62.1	0.006	46.4	0.11%	47.0	0.006	0.00053	6.118	1.11	0.9216	3.02	4.13	2.10	3.21	2.66	0.55
71.0	0.009	47.8	0.16%	55.9	0.009	0.00079	6.121	1.31	1.1232	3.02	4.34	1.90	3.22	2.56	0.66
77.1	0.012	48.6	0.21%	62.0	0.012	0.00105	6.125	1.46	1.2384	3.02	4.48	1.79	3.24	2.51	0.73
80.7	0.014	49.2	0.25%	65.6	0.014	0.00123	6.127	1.54	1.3248	3.02	4.56	1.70	3.24	2.47	0.77
85.9	0.018	49.9	0.32%	70.8	0.018	0.00158	6.131	1.66	1.4256	3.02	4.69	1.60	3.26	2.43	0.83
87.9	0.020	50.1	0.35%	72.8	0.020	0.00175	6.133	1.71	1.4544	3.02	4.73	1.57	3.28	2.42	0.85
91.1	0.023	50.6	0.41%	76.0	0.023	0.00201	6.136	1.78	1.5264	3.02	4.81	1.50	3.28	2.39	0.89
94.4	0.026	51.0	0.46%	79.3	0.026	0.00228	6.140	1.86	1.5840	3.02	4.88	1.44	3.30	2.37	0.93
97.3	0.029	51.4	0.51%	82.2	0.029	0.00254	6.143	1.92	1.6416	3.02	4.95	1.38	3.31	2.34	0.96
99.4	0.032	51.9	0.57%	84.3	0.032	0.00280	6.146	1.97	1.7136	3.02	5.00	1.31	3.28	2.30	0.99
101.4	0.035	52.0	0.62%	86.3	0.035	0.00306	6.150	2.02	1.7280	3.02	5.04	1.30	3.31	2.30	1.01
102.9	0.037	52.3	0.65%	87.8	0.037	0.00324	6.152	2.05	1.7712	3.02	5.08	1.25	3.30	2.28	1.03
104.8	0.040	52.5	0.71%	89.7	0.040	0.00350	6.155	2.10	1.8000	3.02	5.12	1.22	3.32	2.27	1.05
107.0	0.043	52.8	0.76%	91.9	0.043	0.00376	6.158	2.15	1.8432	3.02	5.17	1.18	3.33	2.25	1.07
108.2	0.045	52.8	0.79%	93.1	0.045	0.00394	6.160	2.17	1.8432	3.02	5.20	1.18	3.35	2.27	1.09
109.9	0.048	53.1	0.85%	94.8	0.048	0.00420	6.164	2.21	1.8864	3.02	5.23	1.14	3.35	2.24	1.11
111.9	0.052	53.4	0.92%	96.8	0.052	0.00455	6.168	2.26	1.9296	3.02	5.28	1.09	3.35	2.22	1.13
113.5	0.055	53.5	0.97%	98.4	0.055	0.00481	6.171	2.29	1.9440	3.02	5.32	1.08	3.37	2.23	1.15
114.6	0.057	53.5	1.01%	99.5	0.057	0.00499	6.174	2.32	1.9440	3.02	5.34	1.08	3.40	2.24	1.16
125.9	0.085	54.5	1.50%	110.8	0.085	0.00744	6.205	2.56	2.0880	3.02	5.59	0.94	3.50	2.22	1.28
133.9	0.113	54.7	2.00%	118.8	0.113	0.00989	6.236	2.73	2.1168	3.02	5.76	0.91	3.64	2.27	1.37
140.2	0.142	54.8	2.51%	125.1	0.142	0.01243	6.269	2.86	2.1312	3.02	5.89	0.89	3.75	2.32	1.43
145.9	0.170	54.9	3.00%	130.8	0.170	0.01488	6.301	2.97	2.1456	3.02	6.00	0.88	3.85	2.37	1.49
151.1	0.198	55.0	3.50%	136.0	0.198	0.01733	6.333	3.08	2.1600	3.02	6.10	0.86	3.94	2.40	1.54
155.9	0.227	54.9	4.01%	140.8	0.227	0.01987	6.367	3.16	2.1456	3.02	6.19	0.88	4.04	2.46	1.58
160.3	0.255	54.9	4.50%	145.2	0.255	0.02232	6.400	3.24	2.1456	3.02	6.27	0.88	4.12	2.50	1.62
164.5	0.283	54.7	5.00%	149.4	0.283	0.02477	6.433	3.32	2.1168	3.02	6.34	0.91	4.23	2.57	1.66
168.2	0.312	54.6	5.51%	153.1	0.312	0.02731	6.468	3.38	2.1024	3.02	6.41	0.92	4.30	2.61	1.69
172.1	0.340	54.5	6.01%	157.0	0.340	0.02976	6.502	3.45	2.0880	3.02	6.47	0.94	4.38	2.66	1.72
175.8	0.368	54.4	6.50%	160.7	0.368	0.03221	6.536	3.51	2.0736	3.02	6.53	0.95	4.46	2.70	1.75
179.2	0.396	54.3	6.99%	164.1	0.396	0.03466	6.571	3.56	2.0592	3.02	6.59	0.96	4.53	2.75	1.78
182.5	0.425	54.2	7.51%	167.4	0.425	0.03720	6.608	3.61	2.0448	3.02	6.63	0.98	4.59	2.78	1.81
185.9	0.453	54.1	8.00%	170.8	0.453	0.03965	6.643	3.66	2.0304	3.02	6.69	0.99	4.66	2.82	1.83
188.6	0.481	53.9	8.50%	173.5	0.481	0.04210	6.679	3.70	2.0016	3.02	6.72	1.02	4.72	2.87	1.85
191.4	0.510	53.8	9.01%	176.3	0.510	0.04464	6.717	3.74	1.9872	3.02	6.76	1.04	4.77	2.90	1.87
194.2	0.538	53.7	9.50%	179.1	0.538	0.04709	6.753	3.77	1.9728	3.02	6.80	1.05	4.82	2.94	1.89

Report Date: Friday, May 06, 2005

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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9573**

Point: **A**

196.7	0.566	53.6	10.00%	181.6	0.566	0.04955	6.790	3.80	1.9584	3.02	6.83	1.07	4.87	2.97	1.90
201.1	0.623	53.4	11.00%	186.0	0.623	0.05453	6.867	3.85	1.9296	3.02	6.87	1.09	4.94	3.02	1.92
205.3	0.679	53.1	11.99%	190.2	0.679	0.05944	6.944	3.88	1.8864	3.02	6.91	1.14	5.02	3.08	1.94
209.3	0.736	52.9	13.00%	194.2	0.736	0.06443	7.025	3.92	1.8576	3.02	6.94	1.17	5.08	3.12	1.96
212.4	0.793	52.6	14.01%	197.3	0.793	0.06942	7.107	3.93	1.8144	3.02	6.95	1.21	5.14	3.17	1.96
214.8	0.849	52.4	15.00%	199.7	0.849	0.07432	7.190	3.93	1.7856	3.02	6.95	1.24	5.16	3.20	1.96
216.3	0.906	52.3	16.00%	201.2	0.906	0.07931	7.276	3.90	1.7712	3.02	6.93	1.25	5.16	3.20	1.95
218.1	0.962	52.2	16.99%	203.0	0.962	0.08421	7.363	3.89	1.7568	3.02	6.91	1.27	5.15	3.21	1.94
219.6	1.019	52.0	18.00%	204.5	1.019	0.08920	7.453	3.86	1.7280	3.02	6.89	1.30	5.16	3.23	1.93
219.6	1.070	51.9	18.90%	204.5	1.070	0.09366	7.536	3.81	1.7136	3.02	6.84	1.31	5.12	3.22	1.91
220.7	1.130	51.9	19.96%	205.6	1.130	0.09892	7.636	3.78	1.7136	3.02	6.80	1.31	5.09	3.20	1.89

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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9573**

Point: **B**

Material Description: Shelby Tube - Boring FA-B17; 56.9' - 58.9'

Moisture Determination ASTM D2216

	Before Testing	After Testing
Tare No.	C-1	C-1
Mass of Container and Wet Specimen (Mcws), grams	1397.49	1343.47
Mass of Container and Oven Dry Specimen (Mcs), grams	1120.73	1120.73
Mass of Container (Mc), grams	204.93	204.93
Mass of Water (Mw), grams:	276.76	222.74
Mass of Solid Particles (Ms), grams:	915.8	915.8
Moisture Content (w), %	30.22%	24.32%

Initial Condition of Specimen

	(1)	(2)	(3)	Average
Diameter Measurements, Inches:	2.845	2.85	2.865	2.853
Height Measurements, Inches:	5.82	5.815	5.812	5.816

Initial Volume of Specimen (Vo), In.3:	37.19
Dry Mass of Specimen After Testing, (Md), grams:	915.8
Dry Unit Weight, (γ d) pcf:	93.82
Specific Gravity of the Solids, (G):	2.68
Volume of Solids, (Vs), Cu. In.:	20.8529
Height of Solids,(Hs),In.:	3.2611
Void Ratio Before Consolidation (Eo):	0.7833
Intitail Degree of Saturation: (So)	103.39%

Saturation - ASTM D4767 Section 8.2

Dial Indicator Reading Prior to Saturation (Rb:) In.	0
Cell Pressure After Saturation, psi:	50.00
Back Presssure After Saturation, psi:	40.00
Pore Pressure B Parameter:	0.99
Dial Indicator Reading After Saturation, (Ra) In.:	0.012
Change in Height during Saturation, (Delta Hs) In.	0.012
Change In Volume of Specimen during Saturation (Delta Vsat), In.3:	0.230

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Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9573**

Point: **B**

Consolidation- ASTM D2435, Section 11.5:

Sample No:	T:	Burette 2:	Burette3:	Rc:
9573	0	23.9	23.8	0.012
9573	0.25	20.1	22.6	
9573	0.5	18.6	22.1	
9573	1	16.7	21.2	
9573	2	14.8	20.1	
9573	4	12.7	18.9	
9573	8	11.9	18.3	
9573	15	11.5	18.1	0.062
9573	30	11.2	17.9	0.064
9573	60	11.1	17.6	0.066
9573	120	11.1	17.3	0.066
9573	240	11.3	16.8	0.067
9573	450	11.6	16.1	0.069
9573	1430	13	14.4	0.069

Specimen Height After Consolidation, (Hc), In.: 5.75

Volume Change During Consolidation (Delta Vc), In.3: 1.24

Cross-Sectional Area of Specimen After Consolidation (Ac), In.2: 6.22

Triaxial Compression Testing ASTM D 4767

Sample Depth: 56.9 ft.

Cell Pressure: 82 psi

Back Pressure: 40 psi

Confining Pressure: 42 psi

Strain Rate: 0.006 In/min.

Specimen Height After Consolidation, (Hc), In.: 5.75

Correction for Vert Displacement, In.: 0

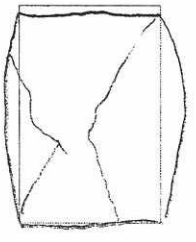
Load due to Friction and Uplift: 22.2 lbs.

Correction for Filter Paper: 0

Thickness of Membrane (tm), In.: 0.012

σ1−σ3=	Deviator Stress at Failure, ksf:	6.72
σ3 f=	Effective Consolidation Stress at Failure, ksf:	6.05
σ1=	Total Major Principal Stress at Failure:	12.77
σ '3f= σ3− Δ υ=	Effective Minor Principal Stress at Failure,ksf:	2.12
σ '1f=	Effective Major Principal Stress at Failure, ksf:	8.83
	Axial Strain at Failure:	13.02%

Failure Sketch



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Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9573**

Point: **B**

Pa: Applied Force	Vertical Displacement Reading In. :	Pore Pressure psi:	Axial Strain (E1):	(P) - Force Adj for U and F lbs:	Corrected Vertical Displac In. :	Correction for Membrane ksf:	(A) Area In.2:	(σ1−σ3) Deviator Stress ksf:	[Δu] Induced Pore Water Pressure ksf:	σ3 Effective Consolidation Stress ksf	σ1 Total Major Principal Stress ksf	σ3 ' Effective Minor Principal Stress ksf	σ1 ' Effective Major Principal Stress ksf	p'	q
22.2	0.000	42.4	0.00%	0.0	0.000	0.00000	6.215	0.00	0.3456	6.05	6.05	5.70	5.70	5.70	0.00
105.2	0.003	49.9	0.05%	83.0	0.003	0.00026	6.219	1.92	1.4256	6.05	7.97	4.62	6.54	5.58	0.96
132.2	0.006	53.5	0.10%	110.0	0.006	0.00051	6.222	2.55	1.9440	6.05	8.59	4.10	6.65	5.38	1.27
146.6	0.009	56.2	0.16%	124.4	0.009	0.00077	6.225	2.88	2.3328	6.05	8.92	3.72	6.59	5.15	1.44
157.6	0.012	58.1	0.21%	135.4	0.012	0.00103	6.228	3.13	2.6064	6.05	9.18	3.44	6.57	5.01	1.56
164.4	0.015	59.7	0.26%	142.2	0.015	0.00128	6.232	3.28	2.8368	6.05	9.33	3.21	6.50	4.85	1.64
171.4	0.018	61.2	0.31%	149.2	0.018	0.00154	6.235	3.44	3.0528	6.05	9.49	3.00	6.44	4.72	1.72
174.8	0.020	61.9	0.35%	152.6	0.020	0.00171	6.237	3.52	3.1536	6.05	9.57	2.89	6.42	4.66	1.76
178.8	0.023	62.6	0.40%	156.6	0.023	0.00197	6.240	3.61	3.2544	6.05	9.66	2.79	6.41	4.60	1.81
183.6	0.027	63.8	0.47%	161.4	0.027	0.00231	6.245	3.72	3.4272	6.05	9.77	2.62	6.34	4.48	1.86
185.3	0.029	64.1	0.50%	163.1	0.029	0.00248	6.247	3.76	3.4704	6.05	9.81	2.58	6.33	4.46	1.88
188.1	0.032	64.7	0.56%	165.9	0.032	0.00274	6.250	3.82	3.5568	6.05	9.87	2.49	6.31	4.40	1.91
191.0	0.035	65.2	0.61%	168.8	0.035	0.00299	6.254	3.88	3.6288	6.05	9.93	2.42	6.30	4.36	1.94
192.8	0.038	65.7	0.66%	170.6	0.038	0.00325	6.257	3.92	3.7008	6.05	9.97	2.35	6.27	4.31	1.96
194.4	0.040	66.1	0.70%	172.2	0.040	0.00342	6.259	3.96	3.7584	6.05	10.01	2.29	6.25	4.27	1.98
196.2	0.043	66.5	0.75%	174.0	0.043	0.00368	6.262	4.00	3.8160	6.05	10.05	2.23	6.23	4.23	2.00
197.8	0.046	66.7	0.80%	175.6	0.046	0.00393	6.266	4.03	3.8448	6.05	10.08	2.20	6.23	4.22	2.02
199.6	0.049	67.0	0.85%	177.4	0.049	0.00419	6.269	4.07	3.8880	6.05	10.12	2.16	6.23	4.20	2.04
201.8	0.053	67.4	0.92%	179.6	0.053	0.00453	6.273	4.12	3.9456	6.05	10.17	2.10	6.22	4.16	2.06
202.7	0.055	67.8	0.96%	180.5	0.055	0.00470	6.276	4.14	4.0032	6.05	10.19	2.04	6.18	4.11	2.07
204.3	0.058	67.8	1.01%	182.1	0.058	0.00496	6.279	4.17	4.0032	6.05	10.22	2.04	6.22	4.13	2.09
215.8	0.086	69.5	1.50%	193.6	0.086	0.00735	6.310	4.41	4.2480	6.05	10.46	1.80	6.21	4.01	2.21
225.6	0.115	70.3	2.00%	203.4	0.115	0.00983	6.342	4.61	4.3632	6.05	10.66	1.68	6.29	3.99	2.30
236.8	0.144	70.7	2.51%	214.6	0.144	0.01231	6.375	4.83	4.4208	6.05	10.88	1.63	6.46	4.04	2.42
246.3	0.173	70.9	3.01%	224.1	0.173	0.01479	6.408	5.02	4.4496	6.05	11.07	1.60	6.62	4.11	2.51
253.8	0.201	70.9	3.50%	231.6	0.201	0.01719	6.441	5.16	4.4496	6.05	11.21	1.60	6.76	4.18	2.58
261.8	0.230	70.9	4.00%	239.6	0.230	0.01967	6.475	5.31	4.4496	6.05	11.36	1.60	6.91	4.25	2.65
270.8	0.259	70.7	4.51%	248.6	0.259	0.02215	6.509	5.48	4.4208	6.05	11.53	1.63	7.11	4.37	2.74
278.9	0.288	70.6	5.01%	256.7	0.288	0.02463	6.543	5.62	4.4064	6.05	11.67	1.64	7.27	4.45	2.81
286.0	0.316	70.4	5.50%	263.8	0.316	0.02702	6.577	5.75	4.3776	6.05	11.80	1.67	7.42	4.54	2.87
292.2	0.345	70.2	6.00%	270.0	0.345	0.02950	6.612	5.85	4.3488	6.05	11.90	1.70	7.55	4.62	2.93
299.8	0.374	70.0	6.51%	277.6	0.374	0.03198	6.648	5.98	4.3200	6.05	12.03	1.73	7.71	4.72	2.99
307.3	0.403	69.8	7.01%	285.1	0.403	0.03446	6.684	6.11	4.2912	6.05	12.16	1.76	7.86	4.81	3.05
313.2	0.431	69.6	7.50%	291.0	0.431	0.03686	6.719	6.20	4.2624	6.05	12.25	1.79	7.98	4.89	3.10
318.5	0.460	69.3	8.00%	296.3	0.460	0.03934	6.756	6.28	4.2192	6.05	12.32	1.83	8.10	4.97	3.14
324.2	0.489	69.1	8.51%	302.0	0.489	0.04182	6.794	6.36	4.1904	6.05	12.41	1.86	8.22	5.04	3.18
330.5	0.518	68.9	9.01%	308.3	0.518	0.04430	6.831	6.45	4.1616	6.05	12.50	1.89	8.34	5.11	3.23
335.9	0.546	68.6	9.50%	313.7	0.546	0.04669	6.868	6.53	4.1184	6.05	12.58	1.93	8.46	5.19	3.27

Report Date: Friday, May 06, 2005

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Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9573**

Point: **B**

339.9	0.575	68.4	10.01%	317.7	0.575	0.04917	6.907	6.57	4.0896	6.05	12.62	1.96	8.53	5.25	3.29
347.8	0.633	68.0	11.02%	325.6	0.633	0.05413	6.985	6.66	4.0320	6.05	12.71	2.02	8.67	5.35	3.33
354.3	0.690	67.6	12.01%	332.1	0.690	0.05900	7.064	6.71	3.9744	6.05	12.76	2.07	8.78	5.43	3.36
358.7	0.748	67.3	13.02%	336.5	0.748	0.06396	7.146	6.72	3.9312	6.05	12.77	2.12	8.83	5.48	3.36
362.4	0.805	67.0	14.01%	340.2	0.805	0.06884	7.228	6.71	3.8880	6.05	12.76	2.16	8.87	5.51	3.35
365.0	0.864	66.8	15.03%	342.8	0.864	0.07388	7.315	6.67	3.8592	6.05	12.72	2.19	8.86	5.53	3.34
364.4	0.920	66.7	16.01%	342.2	0.920	0.07867	7.400	6.58	3.8448	6.05	12.63	2.20	8.78	5.49	3.29
363.0	0.978	66.7	17.02%	340.8	0.978	0.08363	7.490	6.47	3.8448	6.05	12.52	2.20	8.67	5.44	3.23
364.1	1.035	66.8	18.01%	341.9	1.035	0.08850	7.581	6.41	3.8592	6.05	12.45	2.19	8.59	5.39	3.20
363.6	1.093	66.8	19.02%	341.4	1.093	0.09346	7.675	6.31	3.8592	6.05	12.36	2.19	8.50	5.34	3.16
361.4	1.150	66.9	20.01%	339.2	1.150	0.09834	7.770	6.19	3.8736	6.05	12.24	2.17	8.36	5.27	3.09

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Sample No: **9573**

Point: **C**

Material Description:	Shelby Tube - Boring FA-B17; 56.9' - 58.9'

Moisture Determination ASTM D2216

	Before Testing	After Testing
Tare No.	#2A	#2A
Mass of Container and Wet Specimen (Mcws), grams	1427.87	1368.57
Mass of Container and Oven Dry Specimen (Mcs), grams	1149.73	1149.73
Mass of Container (Mc), grams	223.75	223.75
Mass of Water (Mw), grams:	278.14	218.84
Mass of Solid Particles (Ms), grams:	925.98	925.98
Moisture Content (w), %	30.04%	23.63%

Initial Condition of Specimen

	(1)	(2)	(3)	Average
Diameter Measurements, Inches:	2.855	2.85	2.86	2.855
Height Measurements, Inches:	5.875	5.89	5.85	5.872

Initial Volume of Specimen (Vo), In.3:	37.59
Dry Mass of Specimen After Testing, (Md), grams:	925.98
Dry Unit Weight, (γ d) pcf:	93.85
Specific Gravity of the Solids, (G):	2.68
Volume of Solids, (Vs), Cu. In.:	21.0847
Height of Solids,(Hs),In.:	3.2936
Void Ratio Before Consolidation (Eo):	0.7828
Intitail Degree of Saturation: (So)	102.84%

Saturation - ASTM D4767 Section 8.2

Dial Indicator Reading Prior to Saturation (Rb:) In.	0
Cell Pressure After Saturation, psi:	50.00
Back Presssure After Saturation, psi:	40.00
Pore Pressure B Parameter :	1
Dial Indicator Reading After Saturation, (Ra) In.:	0.016
Change in Height during Saturation, (Delta Hs) In.	0.016
Change In Volume of Specimen during Saturation (Delta Vsat), In.3:	0.307

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Consolidation- ASTM D2435, Section 11.5:

Sample No:	T:	Burette 2:	Burette3:	Rc:
9573	0	23.7	55.5	0.016
9573	0.25	23	36.2	
9573	0.5	22.9	32.9	
9573	1	22.6	29.4	
9573	2	22.2	24.8	
9573	4	21.8	22.8	
9573	8	21.2	20.3	
9573	15	20.6	18.2	0.11
9573	30	20.1	16.6	0.117
9573	60	19.9	16	0.119
9573	120	19.8	15.6	0.123
9573	240	19.7	15.2	0.125
9573	450	19.7	15	0.126
9573	1410	19.5	14.5	0.129

Specimen Height After Consolidation, (Hc), In.: 5.74

Volume Change During Consolidation (Delta Vc), In.3: 2.76

Cross-Sectional Area of Specimen After Consolidation (Ac), In.2: 6.01

Triaxial Compression Testing ASTM D 4767

Sample Depth: 56.9 ft.

Cell Pressure: 124 psi

Back Pressure: 40 psi

Confining Pressure: 84 psi

Strain Rate: 0.006 In/min.

Specimen Height After Consolidation, (Hc), In.: 5.74

Correction for Vert Displacement, In.: 0

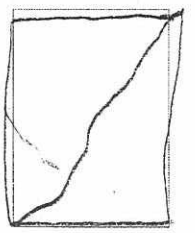
Load due to Friction and Uplift: 26.9 lbs.

Correction for Filter Paper: 0

Thickness of Membrane (tm), In.: 0.012

$\sigma 1-\sigma 3=$	Deviator Stress at Failure, ksf:	9.75
$\sigma 3$ f=	Effective Consolidation Stress at Failure, ksf:	12.10
$\sigma 1=$	Total Major Principal Stress at Failure:	21.85
σ '3f= $\sigma 3-\Delta \upsilon=$	Effective Minor Principal Stress at Failure,ksf:	3.23
σ '1f=	Effective Major Principal Stress at Failure, ksf:	12.98
	Axial Strain at Failure:	12.99%

Failure Sketch



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Pa: Applied Force	Vertical Displacement Reading In. :	Pore Pressure psi:	Axial Strain (E1):	(P) - Force Adj for U and F lbs:	Corrected Vertical Displac In. :	Correction for Membrane ksf:	(A) Area In.2:	(σ1−σ3) Deviator Stress ksf:	[Δu] Induced Pore Water Pressure ksf:	σ3 Effective Consolidation Stress ksf	σ1 Total Major Principal Stress ksf	σ3 ' Effective Minor Principal Stress ksf	σ1 ' Effective Major Principal Stress ksf	p'	q
26.9	0.000	43.8	0.00%	0.0	0.000	0.00000	6.012	0.00	0.5472	12.10	12.10	11.55	11.55	11.55	0.00
98.1	0.003	48.0	0.05%	71.2	0.003	0.00026	6.015	1.70	1.1520	12.10	13.80	10.94	12.65	11.80	0.85
143.2	0.006	52.6	0.10%	116.3	0.006	0.00052	6.018	2.78	1.8144	12.10	14.88	10.28	13.06	11.67	1.39
170.7	0.009	55.8	0.16%	143.8	0.009	0.00078	6.021	3.44	2.2752	12.10	15.53	9.82	13.26	11.54	1.72
196.0	0.012	59.9	0.21%	169.1	0.012	0.00104	6.024	4.04	2.8656	12.10	16.14	9.23	13.27	11.25	2.02
217.8	0.015	63.2	0.26%	190.9	0.015	0.00131	6.028	4.56	3.3408	12.10	16.66	8.76	13.31	11.03	2.28
238.4	0.018	66.1	0.31%	211.5	0.018	0.00157	6.031	5.05	3.7584	12.10	17.14	8.34	13.39	10.86	2.52
251.1	0.020	68.6	0.35%	224.2	0.020	0.00174	6.033	5.35	4.1184	12.10	17.45	7.98	13.33	10.65	2.67
266.5	0.023	71.2	0.40%	239.6	0.023	0.00200	6.036	5.71	4.4928	12.10	17.81	7.60	13.32	10.46	2.86
282.4	0.027	74.8	0.47%	255.5	0.027	0.00235	6.040	6.09	5.0112	12.10	18.18	7.08	13.17	10.13	3.04
291.2	0.029	76.9	0.50%	264.3	0.029	0.00252	6.042	6.30	5.3136	12.10	18.39	6.78	13.08	9.93	3.15
299.3	0.032	79.0	0.56%	272.4	0.032	0.00278	6.045	6.49	5.6160	12.10	18.58	6.48	12.97	9.72	3.24
308.1	0.035	81.0	0.61%	281.2	0.035	0.00305	6.049	6.69	5.9040	12.10	18.79	6.19	12.88	9.54	3.35
314.8	0.038	82.3	0.66%	287.9	0.038	0.00331	6.052	6.85	6.0912	12.10	18.94	6.00	12.85	9.43	3.42
318.8	0.040	83.8	0.70%	291.9	0.040	0.00348	6.054	6.94	6.3072	12.10	19.04	5.79	12.73	9.26	3.47
324.4	0.043	84.9	0.75%	297.5	0.043	0.00374	6.057	7.07	6.4656	12.10	19.16	5.63	12.70	9.16	3.53
328.2	0.046	86.5	0.80%	301.3	0.046	0.00400	6.060	7.16	6.6960	12.10	19.25	5.40	12.56	8.98	3.58
333.2	0.049	87.6	0.85%	306.3	0.049	0.00426	6.064	7.27	6.8544	12.10	19.37	5.24	12.51	8.88	3.63
336.5	0.052	88.9	0.91%	309.6	0.052	0.00452	6.067	7.34	7.0416	12.10	19.44	5.05	12.40	8.73	3.67
339.4	0.055	89.7	0.96%	312.5	0.055	0.00479	6.070	7.41	7.1568	12.10	19.50	4.94	12.35	8.64	3.70
343.4	0.058	90.6	1.01%	316.5	0.058	0.00505	6.073	7.50	7.2864	12.10	19.60	4.81	12.31	8.56	3.75
361.6	0.086	96.5	1.50%	334.7	0.086	0.00748	6.103	7.89	8.1360	12.10	19.99	3.96	11.85	7.90	3.94
374.9	0.115	99.4	2.00%	348.0	0.115	0.01001	6.135	8.16	8.5536	12.10	20.25	3.54	11.70	7.62	4.08
384.4	0.144	101.2	2.51%	357.5	0.144	0.01253	6.166	8.34	8.8128	12.10	20.43	3.28	11.62	7.45	4.17
393.0	0.172	102.3	3.00%	366.1	0.172	0.01497	6.197	8.49	8.9712	12.10	20.59	3.12	11.62	7.37	4.25
401.3	0.201	102.9	3.50%	374.4	0.201	0.01749	6.230	8.64	9.0576	12.10	20.73	3.04	11.68	7.36	4.32
409.0	0.230	103.3	4.01%	382.1	0.230	0.02001	6.263	8.77	9.1152	12.10	20.86	2.98	11.75	7.36	4.38
415.6	0.259	103.3	4.51%	388.7	0.259	0.02254	6.296	8.87	9.1152	12.10	20.96	2.98	11.85	7.41	4.43
421.6	0.287	103.5	5.00%	394.7	0.287	0.02497	6.328	8.96	9.1440	12.10	21.05	2.95	11.91	7.43	4.48
427.9	0.316	103.4	5.50%	401.0	0.316	0.02749	6.362	9.05	9.1296	12.10	21.15	2.97	12.02	7.49	4.52
433.8	0.345	103.4	6.01%	406.9	0.345	0.03002	6.396	9.13	9.1296	12.10	21.23	2.97	12.10	7.53	4.57
439.5	0.373	103.3	6.50%	412.6	0.373	0.03245	6.429	9.21	9.1152	12.10	21.30	2.98	12.19	7.59	4.60
444.8	0.402	103.3	7.00%	417.9	0.402	0.03498	6.464	9.27	9.1152	12.10	21.37	2.98	12.26	7.62	4.64
450.4	0.431	103.0	7.51%	423.5	0.431	0.03750	6.500	9.35	9.0720	12.10	21.44	3.02	12.37	7.70	4.67
455.3	0.459	102.9	7.99%	428.4	0.459	0.03994	6.534	9.40	9.0576	12.10	21.50	3.04	12.44	7.74	4.70
460.4	0.488	102.8	8.50%	433.5	0.488	0.04246	6.570	9.46	9.0432	12.10	21.55	3.05	12.51	7.78	4.73
465.3	0.517	102.6	9.00%	438.4	0.517	0.04498	6.607	9.51	9.0144	12.10	21.61	3.08	12.59	7.84	4.76
470.7	0.546	102.5	9.51%	443.8	0.546	0.04751	6.643	9.57	9.0000	12.10	21.67	3.10	12.67	7.88	4.79

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474.3	0.574	102.3	10.00%	447.4	0.574	0.04994	6.679	9.60	8.9712	12.10	21.69	3.12	12.72	7.92	4.80
483.6	0.632	102.1	11.01%	456.7	0.632	0.05499	6.755	9.68	8.9424	12.10	21.78	3.15	12.83	7.99	4.84
491.4	0.689	101.9	12.00%	464.5	0.689	0.05995	6.831	9.73	8.9136	12.10	21.83	3.18	12.91	8.05	4.87
498.0	0.746	101.6	12.99%	471.1	0.746	0.06491	6.909	9.75	8.8704	12.10	21.85	3.23	12.98	8.10	4.88
502.6	0.804	101.5	14.00%	475.7	0.804	0.06996	6.990	9.73	8.8560	12.10	21.83	3.24	12.97	8.10	4.86
507.5	0.861	101.3	14.99%	480.6	0.861	0.07491	7.072	9.71	8.8272	12.10	21.81	3.27	12.98	8.12	4.86
512.3	0.919	101.2	16.00%	485.4	0.919	0.07996	7.157	9.69	8.8128	12.10	21.78	3.28	12.97	8.13	4.84
514.2	0.976	101.2	17.00%	487.3	0.976	0.08492	7.243	9.60	8.8128	12.10	21.70	3.28	12.89	8.08	4.80
518.0	1.033	101.0	17.99%	491.1	1.033	0.08988	7.330	9.56	8.7840	12.10	21.65	3.31	12.87	8.09	4.78
518.0	1.091	101.0	19.00%	491.1	1.091	0.09493	7.422	9.43	8.7840	12.10	21.53	3.31	12.75	8.03	4.72
512.9	1.148	101.1	19.99%	486.0	1.148	0.09989	7.514	9.21	8.7984	12.10	21.31	3.30	12.51	7.90	4.61
512.9	1.148	101.1	19.99%	486.0	1.148	0.09989	7.514	9.21	8.7984	12.10	21.31	3.30	12.51	7.90	4.61

Report Date: Friday, May 06, 2005

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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9574**

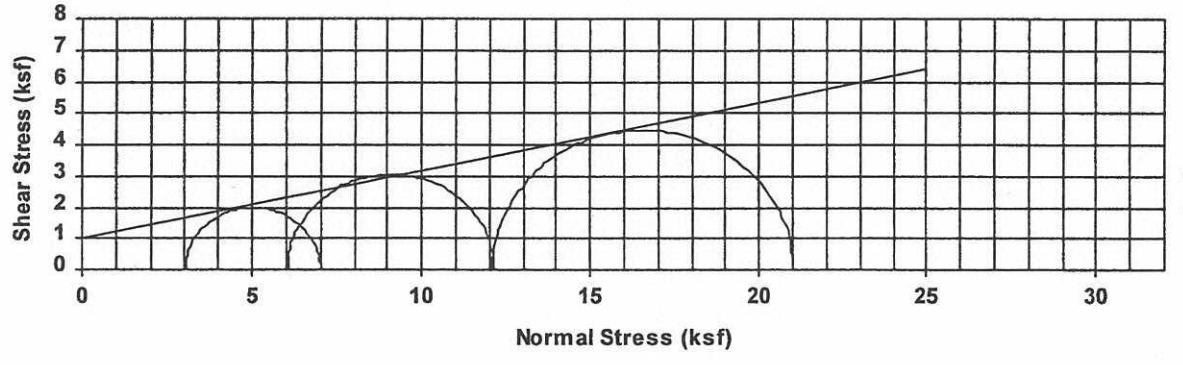
Material Description: Shelby Tube - Boring FA-B17; 66.9' - 68.9' - SOIL

silty clay 2

Point Designation	Initial Conditions			Final Conditions			
	Water Content, %	Dry Density, pcf	Degree of Saturation	Water Content, %	Confining Stress, (ksf)	Deviator Stress	Induced Pore Pressure (ksf)
A	30.2%	95.0	106.8%	27.86%	3.024	3.99	1.87
B	31.8%	91.9	104.3%	26.2%	6.048	6.10	4.28
C	32.2%	91.3	104.3%	26.5%	12.096	8.92	8.81

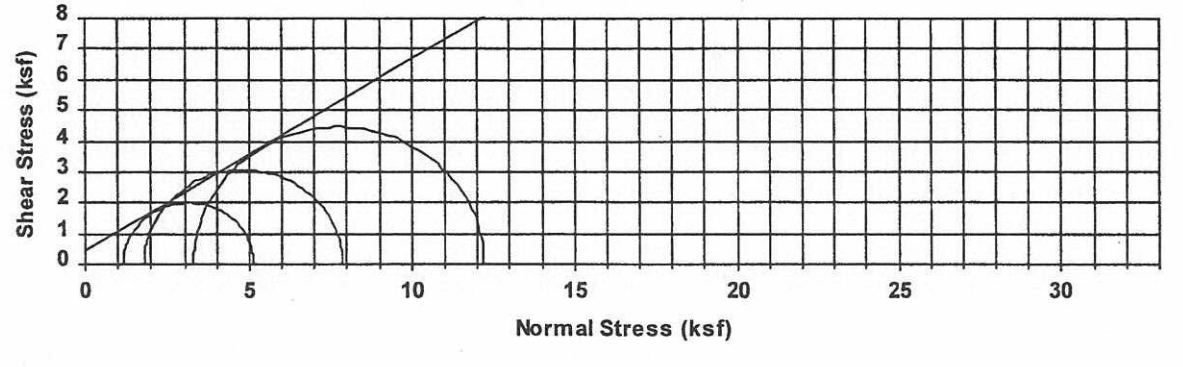
Point Designation	Axial Strain, %	q, (ksf)	Effective Stresses, (ksf)			Total Stresses, (ksf)		
			Major, (ksf)	Minor, (ksf)	p', (ksf)	Major, (ksf)	Minor, (ksf)	p, (ksf)
A	9.5%	1.99	5.14	1.15	3.15	7.01	3.02	5.02
B	14.0%	3.05	7.87	1.77	4.82	12.15	6.05	9.10
C	8.5%	4.46	12.20	3.28	7.74	21.01	12.10	16.55

Total Stress Envelope



ϕ: 12.1°
c : 1.04 ksf

Effective Stress Envelope



ϕ ': 32.0°
c' : 0.46 ksf

Report Date: Friday, May 27, 2005

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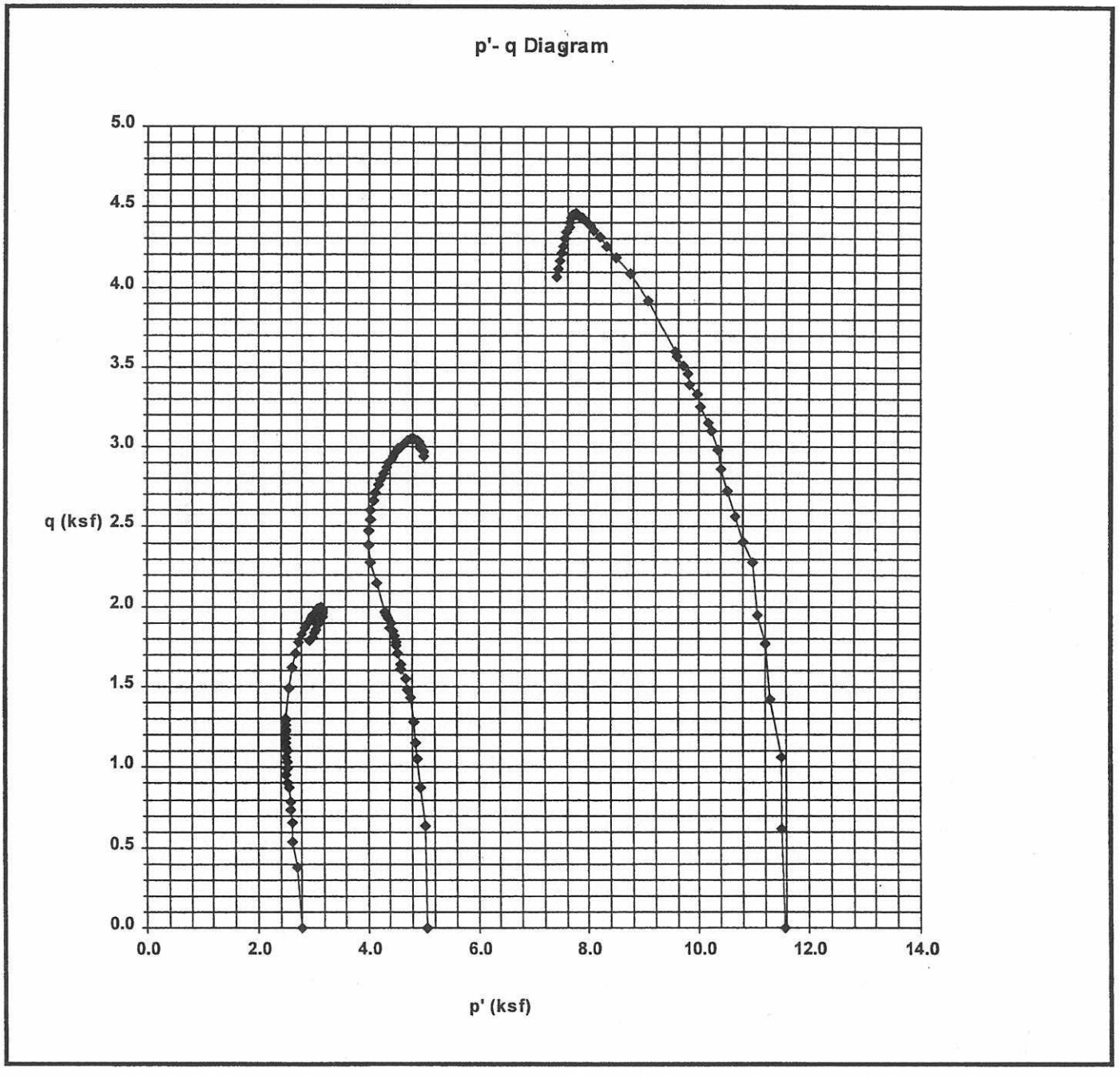
AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9574**



Report Date: Friday, May 27, 2005

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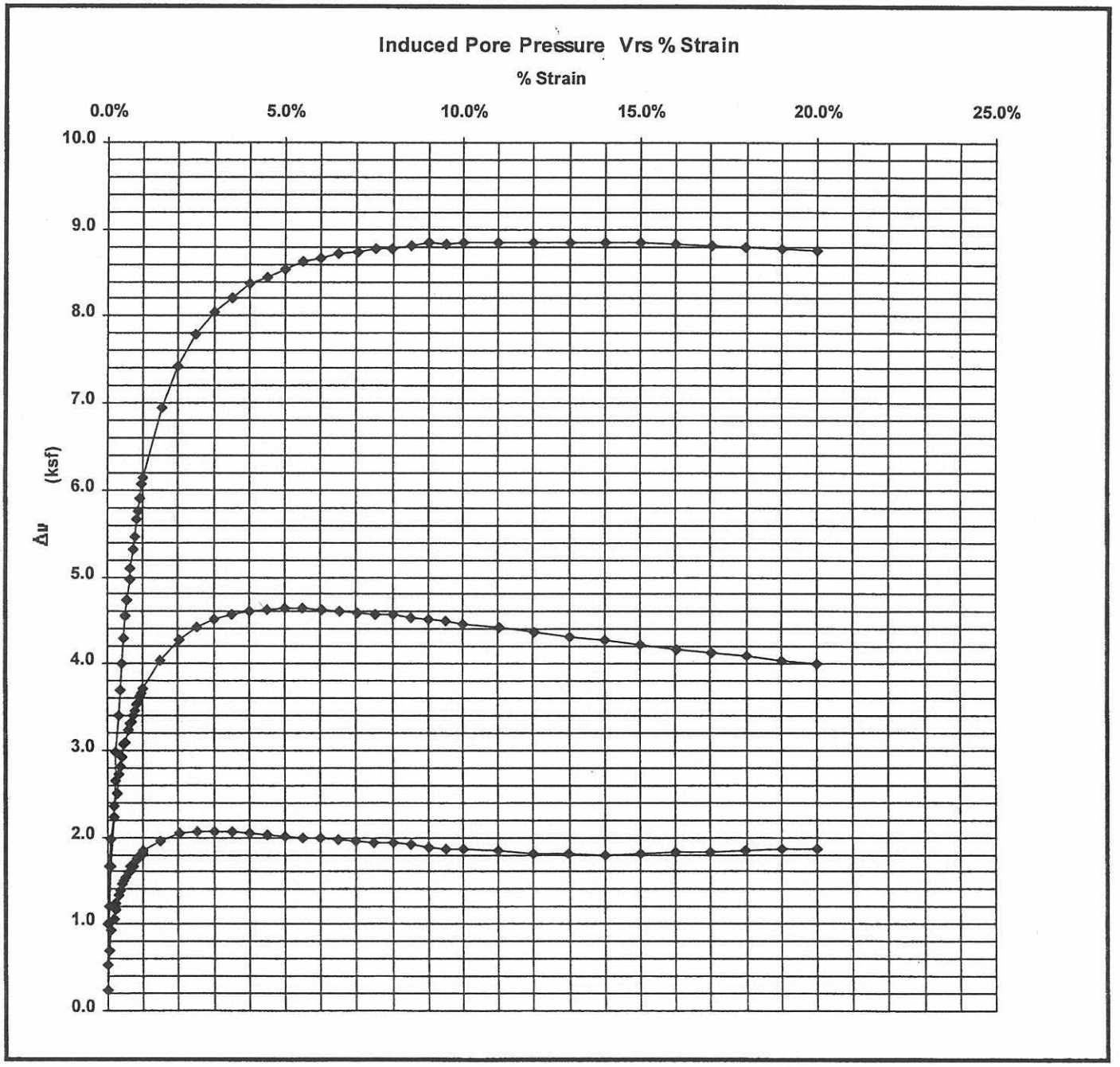
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Company: **AEP**

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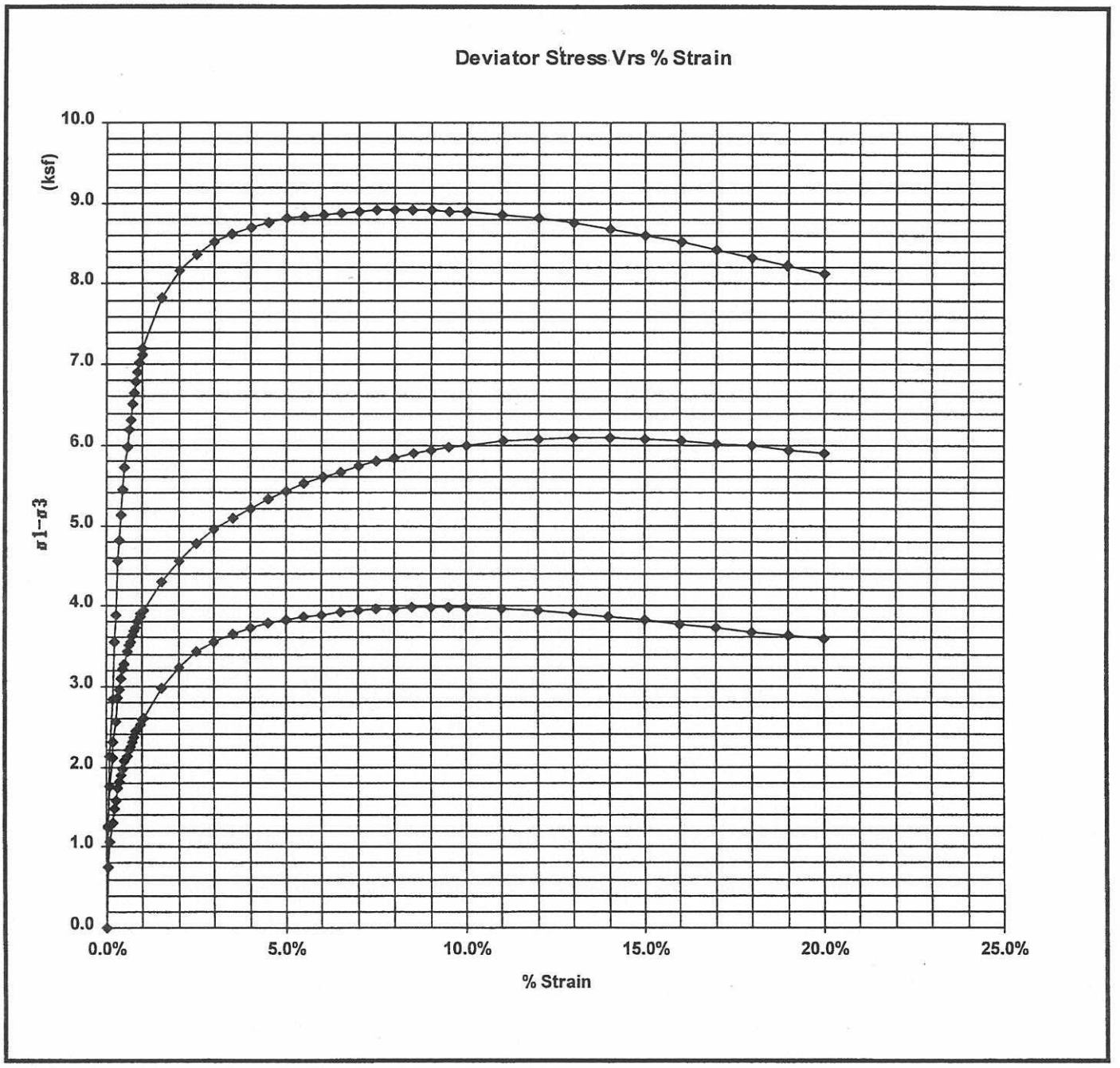
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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9574**

Point: **A**

Material Description: Shelby Tube - Boring FA-B17; 66.9' - 68.9' - SOIL

Moisture Determination ASTM D2216

	Before Testing	After Testing
Tare No.	K	K
Mass of Container and Wet Specimen (Mcws), grams	1376.54	1355.59
Mass of Container and Oven Dry Specimen (Mcs), grams	1104.78	1104.78
Mass of Container (Mc), grams	204.49	204.49
Mass of Water (Mw), grams:	271.76	250.81
Mass of Solid Particles (Ms), grams:	900.29	900.29
Moisture Content (w), %	30.19%	27.86%

Initial Condition of Specimen

	(1)	(2)	(3)	Average
Diameter Measurements, Inches:	2.838	2.818	2.828	2.828
Height Measurements, Inches:	5.756	5.742	5.748	5.749

Initial Volume of Specimen (Vo), In.3:	36.11
Dry Mass of Specimen After Testing, (Md), grams:	900.29
Dry Unit Weight, (γ d) pcf:	94.98
Specific Gravity of the Solids, (G):	2.67
Volume of Solids, (Vs), Cu. In.:	20.5765
Height of Solids,(Hs),In.:	3.2758
Void Ratio Before Consolidation (Eo):	0.7549
Intitail Degree of Saturation: (So)	106.77%

Saturation - ASTM D4767 Section 8.2

Dial Indicator Reading Prior to Saturation (Rb:) In.	0
Cell Pressure After Saturation, psi:	45.00
Back Presssure After Saturation After, psi:	40.00
Pore Pressure B Parameter :	1
Dial Indicator Reading After Saturation, (Ra) In.:	0.026
Change in Height during Saturation, (Delta Hs) In.	0.026
Change In Volume of Specimen during Saturation (Delta Vsat), In.3:	0.490

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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9574**

Point: **A**

Consolidation- ASTM D2435, Section 11.5:

Sample No:	T:	Burette 2:	Burette3:	Rc:
9574	0	23.6	23.7	0.026
9574	0.25	22.8	23.2	
9574	0.5	22.6	23.1	
9574	1	22.3	23	
9574	2	22	22.8	
9574	4	21.2	22.4	
9574	8	20.3	22	
9574	15	19	21.3	0.051
9574	30	17.8	20.7	0.057
9574	60	16.3	19.9	0.063
9574	120	15.2	19.2	0.07
9574	240	14.8	18.9	0.072
9574	440	14.4	18.7	0.074
9574	1400	14.2	18.4	0.075

Specimen Height After Consolidation, (Hc), In.:	5.67
Volume Change During Consolidation (Delta Vc), In.3:	0.90
Cross-Sectional Area of Specimen After Consolidation (Ac), In.2:	6.12

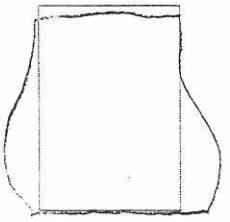
Triaxial Compression Testing ASTM D 4767

Sample Depth:	66.9	ft.
Cell Pressure:	61	psi
Back Pressure:	40	psi
Confining Pressure:	21	psi
Strain Rate:	0.006	in./min.

Specimen Height After Consolidation, (Hc), In.:	5.67
Correction for Vert Displacement, In.:	0
Load due to Friction and Uplift:	13.1 lbs.
Correction for Filter Paper:	0
Thickness of Membrane (tm), In.:	0.012

	$\sigma 1-\sigma 3=$	Deviator Stress at Failure, ksf:	3.99
	$\sigma 3$ f=	Effective Consolidation Stress at Failure, ksf:	3.02
	$\sigma 1=$	Total Major Principal Stress at Failure:	7.01
σ '3f=	$\sigma 3-\Delta \upsilon=$	Effective Minor Principal Stress at Failure,ksf:	1.15
	σ '1f=	Effective Major Principal Stress at Failure, ksf:	5.14
		Axial Strain at Failure:	9.50%

Failure Sketch



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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9574**

Point: **A**

Pa: Applied Force	Vertical Displacement Reading In. :	Pore Pressure psi:	Axial Strain (E1):	(P) - Force Adj for U and F lbs:	Corrected Vertical Displac In. :	Correction for Membrane ksf:	(A) Area In.2:	(σ1–σ3) Deviator Stress ksf:	[Δυ] Induced Pore Water Pressure ksf:	σ3 Effective Consolidation Stress ksf	σ1 Total Major Principal Stress ksf	σ3 ' Effective Minor Principal Stress ksf	σ1 ' Effective Major Principal Stress ksf	p'	q
13.1	0.000	41.7	0.00%	0.0	0.000	0.00000	6.120	0.00	0.2448	3.02	3.02	2.78	2.78	2.78	0.00
45.0	0.003	44.8	0.05%	31.9	0.003	0.00026	6.123	0.75	0.6912	3.02	3.77	2.33	3.08	2.71	0.37
58.7	0.006	46.5	0.11%	45.6	0.006	0.00052	6.126	1.07	0.9360	3.02	4.10	2.09	3.16	2.62	0.54
68.9	0.009	47.4	0.16%	55.8	0.009	0.00079	6.130	1.31	1.0656	3.02	4.33	1.96	3.27	2.61	0.66
76.0	0.012	48.1	0.21%	62.9	0.012	0.00105	6.133	1.48	1.1664	3.02	4.50	1.86	3.33	2.60	0.74
80.1	0.014	48.6	0.25%	67.0	0.014	0.00122	6.135	1.57	1.2384	3.02	4.60	1.79	3.36	2.57	0.79
87.4	0.018	49.3	0.32%	74.3	0.018	0.00157	6.139	1.74	1.3392	3.02	4.77	1.68	3.43	2.56	0.87
90.6	0.020	49.7	0.35%	77.5	0.020	0.00175	6.142	1.82	1.3968	3.02	4.84	1.63	3.44	2.53	0.91
94.3	0.023	50.2	0.41%	81.2	0.023	0.00201	6.145	1.90	1.4688	3.02	4.92	1.56	3.46	2.51	0.95
97.8	0.026	50.4	0.46%	84.7	0.026	0.00227	6.148	1.98	1.4976	3.02	5.01	1.53	3.51	2.52	0.99
101.3	0.029	50.7	0.51%	88.2	0.029	0.00253	6.151	2.06	1.5408	3.02	5.09	1.48	3.55	2.51	1.03
104.3	0.032	51.1	0.56%	91.2	0.032	0.00279	6.155	2.13	1.5984	3.02	5.16	1.43	3.56	2.49	1.07
107.5	0.035	51.2	0.62%	94.4	0.035	0.00306	6.158	2.20	1.6128	3.02	5.23	1.41	3.62	2.51	1.10
109.2	0.037	51.5	0.65%	96.1	0.037	0.00323	6.160	2.24	1.6560	3.02	5.27	1.37	3.61	2.49	1.12
112.0	0.040	51.6	0.71%	98.9	0.040	0.00349	6.163	2.31	1.6704	3.02	5.33	1.35	3.66	2.51	1.15
114.9	0.043	51.9	0.76%	101.8	0.043	0.00375	6.167	2.37	1.7136	3.02	5.40	1.31	3.68	2.50	1.19
117.7	0.046	52.2	0.81%	104.6	0.046	0.00402	6.170	2.44	1.7568	3.02	5.46	1.27	3.70	2.49	1.22
119.2	0.048	52.2	0.85%	106.1	0.048	0.00419	6.172	2.47	1.7568	3.02	5.50	1.27	3.74	2.50	1.24
121.6	0.052	52.5	0.92%	108.5	0.052	0.00454	6.176	2.53	1.8000	3.02	5.55	1.22	3.75	2.49	1.26
123.9	0.055	52.6	0.97%	110.8	0.055	0.00480	6.180	2.58	1.8144	3.02	5.60	1.21	3.79	2.50	1.29
125.4	0.057	52.8	1.00%	112.3	0.057	0.00498	6.182	2.61	1.8432	3.02	5.63	1.18	3.79	2.49	1.31
142.2	0.085	53.6	1.50%	129.1	0.085	0.00742	6.213	2.98	1.9584	3.02	6.01	1.07	4.05	2.56	1.49
154.2	0.114	54.2	2.01%	141.1	0.114	0.00995	6.245	3.24	2.0448	3.02	6.27	0.98	4.22	2.60	1.62
163.0	0.142	54.3	2.50%	149.9	0.142	0.01239	6.277	3.43	2.0592	3.02	6.45	0.96	4.39	2.68	1.71
169.5	0.170	54.3	3.00%	156.4	0.170	0.01484	6.309	3.55	2.0592	3.02	6.58	0.96	4.52	2.74	1.78
174.9	0.199	54.3	3.51%	161.8	0.199	0.01737	6.342	3.66	2.0592	3.02	6.68	0.96	4.62	2.79	1.83
179.1	0.227	54.2	4.00%	166.0	0.227	0.01981	6.375	3.73	2.0448	3.02	6.75	0.98	4.71	2.84	1.86
182.2	0.255	54.1	4.49%	169.1	0.255	0.02226	6.408	3.78	2.0304	3.02	6.80	0.99	4.77	2.88	1.89
185.4	0.284	54.0	5.01%	172.3	0.284	0.02479	6.442	3.83	2.0160	3.02	6.85	1.01	4.83	2.92	1.91
188.1	0.312	53.9	5.50%	175.0	0.312	0.02723	6.476	3.86	2.0016	3.02	6.89	1.02	4.89	2.95	1.93
190.4	0.340	53.8	5.99%	177.3	0.340	0.02968	6.510	3.89	1.9872	3.02	6.92	1.04	4.93	2.98	1.95
192.6	0.369	53.7	6.50%	179.5	0.369	0.03221	6.546	3.92	1.9728	3.02	6.94	1.05	4.97	3.01	1.96
194.7	0.397	53.6	7.00%	181.6	0.397	0.03465	6.580	3.94	1.9584	3.02	6.96	1.07	5.00	3.04	1.97
196.6	0.425	53.4	7.49%	183.5	0.425	0.03710	6.615	3.96	1.9296	3.02	6.98	1.09	5.05	3.07	1.98
198.3	0.454	53.4	8.00%	185.2	0.454	0.03963	6.652	3.97	1.9296	3.02	6.99	1.09	5.06	3.08	1.98
199.7	0.482	53.3	8.50%	186.6	0.482	0.04207	6.688	3.98	1.9152	3.02	7.00	1.11	5.08	3.10	1.99
201.0	0.511	53.1	9.01%	187.9	0.511	0.04460	6.726	3.98	1.8864	3.02	7.00	1.14	5.12	3.13	1.99
202.5	0.539	53.0	9.50%	189.4	0.539	0.04705	6.762	3.99	1.8720	3.02	7.01	1.15	5.14	3.15	1.99

Report Date: Friday, May 27, 2005

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AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9574**

Point: **A**

203.4	0.567	52.9	9.99%	190.3	0.567	0.04949	6.799	3.98	1.8576	3.02	7.00	1.17	5.15	3.16	1.99
204.9	0.624	52.8	11.00%	191.8	0.624	0.05447	6.876	3.96	1.8432	3.02	6.99	1.18	5.14	3.16	1.98
206.3	0.681	52.6	12.00%	193.2	0.681	0.05944	6.955	3.94	1.8144	3.02	6.96	1.21	5.15	3.18	1.97
207.2	0.737	52.6	12.99%	194.1	0.737	0.06433	7.033	3.91	1.8144	3.02	6.93	1.21	5.12	3.16	1.95
207.7	0.794	52.5	13.99%	194.6	0.794	0.06931	7.116	3.87	1.8000	3.02	6.89	1.22	5.09	3.16	1.93
207.8	0.851	52.6	15.00%	194.7	0.851	0.07428	7.200	3.82	1.8144	3.02	6.84	1.21	5.03	3.12	1.91
208.0	0.907	52.7	15.99%	194.9	0.907	0.07917	7.284	3.77	1.8288	3.02	6.80	1.20	4.97	3.08	1.89
207.9	0.964	52.7	16.99%	194.8	0.964	0.08414	7.372	3.72	1.8288	3.02	6.74	1.20	4.92	3.06	1.86
208.0	1.021	52.8	18.00%	194.9	1.021	0.08912	7.463	3.67	1.8432	3.02	6.70	1.18	4.85	3.02	1.84
208.2	1.078	52.9	19.00%	195.1	1.078	0.09409	7.555	3.62	1.8576	3.02	6.65	1.17	4.79	2.98	1.81
208.6	1.134	53.0	19.99%	195.5	1.134	0.09898	7.649	3.58	1.8720	3.02	6.61	1.15	4.73	2.94	1.79

Report Date: Friday, May 27, 2005

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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9574**

Point: **B**

Material Description:	Shelby Tube - Boring FA-B17; 66.9' - 68.9' - SOIL

Moisture Determination ASTM D2216

	Before Testing	After Testing
Tare No.	T-102	T-102
Mass of Container and Wet Specimen (Mcws), grams	1352.99	1304.19
Mass of Container and Oven Dry Specimen (Mcs), grams	1073.86	1073.86
Mass of Container (Mc), grams	195.98	195.98
Mass of Water (Mw), grams:	279.13	230.33
Mass of Solid Particles (Ms), grams:	877.88	877.88
Moisture Content (w), %	31.80%	26.24%

Initial Condition of Specimen

	(1)	(2)	(3)	Average
Diameter Measurements, Inches:	2.826	2.834	2.827	2.829
Height Measurements, Inches:	5.797	5.791	5.784	5.791

Initial Volume of Specimen (Vo), In.3:	36.40
Dry Mass of Specimen After Testing, (Md), grams:	877.88
Dry Unit Weight, (γ d) pcf:	91.88
Specific Gravity of the Solids, (G):	2.67
Volume of Solids, (Vs), Cu. In.:	20.0643
Height of Solids,(Hs),In.:	3.1920
Void Ratio Before Consolidation (Eo):	0.8141
Intitail Degree of Saturation: (So)	104.28%

Saturation - ASTM D4767 Section 8.2

Dial Indicator Reading Prior to Saturation (Rb:) In.	0
Cell Pressure After Saturation, psi:	45.00
Back Presssure After Saturation, psi:	40.00
Pore Pressure B Parameter:	0.96
Dial Indicator Reading After Saturation, (Ra) In.:	0.038
Change in Height during Saturation, (Delta Hs) In.	0.038
Change In Volume of Specimen during Saturation (Delta Vsat), In.3:	0.717

Report Date: Friday, May 27, 2005

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AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9574**

Point: **B**

Consolidation- ASTM D2435, Section 11.5:

Sample No:	T:	Burette 2:	Burette3:	Rc:
9574	0	23.9	23.6	0.038
9574	0.25	23.3	23	
9574	0.5	23.2	22.9	
9574	1	22.9	22.8	
9574	2	22.7	22.6	
9574	4	22.2	22.3	
9574	8	21.6	21.7	
9574	15	20.6	21	0.067
9574	30	19.1	20.1	0.074
9574	60	17.1	18.5	0.081
9574	120	14.1	16	0.099
9574	240	11.1	13.3	0.112
9574	440	8	10.3	0.13
9574	1440	3.6	6.2	0.155

Specimen Height After Consolidation, (Hc), In.:	5.64
Volume Change During Consolidation (Delta Vc), In.3:	2.30
Cross-Sectional Area of Specimen After Consolidation (Ac), In.2:	5.92

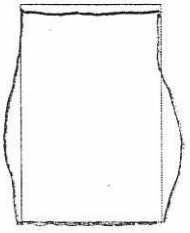
Triaxial Compression Testing ASTM D 4767

Sample Depth:	66.9	ft.
Cell Pressure:	82	psi
Back Pressure:	40	psi
Confining Pressure:	42	psi
Strain Rate:	0.006	In/min.

Specimen Height After Consolidation, (Hc), In.:	5.64	
Correction for Vert Displacement, In.:	0	
Load due to Friction and Uplift:	15.7	lbs.
Correction for Filter Paper:	0	
Thickness of Membrane (tm), In.:	0.012	

	$\sigma 1-\sigma 3=$	Deviator Stress at Failure, ksf:	6.10
	$\sigma 3$ f=	Effective Consolidation Stress at Failure, ksf:	6.05
	$\sigma 1=$	Total Major Principal Stress at Failure:	12.15
σ '3f=	$\sigma 3-\Delta \upsilon=$	Effective Minor Principal Stress at Failure,ksf:	1.77
	σ '1f=	Effective Major Principal Stress at Failure, ksf:	7.87
		Axial Strain at Failure:	14.02%

Failure Sketch



Report Date: Friday, May 27, 2005

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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9574**

Point: **B**

Pa: Applied Force	Vertical Displacement Reading In. :	Pore Pressure psi:	Axial Strain (E1):	(P) - Force Adj for U and F lbs:	Corrected Vertical Displac In. :	Correction for Membrane ksf:	(A) Area In.2:	(σ1−σ3) Deviator Stress ksf:	[Δυ] Induced Pore Water Pressure ksf:	σ3 Effective Consolidation Stress ksf	σ1 Total Major Principal Stress ksf	σ3 ' Effective Minor Principal Stress ksf	σ1 ' Effective Major Principal Stress ksf	p'	q
15.7	0.000	47.0	0.00%	0.0	0.000	0.00000	5.923	0.00	1.0080	6.05	6.05	5.04	5.04	5.04	0.00
68.0	0.003	51.5	0.05%	52.3	0.003	0.00027	5.926	1.27	1.6560	6.05	7.32	4.39	5.66	5.03	0.64
87.8	0.006	53.7	0.11%	72.1	0.006	0.00054	5.930	1.75	1.9728	6.05	7.80	4.08	5.83	4.95	0.88
102.7	0.009	55.5	0.16%	87.0	0.009	0.00080	5.933	2.11	2.2320	6.05	8.16	3.82	5.93	4.87	1.06
110.9	0.011	56.4	0.20%	95.2	0.011	0.00098	5.935	2.31	2.3616	6.05	8.36	3.69	6.00	4.84	1.15
121.5	0.014	57.4	0.25%	105.8	0.014	0.00125	5.938	2.56	2.5056	6.05	8.61	3.54	6.11	4.82	1.28
133.5	0.018	58.9	0.32%	117.8	0.018	0.00161	5.942	2.85	2.7216	6.05	8.90	3.33	6.18	4.75	1.43
137.7	0.020	59.5	0.35%	122.0	0.020	0.00179	5.944	2.95	2.8080	6.05	9.00	3.24	6.19	4.72	1.48
143.9	0.023	60.3	0.41%	128.2	0.023	0.00205	5.948	3.10	2.9232	6.05	9.15	3.12	6.23	4.68	1.55
149.0	0.026	61.3	0.46%	133.3	0.026	0.00232	5.951	3.22	3.0672	6.05	9.27	2.98	6.20	4.59	1.61
151.3	0.028	61.5	0.50%	135.6	0.028	0.00250	5.953	3.28	3.0960	6.05	9.33	2.95	6.23	4.59	1.64
157.6	0.032	62.5	0.57%	141.9	0.032	0.00286	5.957	3.43	3.2400	6.05	9.48	2.81	6.24	4.52	1.71
161.1	0.035	63.0	0.62%	145.4	0.035	0.00313	5.960	3.51	3.3120	6.05	9.56	2.74	6.25	4.49	1.75
163.0	0.037	63.1	0.66%	147.3	0.037	0.00330	5.962	3.55	3.3264	6.05	9.60	2.72	6.28	4.50	1.78
166.2	0.040	63.6	0.71%	150.5	0.040	0.00357	5.966	3.63	3.3984	6.05	9.68	2.65	6.28	4.46	1.81
169.1	0.043	64.0	0.76%	153.4	0.043	0.00384	5.969	3.70	3.4560	6.05	9.75	2.59	6.29	4.44	1.85
170.6	0.045	64.5	0.80%	154.9	0.045	0.00402	5.971	3.73	3.5280	6.05	9.78	2.52	6.25	4.39	1.87
173.4	0.048	64.6	0.85%	157.7	0.048	0.00429	5.974	3.80	3.5424	6.05	9.84	2.51	6.30	4.40	1.90
176.4	0.052	65.1	0.92%	160.7	0.052	0.00464	5.978	3.87	3.6144	6.05	9.91	2.43	6.30	4.37	1.93
177.8	0.054	65.4	0.96%	162.1	0.054	0.00482	5.981	3.90	3.6576	6.05	9.95	2.39	6.29	4.34	1.95
179.6	0.057	65.8	1.01%	163.9	0.057	0.00509	5.984	3.94	3.7152	6.05	9.99	2.33	6.27	4.30	1.97
195.2	0.085	68.0	1.51%	179.5	0.085	0.00759	6.014	4.29	4.0320	6.05	10.34	2.02	6.31	4.16	2.15
207.4	0.113	69.7	2.01%	191.7	0.113	0.01009	6.044	4.56	4.2768	6.05	10.60	1.77	6.33	4.05	2.28
217.6	0.141	70.7	2.50%	201.9	0.141	0.01259	6.075	4.77	4.4208	6.05	10.82	1.63	6.40	4.01	2.39
226.0	0.169	71.3	3.00%	210.3	0.169	0.01510	6.106	4.94	4.5072	6.05	10.99	1.54	6.49	4.01	2.47
233.1	0.198	71.7	3.51%	217.4	0.198	0.01769	6.139	5.08	4.5648	6.05	11.13	1.48	6.57	4.02	2.54
239.9	0.226	72.0	4.01%	224.2	0.226	0.02019	6.171	5.21	4.6080	6.05	11.26	1.44	6.65	4.05	2.61
246.0	0.254	72.1	4.51%	230.3	0.254	0.02269	6.203	5.32	4.6224	6.05	11.37	1.43	6.75	4.09	2.66
251.8	0.282	72.2	5.00%	236.1	0.282	0.02519	6.235	5.43	4.6368	6.05	11.48	1.41	6.84	4.12	2.71
257.1	0.310	72.2	5.50%	241.4	0.310	0.02769	6.268	5.52	4.6368	6.05	11.57	1.41	6.93	4.17	2.76
261.8	0.339	72.1	6.02%	246.1	0.339	0.03028	6.302	5.59	4.6224	6.05	11.64	1.43	7.02	4.22	2.80
266.5	0.367	72.0	6.51%	250.8	0.367	0.03278	6.336	5.67	4.6080	6.05	11.72	1.44	7.11	4.27	2.83
271.1	0.395	71.9	7.01%	255.4	0.395	0.03528	6.370	5.74	4.5936	6.05	11.79	1.45	7.19	4.32	2.87
275.3	0.423	71.8	7.51%	259.6	0.423	0.03778	6.404	5.80	4.5792	6.05	11.85	1.47	7.27	4.37	2.90
278.8	0.451	71.7	8.00%	263.1	0.451	0.04028	6.438	5.84	4.5648	6.05	11.89	1.48	7.33	4.41	2.92
282.5	0.480	71.5	8.52%	266.8	0.480	0.04287	6.475	5.89	4.5360	6.05	11.94	1.51	7.40	4.46	2.95
286.1	0.508	71.4	9.01%	270.4	0.508	0.04538	6.510	5.94	4.5216	6.05	11.98	1.53	7.46	4.49	2.97
289.6	0.536	71.2	9.51%	273.9	0.536	0.04788	6.546	5.98	4.4928	6.05	12.03	1.56	7.53	4.54	2.99

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Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9574**

Point: **B**

292.4	0.564	71.0	10.01%	276.7	0.564	0.05038	6.582	6.00	4.4640	6.05	12.05	1.58	7.59	4.59	3.00
298.1	0.621	70.7	11.02%	282.4	0.621	0.05547	6.657	6.05	4.4208	6.05	12.10	1.63	7.68	4.65	3.03
302.9	0.677	70.4	12.01%	287.2	0.677	0.06047	6.732	6.08	4.3776	6.05	12.13	1.67	7.75	4.71	3.04
307.0	0.733	70.0	13.01%	291.3	0.733	0.06547	6.809	6.10	4.3200	6.05	12.14	1.73	7.82	4.78	3.05
310.8	0.790	69.7	14.02%	295.1	0.790	0.07056	6.889	6.10	4.2768	6.05	12.15	1.77	7.87	4.82	3.05
313.8	0.846	69.3	15.01%	298.1	0.846	0.07557	6.969	6.08	4.2192	6.05	12.13	1.83	7.91	4.87	3.04
316.5	0.903	69.0	16.02%	300.8	0.903	0.08066	7.053	6.06	4.1760	6.05	12.11	1.87	7.93	4.90	3.03
318.4	0.959	68.7	17.02%	302.7	0.959	0.08566	7.138	6.02	4.1328	6.05	12.07	1.92	7.94	4.93	3.01
320.6	1.015	68.4	18.01%	304.9	1.015	0.09066	7.224	5.99	4.0896	6.05	12.03	1.96	7.95	4.95	2.99
322.5	1.072	68.0	19.02%	306.8	1.072	0.09575	7.315	5.94	4.0320	6.05	11.99	2.02	7.96	4.99	2.97
323.8	1.128	67.8	20.02%	308.1	1.128	0.10075	7.405	5.89	4.0032	6.05	11.94	2.04	7.94	4.99	2.95

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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9574**

Point: **C**

Material Description:	Shelby Tube - Boring FA-B17; 66.9' - 68.9' - SOIL

Moisture Determination ASTM D2216

	Before Testing	After Testing
Tare No.	T	T
Mass of Container and Wet Specimen (Mcws), grams	1390.32	1339.79
Mass of Container and Oven Dry Specimen (Mcs), grams	1104.86	1104.86
Mass of Container (Mc), grams	219.63	219.63
Mass of Water (Mw), grams:	285.46	234.93
Mass of Solid Particles (Ms), grams:	885.23	885.23
Moisture Content (w), %	32.25%	26.54%

Initial Condition of Specimen

	(1)	(2)	(3)	Average
Diameter Measurements, Inches:	2.84	2.828	2.84	2.836
Height Measurements, Inches:	5.851	5.841	5.848	5.847

Initial Volume of Specimen (Vo), In.3:	36.93
Dry Mass of Specimen After Testing, (Md), grams:	885.23
Dry Unit Weight, (γ d) pcf:	91.31
Specific Gravity of the Solids, (G):	2.67
Volume of Solids, (Vs), Cu. In.:	20.2323
Height of Solids,(Hs),In.:	3.2029
Void Ratio Before Consolidation (Eo):	0.8254
Intitail Degree of Saturation: (So)	104.31%

Saturation - ASTM D4767 Section 8.2

Dial Indicator Reading Prior to Saturation (Rb:) In.	0
Cell Pressure After Saturation, psi:	45.00
Back Presssure After Saturation, psi:	40.00
Pore Pressure B Parameter :	1
Dial Indicator Reading After Saturation, (Ra) In.:	0.006
Change in Height during Saturation, (Delta Hs) In.	0.006
Change In Volume of Specimen during Saturation (Delta Vsat), In.3:	0.114

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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9574**

Point: **C**

Consolidation- ASTM D2435, Section 11.5:

Sample No:	T:	Burette 2:	Burette3:	Rc:
9574	0	39.8	35.9	0.006
9574	0.25	38.6	34.8	
9574	0.5	38.3	34.6	
9574	1	37.9	34.3	
9574	2	37.8	33.8	
9574	4	36.2	33.1	
9574	8	34.7	32.1	
9574	15	32.8	30.8	0.058
9574	30	30.2	28.7	0.068
9574	60	27.3	26.4	0.08
9574	120	22.9	22.4	0.099
9574	240	19.1	18.5	0.117
9574	440	16	15.1	0.135
9574	1440	12.7	11.7	0.155

Specimen Height After Consolidation, (Hc), In.:	5.69
Volume Change During Consolidation (Delta Vc), In.3:	3.13
Cross-Sectional Area of Specimen After Consolidation (Ac), In.2:	5.92

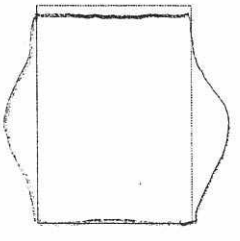
Triaxial Compression Testing ASTM D 4767

Sample Depth:	66.9	ft.
Cell Pressure:	124	psi
Back Pressure:	40	psi
Confining Pressure:	84	psi
Strain Rate:	0.006	In/min.

Specimen Height After Consolidation, (Hc), In.:	5.69	
Correction for Vert Displacement, In.:	0	
Load due to Friction and Uplift:	23.9	lbs.
Correction for Filter Paper:	0	
Thickness of Membrane (tm), In.:	0.012	

$\sigma 1-\sigma 3=$	Deviator Stress at Failure, ksf:	8.92	
$\sigma 3$ f=	Effective Consolidation Stress at Failure, ksf:	12.10	
$\sigma 1=$	Total Major Principal Stress at Failure:	21.01	
σ '3f= $\sigma 3-\Delta \upsilon=$	Effective Minor Principal Stress at Failure,ksf:	3.28	
σ '1f=	Effective Major Principal Stress at Failure, ksf:	12.20	
	Axial Strain at Failure:	8.50%	

Failure Sketch



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Company: **AEP**

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Sample No: **9574**

Point: **C**

Pa: Applied Force	Vertical Displacement Reading In. :	Pore Pressure psi:	Axial Strain (E1):	(P) - Force Adj for U and F lbs:	Corrected Vertical Displac In. :	Correction for Membrane ksf:	(A) Area In.2:	(σ1−σ3) Deviator Stress ksf:	[Δυ] Induced Pore Water Pressure ksf:	σ3 Effective Consolidation Stress ksf	σ1 Total Major Principal Stress ksf	σ3 ' Effective Minor Principal Stress ksf	σ1 ' Effective Major Principal Stress ksf	p'	q
23.9	0.000	43.7	0.00%	0.0	0.000	0.00000	5.919	0.00	0.5328	12.10	12.10	11.56	11.56	11.56	0.00
74.9	0.003	48.4	0.05%	51.0	0.003	0.00027	5.922	1.24	1.2096	12.10	13.34	10.89	12.13	11.51	0.62
111.7	0.006	51.5	0.11%	87.8	0.006	0.00053	5.925	2.13	1.6560	12.10	14.23	10.44	12.57	11.51	1.07
140.9	0.009	55.5	0.16%	117.0	0.009	0.00080	5.928	2.84	2.2320	12.10	14.94	9.86	12.71	11.28	1.42
169.8	0.012	58.4	0.21%	145.9	0.012	0.00106	5.931	3.54	2.6496	12.10	15.64	9.45	12.99	11.22	1.77
184.2	0.014	60.7	0.25%	160.3	0.014	0.00124	5.933	3.89	2.9808	12.10	15.99	9.12	13.00	11.06	1.94
211.7	0.018	63.6	0.32%	187.8	0.018	0.00159	5.938	4.55	3.3984	12.10	16.65	8.70	13.25	10.97	2.28
222.5	0.020	65.6	0.35%	198.6	0.020	0.00177	5.940	4.81	3.6864	12.10	16.91	8.41	13.22	10.82	2.41
235.9	0.023	67.8	0.40%	212.0	0.023	0.00203	5.943	5.13	4.0032	12.10	17.23	8.09	13.23	10.66	2.57
248.6	0.026	69.8	0.46%	224.7	0.026	0.00230	5.946	5.44	4.2912	12.10	17.54	7.80	13.24	10.52	2.72
260.3	0.029	71.6	0.51%	236.4	0.029	0.00257	5.949	5.72	4.5504	12.10	17.82	7.55	13.27	10.41	2.86
270.8	0.032	72.9	0.56%	246.9	0.032	0.00283	5.952	5.97	4.7376	12.10	18.07	7.36	13.33	10.34	2.99
280.4	0.035	74.5	0.61%	256.5	0.035	0.00310	5.956	6.20	4.9680	12.10	18.29	7.13	13.33	10.23	3.10
285.1	0.037	75.4	0.65%	261.2	0.037	0.00327	5.958	6.31	5.0976	12.10	18.41	7.00	13.31	10.15	3.16
293.3	0.040	77.0	0.70%	269.4	0.040	0.00354	5.961	6.50	5.3280	12.10	18.60	6.77	13.27	10.02	3.25
299.5	0.043	77.9	0.76%	275.6	0.043	0.00380	5.964	6.65	5.4576	12.10	18.75	6.64	13.29	9.96	3.33
305.3	0.046	79.3	0.81%	281.4	0.046	0.00407	5.967	6.79	5.6592	12.10	18.88	6.44	13.22	9.83	3.39
310.7	0.049	80.0	0.86%	286.8	0.049	0.00434	5.970	6.91	5.7600	12.10	19.01	6.34	13.25	9.79	3.46
315.1	0.052	81.0	0.91%	291.2	0.052	0.00460	5.973	7.02	5.9040	12.10	19.11	6.19	13.21	9.70	3.51
320.0	0.055	82.1	0.97%	296.1	0.055	0.00487	5.977	7.13	6.0624	12.10	19.23	6.03	13.16	9.60	3.56
323.2	0.057	82.7	1.00%	299.3	0.057	0.00504	5.979	7.20	6.1488	12.10	19.30	5.95	13.15	9.55	3.60
350.9	0.086	88.3	1.51%	327.0	0.086	0.00761	6.010	7.83	6.9552	12.10	19.92	5.14	12.97	9.05	3.91
366.7	0.114	91.6	2.00%	342.8	0.114	0.01009	6.040	8.16	7.4304	12.10	20.26	4.67	12.83	8.75	4.08
377.0	0.142	94.1	2.49%	353.1	0.142	0.01256	6.070	8.36	7.7904	12.10	20.46	4.31	12.67	8.49	4.18
385.4	0.171	95.9	3.00%	361.5	0.171	0.01513	6.102	8.52	8.0496	12.10	20.61	4.05	12.56	8.30	4.26
391.9	0.199	97.0	3.50%	368.0	0.199	0.01761	6.133	8.62	8.2080	12.10	20.72	3.89	12.51	8.20	4.31
397.4	0.228	98.1	4.01%	373.5	0.228	0.02017	6.166	8.70	8.3664	12.10	20.80	3.73	12.43	8.08	4.35
401.8	0.256	98.7	4.50%	377.9	0.256	0.02265	6.198	8.76	8.4528	12.10	20.85	3.64	12.40	8.02	4.38
406.1	0.285	99.3	5.01%	382.2	0.285	0.02522	6.231	8.81	8.5392	12.10	20.90	3.56	12.36	7.96	4.40
409.7	0.313	99.9	5.50%	385.8	0.313	0.02769	6.263	8.84	8.6256	12.10	20.94	3.47	12.31	7.89	4.42
412.9	0.342	100.2	6.01%	389.0	0.342	0.03026	6.297	8.86	8.6688	12.10	20.96	3.43	12.29	7.86	4.43
415.9	0.370	100.5	6.50%	392.0	0.370	0.03274	6.330	8.88	8.7120	12.10	20.98	3.38	12.27	7.83	4.44
418.7	0.399	100.7	7.01%	394.8	0.399	0.03530	6.365	8.90	8.7408	12.10	20.99	3.36	12.25	7.80	4.45
421.4	0.427	101.0	7.50%	397.5	0.427	0.03778	6.399	8.91	8.7840	12.10	21.00	3.31	12.22	7.77	4.45
424.0	0.455	101.0	7.99%	400.1	0.455	0.04026	6.433	8.92	8.7840	12.10	21.01	3.31	12.23	7.77	4.46
426.4	0.484	101.2	8.50%	402.5	0.484	0.04282	6.469	8.92	8.8128	12.10	21.01	3.28	12.20	7.74	4.46
428.3	0.512	101.4	9.00%	404.4	0.512	0.04530	6.504	8.91	8.8416	12.10	21.00	3.25	12.16	7.71	4.45
430.4	0.541	101.3	9.51%	406.5	0.541	0.04786	6.541	8.90	8.8272	12.10	21.00	3.27	12.17	7.72	4.45

Report Date: Friday, May 27, 2005

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AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9574**

Point: **C**

432.3	0.569	101.5	10.00%	408.4	0.569	0.05034	6.576	8.89	8.8560	12.10	20.99	3.24	12.13	7.69	4.45
435.6	0.626	101.5	11.00%	411.7	0.626	0.05539	6.650	8.86	8.8560	12.10	20.96	3.24	12.10	7.67	4.43
438.2	0.683	101.5	12.00%	414.3	0.683	0.06043	6.726	8.81	8.8560	12.10	20.91	3.24	12.05	7.64	4.40
440.5	0.740	101.4	13.00%	416.6	0.740	0.06547	6.803	8.75	8.8416	12.10	20.85	3.25	12.01	7.63	4.38
442.2	0.797	101.5	14.00%	418.3	0.797	0.07051	6.883	8.68	8.8560	12.10	20.78	3.24	11.92	7.58	4.34
443.4	0.854	101.4	15.00%	419.5	0.854	0.07556	6.964	8.60	8.8416	12.10	20.70	3.25	11.85	7.55	4.30
444.5	0.911	101.3	16.01%	420.6	0.911	0.08060	7.047	8.51	8.8272	12.10	20.61	3.27	11.78	7.53	4.26
445.5	0.968	101.2	17.01%	421.6	0.968	0.08564	7.132	8.43	8.8128	12.10	20.52	3.28	11.71	7.50	4.21
446.0	1.024	101.1	17.99%	422.1	1.024	0.09060	7.217	8.33	8.7984	12.10	20.43	3.30	11.63	7.46	4.17
446.3	1.081	101.0	18.99%	422.4	1.081	0.09564	7.307	8.23	8.7840	12.10	20.33	3.31	11.54	7.43	4.11
447.0	1.138	100.8	19.99%	423.1	1.138	0.10068	7.398	8.13	8.7552	12.10	20.23	3.34	11.48	7.41	4.07

Report Date: Friday, May 27, 2005

JOB NO. _____ DATE: May 27, 05

PROJECT KANAWHA RIVER FLY ASH LANDFILL

LOCATION: _____

SOURCE OF MATERIAL FA-B17 DEPTH 66.9 ft.

DESCRIPTION OF MATERIAL GRAY CLAY

ASTM DESCRIPTION _____

MAX. DRY DENSITY, pcf		OPTIMUM MOISTURE, %	
SPECIFIC GRAVITY	2.67		
SAMPLE HGT., mm	147.080	SAMPLE DIA., mm	71.860
CHAMBER PRESSURE, psi	82.0	BACK PRESSURE, psi	40.0
B-PARAMETER		EFFECTIVE PRESSURE, psi	42.0
INITIAL HEAD, mm	4698.3		

	BEFORE	AFTER
WATER CONTENT, %	31.8	26.2
WET DENSITY, pcf	121.1	
DRY DENSITY, pcf	91.9	
SATURATION, %	104.26	
VOID RATIO	0.8142	

PERMEABILITY COEFFICIENT K, cm/sec 5.18E-09

FLEXIBLE-MEMBRANE PERMEABILITY TEST

American Electric Power Service Corp.

Groveport, Ohio

AEP

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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

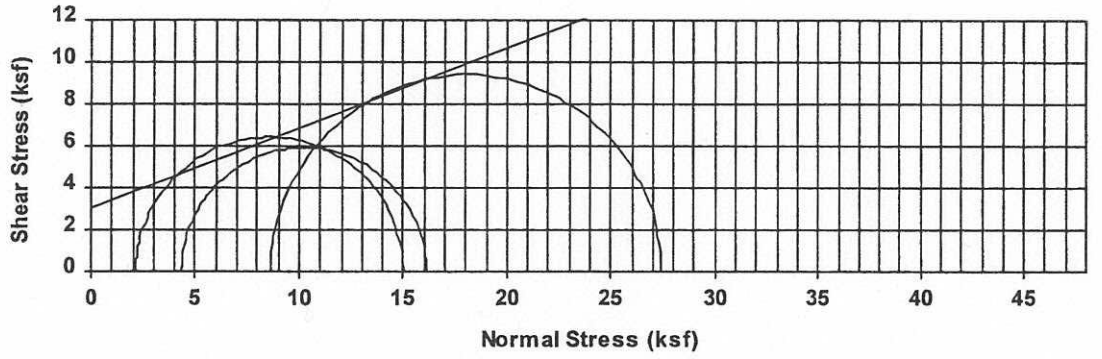
Sample No: **9576**

Material Description: Shelby Tube - Boring FA-B18; 32.0' - 34.0' Fly Ash

Point Designation	Initial Conditions			Final Conditions			
	Water Content, %	Dry Density, pcf	Degree of Saturation	Water Content, %	Confining Stress, (ksf)	Deviator Stress	Induced Pore Pressure (ksf)
A	41.7%	75.4	105.0%	39.41%	2.16	12.86	-3.40
B	42.7%	75.3	107.1%	40.3%	4.32	11.80	-0.71
C	40.3%	75.6	102.1%	38.4%	8.64	18.80	0.35

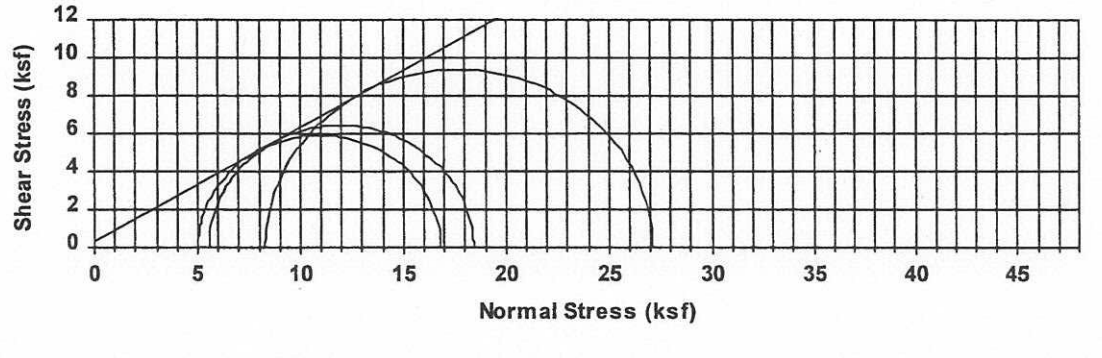
Point Designation	Axial Strain, %	q, (ksf)	Effective Stresses, (ksf)			Total Stresses, (ksf)		
			Major, (ksf)	Minor, (ksf)	p', (ksf)	Major, (ksf)	Minor, (ksf)	p, (ksf)
A	13.0%	6.43	18.42	5.56	11.99	15.02	2.16	8.59
B	13.0%	5.90	16.83	5.03	10.93	16.12	4.32	10.22
C	14.0%	9.40	27.10	8.29	17.69	27.44	8.64	18.04

Total Stress Envelope



ϕ: 20.9 °
c : 3.07 ksf

Effective Stress Envelope



ϕ ': 31.2 °
c' : 0.27 ksf

Report Date: Friday, June 10, 2005

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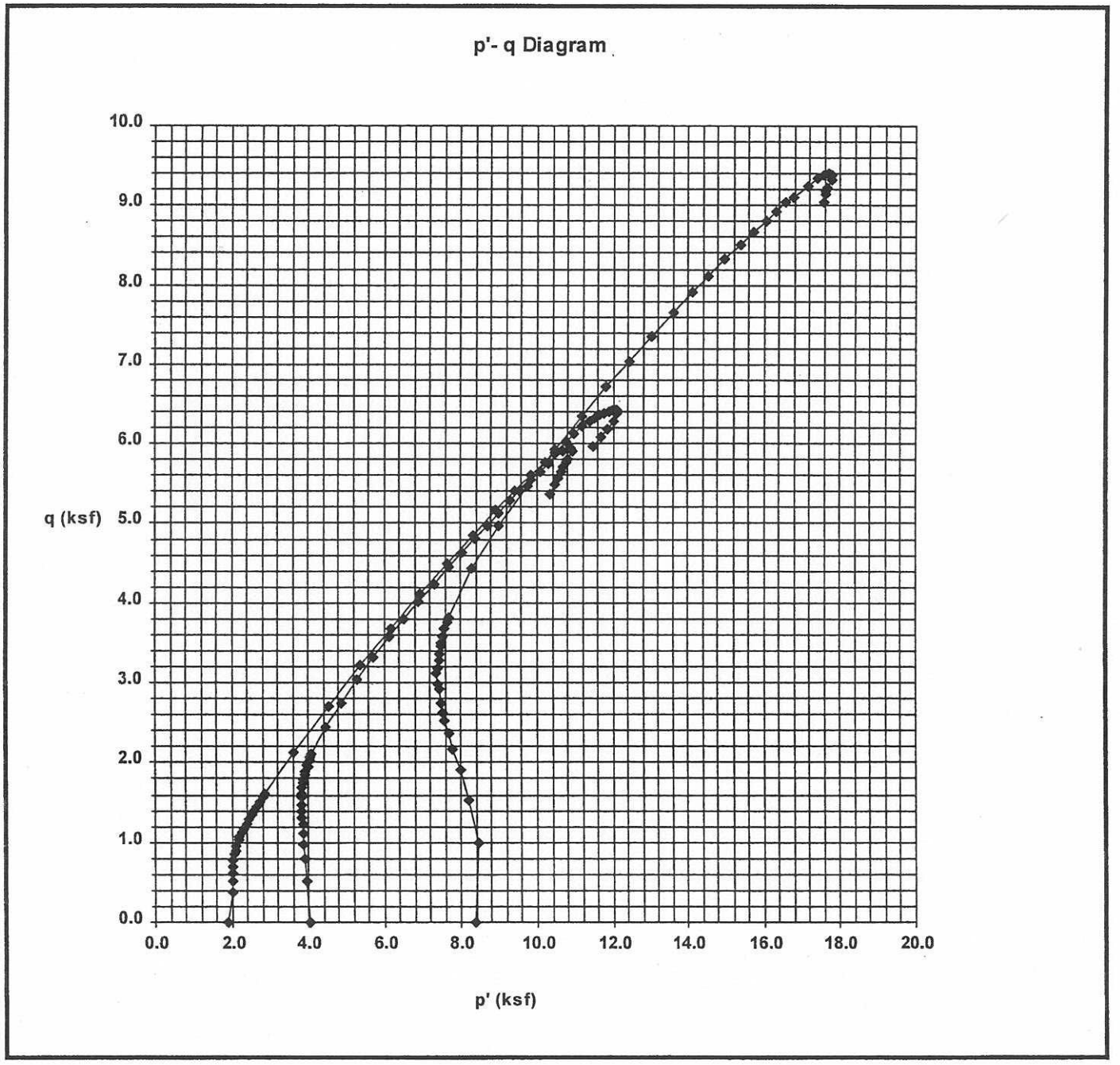
AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9576**



Report Date: Friday, June 10, 2005

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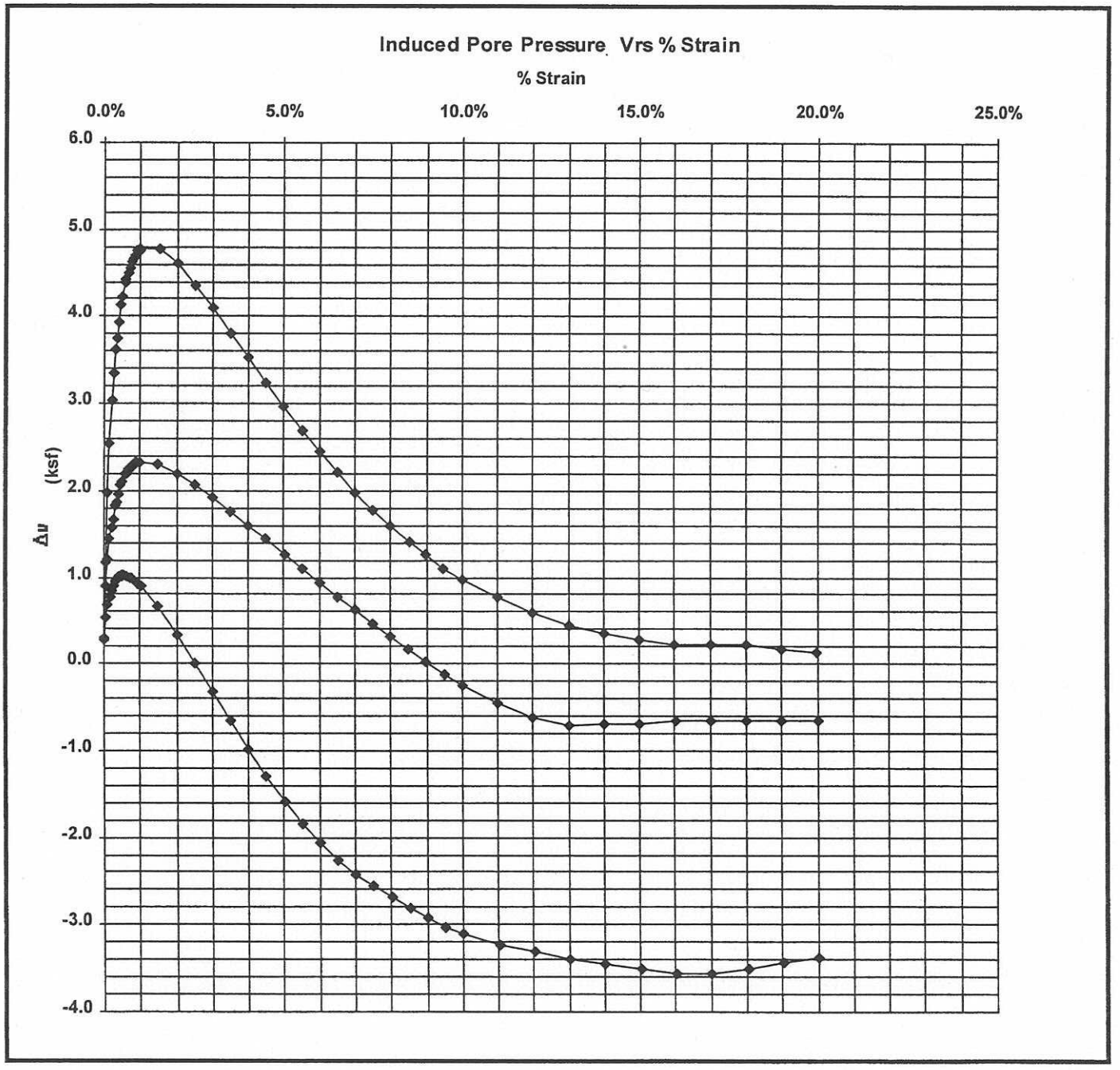
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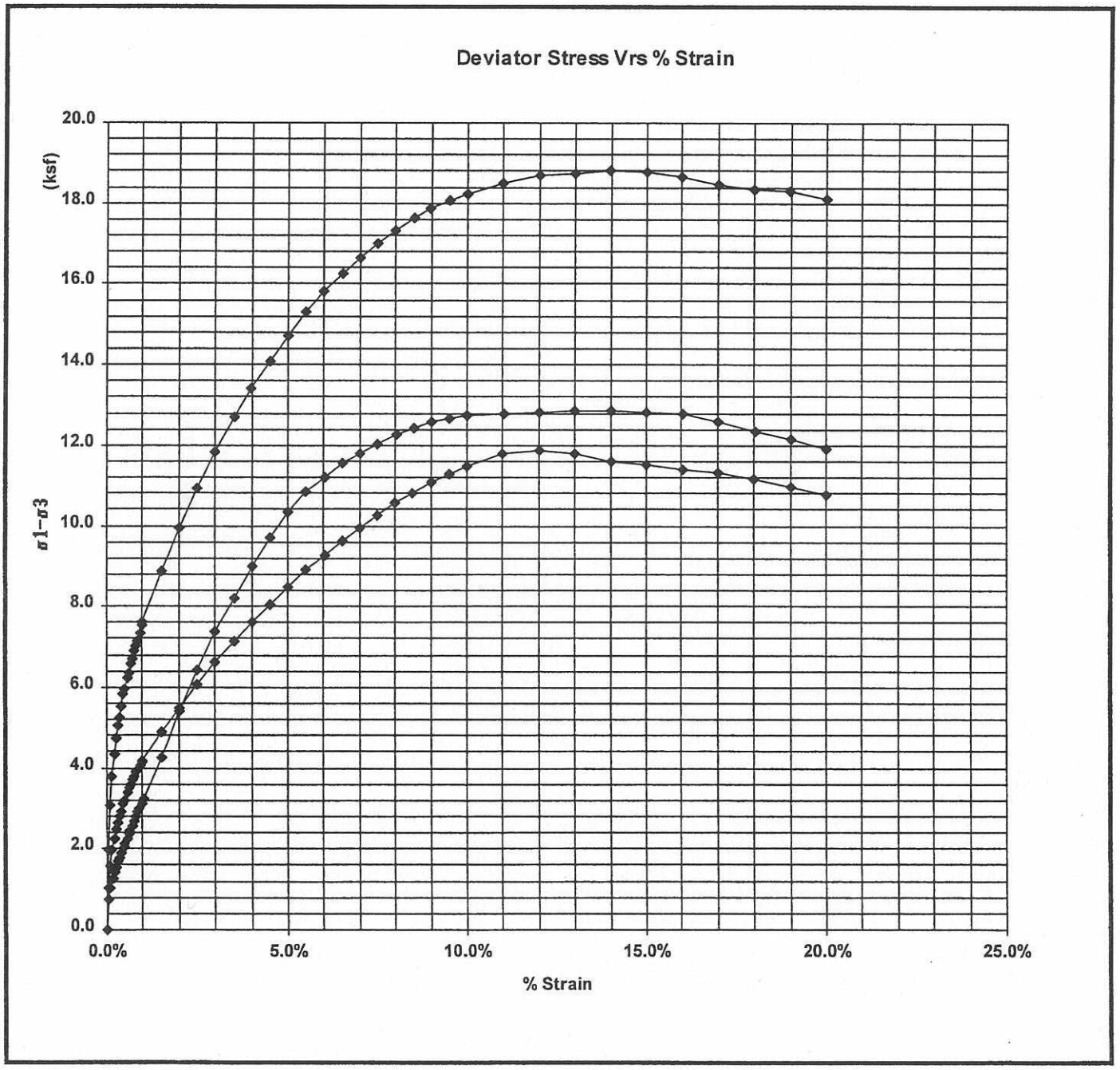
AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9576**

Point: **A**

Material Description:	Shelby Tube - Boring FA-B18; 32.0' - 34.0' Fly Ash

Moisture Determination ASTM D2216

	Before Testing	After Testing
Tare No.	M-9	M-9
Mass of Container and Wet Specimen (Mcws), grams	1216.83	1200.50
Mass of Container and Oven Dry Specimen (Mcs), grams	919.68	919.68
Mass of Container (Mc), grams	207.17	207.17
Mass of Water (Mw), grams:	297.15	280.82
Mass of Solid Particles (Ms), grams:	712.51	712.51
Moisture Content (w), %	41.70%	39.41%

Initial Condition of Specimen

	(1)	(2)	(3)	Average
Diameter Measurements, Inches:	2.825	2.83	2.839	2.831
Height Measurements, Inches:	5.722	5.719	5.714	5.718

Initial Volume of Specimen (Vo), In.3:	36.00
Dry Mass of Specimen After Testing, (Md), grams:	712.51
Dry Unit Weight, (γ d) pcf:	75.39
Specific Gravity of the Solids, (G):	2.32
Volume of Solids, (Vs), Cu. In.:	18.7415
Height of Solids,(Hs),In.:	2.9767
Void Ratio Before Consolidation (Eo):	0.9211
Intitail Degree of Saturation: (So)	105.05%

Saturation - ASTM D4767 Section 8.2

Dial Indicator Reading Prior to Saturation (Rb:) In.	0
Cell Pressure After Saturation, psi:	35.00
Back Presssure After Saturation After, psi:	30.00
Pore Pressure B Parameter :	1
Dial Indicator Reading After Saturation, (Ra) In.:	-0.012
Change in Height during Saturation, (Delta Hs) In.	-0.012
Change In Volume of Specimen during Saturation (Delta Vsat), In.3:	-0.227

Report Date: Friday, June 10, 2005

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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9576**

Point: **A**

Consolidation- ASTM D2435, Section 11.5:

Sample No:	T:	Burette 2:	Burette3:	Rc:
9576	0	24	23.9	-0.012
9576	0.25	22.6	22	
9576	0.5	22.5	21.9	
9576	1	22.5	22.9	
9576	2	22.4	21.8	
9576	4	22.3	21.7	
9576	8	22.3	21.7	
9576	15	22.2	21.7	-0.008
9576	30	22.1	21.8	-0.008
9576	60	22	21.8	-0.008
9576	120	21.9	21.8	-0.007
9576	240	21.8	21.8	-0.007
9576	420	21.8	21.8	-0.007
9576	1440	21.8	21.8	-0.007

Specimen Height After Consolidation, (Hc), In.:	5.73
Volume Change During Consolidation (Delta Vc), In.3:	0.26
Cross-Sectional Area of Specimen After Consolidation (Ac), In.2:	6.28

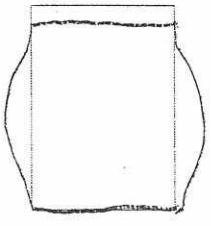
Triaxial Compression Testing
ASTM D 4767

Sample Depth:	32	ft.
Cell Pressure:	45	psi
Back Pressure:	30	psi
Confining Pressure:	15	psi
Strain Rate:	0.006	in./min.

Specimen Height After Consolidation, (Hc), In.:	5.73	
Correction for Vert Displacement, In.:	0	
Load due to Friction and Uplift:	15.8	lbs.
Correction for Filter Paper:	0	
Thickness of Membrane (tm), In.:	0.012	

	$\sigma 1-\sigma 3=$	Deviator Stress at Failure, ksf:	12.86
	$\sigma 3$ f=	Effective Consolidation Stress at Failure, ksf:	2.16
	$\sigma 1=$	Total Major Principal Stress at Failure:	15.02
σ '3f=	$\sigma 3-\Delta \upsilon=$	Effective Minor Principal Stress at Failure,ksf:	5.56
	σ '1f=	Effective Major Principal Stress at Failure, ksf:	18.42
		Axial Strain at Failure:	13.01%

Failure Sketch



Report Date: Friday, June 10, 2005

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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9576**

Point: **A**

Pa: Applied Force	Vertical Displacement Reading In. :	Pore Pressure psi:	Axial Strain (E1):	(P) - Force Adj for U and F lbs:	Corrected Vertical Displac In. :	Correction for Membrane ksf:	(A) Area In.2:	(σ1−σ3) Deviator Stress ksf:	[Δu] Induced Pore Water Pressure ksf:	σ3 Effective Consolidation Stress ksf	σ1 Total Major Principal Stress ksf	σ3 ' Effective Minor Principal Stress ksf	σ1 ' Effective Major Principal Stress ksf	p'	q
15.8	0.000	31.9	0.00%	0.0	0.000	0.00000	6.282	0.00	0.2736	2.16	2.16	1.89	1.89	1.89	0.00
49.2	0.003	33.7	0.05%	33.4	0.003	0.00026	6.285	0.76	0.5328	2.16	2.92	1.63	2.39	2.01	0.38
61.0	0.006	34.7	0.10%	45.2	0.006	0.00051	6.289	1.03	0.6768	2.16	3.19	1.48	2.52	2.00	0.52
70.2	0.009	35.4	0.16%	54.4	0.009	0.00077	6.292	1.24	0.7776	2.16	3.40	1.38	2.63	2.00	0.62
77.1	0.012	35.9	0.21%	61.3	0.012	0.00102	6.295	1.40	0.8496	2.16	3.56	1.31	2.71	2.01	0.70
83.6	0.015	36.3	0.26%	67.8	0.015	0.00128	6.299	1.55	0.9072	2.16	3.71	1.25	2.80	2.03	0.77
90.0	0.018	36.6	0.31%	74.2	0.018	0.00154	6.302	1.69	0.9504	2.16	3.85	1.21	2.90	2.06	0.85
93.9	0.020	36.7	0.35%	78.1	0.020	0.00171	6.304	1.78	0.9648	2.16	3.94	1.20	2.98	2.09	0.89
99.6	0.023	37.0	0.40%	83.8	0.023	0.00196	6.307	1.91	1.0080	2.16	4.07	1.15	3.06	2.11	0.96
105.9	0.027	37.0	0.47%	90.1	0.027	0.00231	6.312	2.05	1.0080	2.16	4.21	1.15	3.21	2.18	1.03
109.5	0.029	37.1	0.51%	93.7	0.029	0.00248	6.314	2.13	1.0224	2.16	4.29	1.14	3.27	2.20	1.07
115.1	0.032	37.1	0.56%	99.3	0.032	0.00273	6.317	2.26	1.0224	2.16	4.42	1.14	3.40	2.27	1.13
119.5	0.035	37.0	0.61%	103.7	0.035	0.00299	6.321	2.36	1.0080	2.16	4.52	1.15	3.51	2.33	1.18
123.4	0.037	37.0	0.65%	107.6	0.037	0.00316	6.323	2.45	1.0080	2.16	4.61	1.15	3.60	2.38	1.22
129.0	0.040	36.9	0.70%	113.2	0.040	0.00341	6.326	2.57	0.9936	2.16	4.73	1.17	3.74	2.45	1.29
134.2	0.043	36.9	0.75%	118.4	0.043	0.00367	6.330	2.69	0.9936	2.16	4.85	1.17	3.86	2.51	1.34
138.6	0.046	36.8	0.80%	122.8	0.046	0.00393	6.333	2.79	0.9792	2.16	4.95	1.18	3.97	2.57	1.39
144.0	0.049	36.6	0.86%	128.2	0.049	0.00418	6.336	2.91	0.9504	2.16	5.07	1.21	4.12	2.66	1.45
148.3	0.052	36.5	0.91%	132.5	0.052	0.00444	6.340	3.01	0.9360	2.16	5.17	1.22	4.23	2.73	1.50
153.7	0.055	36.4	0.96%	137.9	0.055	0.00470	6.343	3.13	0.9216	2.16	5.29	1.24	4.36	2.80	1.56
158.0	0.058	36.3	1.01%	142.2	0.058	0.00495	6.346	3.22	0.9072	2.16	5.38	1.25	4.47	2.86	1.61
205.4	0.086	34.6	1.50%	189.6	0.086	0.00734	6.378	4.27	0.6624	2.16	6.43	1.50	5.77	3.63	2.14
256.7	0.115	32.3	2.01%	240.9	0.115	0.00982	6.411	5.40	0.3312	2.16	7.56	1.83	7.23	4.53	2.70
304.4	0.143	30.0	2.50%	288.6	0.143	0.01221	6.443	6.44	0.0000	2.16	8.60	2.16	8.60	5.38	3.22
347.7	0.172	27.7	3.00%	331.9	0.172	0.01468	6.477	7.36	-0.3312	2.16	9.52	2.49	9.86	6.17	3.68
388.1	0.201	25.4	3.51%	372.3	0.201	0.01716	6.511	8.22	-0.6624	2.16	10.38	2.82	11.04	6.93	4.11
425.3	0.229	23.2	4.00%	409.5	0.229	0.01955	6.544	8.99	-0.9792	2.16	11.15	3.14	12.13	7.63	4.50
460.7	0.258	21.0	4.51%	444.9	0.258	0.02203	6.579	9.72	-1.2960	2.16	11.88	3.46	13.17	8.31	4.86
491.9	0.287	19.0	5.01%	476.1	0.287	0.02450	6.614	10.34	-1.5840	2.16	12.50	3.74	14.09	8.91	5.17
517.0	0.315	17.2	5.50%	501.2	0.315	0.02689	6.648	10.83	-1.8432	2.16	12.99	4.00	14.83	9.42	5.41
537.9	0.344	15.7	6.01%	522.1	0.344	0.02937	6.684	11.22	-2.0592	2.16	13.38	4.22	15.44	9.83	5.61
555.8	0.373	14.3	6.51%	540.0	0.373	0.03184	6.720	11.54	-2.2608	2.16	13.70	4.42	15.96	10.19	5.77
570.4	0.401	13.2	7.00%	554.6	0.401	0.03423	6.755	11.79	-2.4192	2.16	13.95	4.58	16.37	10.47	5.89
585.4	0.430	12.2	7.51%	569.6	0.430	0.03671	6.792	12.04	-2.5632	2.16	14.20	4.72	16.76	10.74	6.02
598.9	0.459	11.3	8.02%	583.1	0.459	0.03919	6.830	12.26	-2.6928	2.16	14.42	4.85	17.11	10.98	6.13
610.3	0.487	10.5	8.51%	594.5	0.487	0.04158	6.866	12.43	-2.8080	2.16	14.59	4.97	17.39	11.18	6.21
620.4	0.516	9.7	9.01%	604.6	0.516	0.04405	6.904	12.57	-2.9232	2.16	14.73	5.08	17.65	11.37	6.28
628.6	0.545	9.0	9.52%	612.8	0.545	0.04653	6.943	12.66	-3.0240	2.16	14.82	5.18	17.85	11.52	6.33

Report Date: Friday, June 10, 2005

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AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9576**

Point: **A**

635.5	0.573	8.4	10.01%	619.7	0.573	0.04892	6.981	12.73	-3.1104	2.16	14.89	5.27	18.00	11.64	6.37
644.5	0.631	7.6	11.02%	628.7	0.631	0.05387	7.060	12.77	-3.2256	2.16	14.93	5.39	18.15	11.77	6.38
654.4	0.688	7.0	12.02%	638.6	0.688	0.05874	7.140	12.82	-3.3120	2.16	14.98	5.47	18.29	11.88	6.41
663.9	0.745	6.4	13.01%	648.1	0.745	0.06360	7.222	12.86	-3.3984	2.16	15.02	5.56	18.42	11.99	6.43
670.9	0.802	6.0	14.01%	655.1	0.802	0.06847	7.306	12.84	-3.4560	2.16	15.00	5.62	18.46	12.04	6.42
677.9	0.860	5.6	15.02%	662.1	0.860	0.07342	7.393	12.82	-3.5136	2.16	14.98	5.67	18.50	12.09	6.41
682.8	0.917	5.3	16.02%	667.0	0.917	0.07829	7.480	12.76	-3.5568	2.16	14.92	5.72	18.48	12.10	6.38
681.1	0.974	5.3	17.01%	665.3	0.974	0.08315	7.570	12.57	-3.5568	2.16	14.73	5.72	18.29	12.00	6.29
678.3	1.032	5.6	18.03%	662.5	1.032	0.08811	7.664	12.36	-3.5136	2.16	14.52	5.67	18.03	11.85	6.18
675.8	1.089	6.1	19.02%	660.0	1.089	0.09297	7.758	12.16	-3.4416	2.16	14.32	5.60	17.76	11.68	6.08
671.0	1.146	6.6	20.02%	655.2	1.146	0.09784	7.854	11.91	-3.3696	2.16	14.07	5.53	17.44	11.49	5.96

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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9576**

Point: **B**

Material Description: Shelby Tube - Boring FA-B18; 32.0' - 34.0' Fly Ash

Moisture Determination ASTM D2216

	Before Testing	After Testing
Tare No.	A-3	A-3
Mass of Container and Wet Specimen (Mcws), grams	1217.41	1200.64
Mass of Container and Oven Dry Specimen (Mcs), grams	915.80	915.80
Mass of Container (Mc), grams	208.70	208.70
Mass of Water (Mw), grams:	301.61	284.84
Mass of Solid Particles (Ms), grams:	707.1	707.1
Moisture Content (w), %	42.65%	40.28%

Initial Condition of Specimen

	(1)	(2)	(3)	Average
Diameter Measurements, Inches:	2.796	2.801	2.811	2.803
Height Measurements, Inches:	5.801	5.802	5.798	5.800

Initial Volume of Specimen (Vo), In.3:	35.78
Dry Mass of Specimen After Testing, (Md), grams:	707.1
Dry Unit Weight, (γ d) pcf:	75.28
Specific Gravity of the Solids, (G):	2.32
Volume of Solids, (Vs), Cu. In.:	18.5992
Height of Solids,(Hs),In.:	3.0148
Void Ratio Before Consolidation (Eo):	0.9239
Intitail Degree of Saturation: (So)	107.10%

Saturation - ASTM D4767 Section 8.2

Dial Indicator Reading Prior to Saturation (Rb:) In.	0
Cell Pressure After Saturation, psi:	35.00
Back Presssure After Saturation, psi:	30.00
Pore Pressure B Parameter:	1
Dial Indicator Reading After Saturation, (Ra) In.:	-0.008
Change in Height during Saturation, (Delta Hs) In.	-0.008
Change In Volume of Specimen during Saturation (Delta Vsat), In.3:	-0.148

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Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9576**

Point: **B**

Consolidation- ASTM D2435, Section 11.5:

Sample No:	T:	Burette 2:	Burette3:	Rc:
9576	0	24.2	24	-0.008
9576	0.25	21.3	20.4	
9576	0.5	21.2	20.3	
9576	1	21.1	20.2	
9576	2	21.1	20.1	
9576	4	21	20.1	
9576	8	20.9	20.1	
9576	15	20.8	20	0.009
9576	30	20.7	20	0.009
9576	60	20.5	20	0.009
9576	120	20.3	20	0.009
9576	240	20.1	19.9	0.009
9576	420	19.9	19.7	0.009
9576	1440	19.5	19.2	0.01

Specimen Height After Consolidation, (Hc), In.: 5.79

Volume Change During Consolidation (Delta Vc), In.3: 0.58

Cross-Sectional Area of Specimen After Consolidation (Ac), In.2: 6.11

Triaxial Compression Testing ASTM D 4767

Sample Depth: 32 ft.

Cell Pressure: 60 psi

Back Pressure: 30 psi

Confining Pressure: 30 psi

Strain Rate: 0.006 In/min.

Specimen Height After Consolidation, (Hc), In.: 5.79

Correction for Vert Displacement, In.: 0

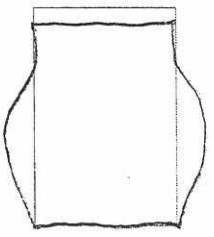
Load due to Friction and Uplift: 16.2 lbs.

Correction for Filter Paper: 0

Thickness of Membrane (tm), In.: 0.012

$\sigma 1-\sigma 3=$	Deviator Stress at Failure, ksf:	11.80
$\sigma 3$ f=	Effective Consolidation Stress at Failure, ksf:	4.32
$\sigma 1=$	Total Major Principal Stress at Failure:	16.12
σ '3f= $\sigma 3-\Delta \upsilon=$	Effective Minor Principal Stress at Failure,ksf:	5.03
σ '1f=	Effective Major Principal Stress at Failure, ksf:	16.83
	Axial Strain at Failure:	13.00%

Failure Sketch



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Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9576**

Point: **B**

Pa: Applied Force	Vertical Displacement Reading In. :	Pore Pressure psi:	Axial Strain (E1):	(P) - Force Adj for U and F lbs:	Corrected Vertical Displac In. :	Correction for Membrane ksf:	(A) Area In.2:	(σ1−σ3) Deviator Stress ksf:	[Δu] Induced Pore Water Pressure ksf:	σ3 Effective Consolidation Stress ksf	σ1 Total Major Principal Stress ksf	σ3 ' Effective Minor Principal Stress ksf	σ1 ' Effective Major Principal Stress ksf	p'	q
16.2	0.000	32.1	0.00%	0.0	0.000	0.00000	6.105	0.00	0.3024	4.32	4.32	4.02	4.02	4.02	0.00
60.1	0.003	36.3	0.05%	43.9	0.003	0.00026	6.109	1.03	0.9072	4.32	5.35	3.41	4.45	3.93	0.52
83.9	0.006	38.4	0.10%	67.7	0.006	0.00051	6.112	1.59	1.2096	4.32	5.91	3.11	4.70	3.91	0.80
99.8	0.009	40.1	0.16%	83.6	0.009	0.00077	6.115	1.97	1.4544	4.32	6.29	2.87	4.83	3.85	0.98
111.4	0.012	40.9	0.21%	95.2	0.012	0.00103	6.118	2.24	1.5696	4.32	6.56	2.75	4.99	3.87	1.12
121.4	0.015	41.6	0.26%	105.2	0.015	0.00128	6.121	2.47	1.6704	4.32	6.79	2.65	5.12	3.89	1.24
128.6	0.018	42.7	0.31%	112.4	0.018	0.00154	6.124	2.64	1.8288	4.32	6.96	2.49	5.13	3.81	1.32
134.9	0.020	43.0	0.35%	118.7	0.020	0.00171	6.127	2.79	1.8720	4.32	7.11	2.45	5.24	3.84	1.39
141.2	0.023	43.6	0.40%	125.0	0.023	0.00197	6.130	2.93	1.9584	4.32	7.25	2.36	5.30	3.83	1.47
149.3	0.027	44.4	0.47%	133.1	0.027	0.00231	6.134	3.12	2.0736	4.32	7.44	2.25	5.37	3.81	1.56
153.1	0.029	44.6	0.50%	136.9	0.029	0.00248	6.136	3.21	2.1024	4.32	7.53	2.22	5.43	3.82	1.61
160.5	0.033	45.3	0.57%	144.3	0.033	0.00283	6.140	3.38	2.2032	4.32	7.70	2.12	5.50	3.81	1.69
165.6	0.036	45.3	0.62%	149.4	0.036	0.00308	6.144	3.50	2.2032	4.32	7.82	2.12	5.62	3.87	1.75
169.1	0.038	45.6	0.66%	152.9	0.038	0.00325	6.146	3.58	2.2464	4.32	7.90	2.07	5.65	3.86	1.79
173.9	0.041	45.6	0.71%	157.7	0.041	0.00351	6.149	3.69	2.2464	4.32	8.01	2.07	5.76	3.92	1.84
178.0	0.044	45.9	0.76%	161.8	0.044	0.00377	6.152	3.78	2.2896	4.32	8.10	2.03	5.81	3.92	1.89
182.6	0.047	45.9	0.81%	166.4	0.047	0.00402	6.155	3.89	2.2896	4.32	8.21	2.03	5.92	3.97	1.94
184.6	0.049	46.1	0.85%	168.4	0.049	0.00420	6.157	3.93	2.3184	4.32	8.25	2.00	5.94	3.97	1.97
189.7	0.053	46.1	0.92%	173.5	0.053	0.00454	6.162	4.05	2.3184	4.32	8.37	2.00	6.05	4.03	2.03
193.3	0.056	46.2	0.97%	177.1	0.056	0.00480	6.165	4.13	2.3328	4.32	8.45	1.99	6.12	4.05	2.07
196.3	0.058	46.2	1.00%	180.1	0.058	0.00497	6.167	4.20	2.3328	4.32	8.52	1.99	6.19	4.09	2.10
227.8	0.087	46.0	1.50%	211.6	0.087	0.00745	6.198	4.91	2.3040	4.32	9.23	2.02	6.92	4.47	2.45
254.6	0.116	45.3	2.00%	238.4	0.116	0.00993	6.230	5.50	2.2032	4.32	9.82	2.12	7.62	4.87	2.75
281.7	0.145	44.4	2.50%	265.5	0.145	0.01242	6.262	6.09	2.0736	4.32	10.41	2.25	8.34	5.29	3.05
306.9	0.174	43.3	3.01%	290.7	0.174	0.01490	6.295	6.64	1.9152	4.32	10.96	2.40	9.04	5.72	3.32
330.9	0.203	42.2	3.51%	314.7	0.203	0.01738	6.327	7.14	1.7568	4.32	11.46	2.56	9.71	6.14	3.57
353.1	0.232	41.1	4.01%	336.9	0.232	0.01987	6.360	7.61	1.5984	4.32	11.93	2.72	10.33	6.53	3.80
374.2	0.261	40.0	4.51%	358.0	0.261	0.02235	6.394	8.04	1.4400	4.32	12.36	2.88	10.92	6.90	4.02
395.9	0.290	38.8	5.01%	379.7	0.290	0.02483	6.427	8.48	1.2672	4.32	12.80	3.05	11.53	7.29	4.24
416.6	0.319	37.6	5.51%	400.4	0.319	0.02732	6.461	8.90	1.0944	4.32	13.22	3.23	12.12	7.67	4.45
435.3	0.348	36.5	6.01%	419.1	0.348	0.02980	6.496	9.26	0.9360	4.32	13.58	3.38	12.64	8.01	4.63
453.4	0.377	35.4	6.51%	437.2	0.377	0.03228	6.531	9.61	0.7776	4.32	13.93	3.54	13.15	8.35	4.80
471.7	0.406	34.3	7.01%	455.5	0.406	0.03477	6.566	9.96	0.6192	4.32	14.28	3.70	13.66	8.68	4.98
488.3	0.434	33.2	7.50%	472.1	0.434	0.03716	6.600	10.26	0.4608	4.32	14.58	3.86	14.12	8.99	5.13
504.6	0.463	32.2	8.00%	488.4	0.463	0.03965	6.636	10.56	0.3168	4.32	14.88	4.00	14.56	9.28	5.28
519.3	0.492	31.2	8.50%	503.1	0.492	0.04213	6.672	10.82	0.1728	4.32	15.14	4.15	14.96	9.56	5.41
534.3	0.521	30.2	9.00%	518.1	0.521	0.04461	6.709	11.08	0.0288	4.32	15.40	4.29	15.37	9.83	5.54
547.3	0.550	29.2	9.50%	531.1	0.550	0.04710	6.746	11.29	-0.1152	4.32	15.61	4.44	15.72	10.08	5.64

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Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9576**

Point: **B**

559.7	0.579	28.3	10.00%	543.5	0.579	0.04958	6.784	11.49	-0.2448	4.32	15.81	4.56	16.05	10.31	5.74
580.7	0.637	26.8	11.00%	564.5	0.637	0.05455	6.860	11.79	-0.4608	4.32	16.11	4.78	16.58	10.68	5.90
591.0	0.695	25.7	12.00%	574.8	0.695	0.05951	6.938	11.87	-0.6192	4.32	16.19	4.94	16.81	10.87	5.94
594.4	0.753	25.1	13.00%	578.2	0.753	0.06448	7.018	11.80	-0.7056	4.32	16.12	5.03	16.83	10.93	5.90
592.1	0.811	25.2	14.01%	575.9	0.811	0.06944	7.100	11.61	-0.6912	4.32	15.93	5.01	16.62	10.82	5.81
594.7	0.869	25.2	15.01%	578.5	0.869	0.07441	7.183	11.52	-0.6912	4.32	15.84	5.01	16.53	10.77	5.76
596.0	0.927	25.4	16.01%	579.8	0.927	0.07938	7.269	11.41	-0.6624	4.32	15.73	4.98	16.39	10.69	5.70
598.2	0.985	25.4	17.01%	582.0	0.985	0.08434	7.357	11.31	-0.6624	4.32	15.63	4.98	16.29	10.64	5.65
597.2	1.042	25.4	18.00%	581.0	1.042	0.08923	7.445	11.15	-0.6624	4.32	15.47	4.98	16.13	10.56	5.57
595.8	1.100	25.4	19.00%	579.6	1.100	0.09419	7.537	10.98	-0.6624	4.32	15.30	4.98	15.96	10.47	5.49
591.4	1.158	25.5	20.00%	575.2	1.158	0.09916	7.632	10.75	-0.6480	4.32	15.07	4.97	15.72	10.35	5.38

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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9576**

Point: **C**

Material Description: Shelby Tube - Boring FA-B18; 32.0' - 34.0' Fly Ash

Moisture Determination ASTM D2216

	Before Testing	After Testing
Tare No.	C-4	C-4
Mass of Container and Wet Specimen (Mcws), grams	1232.91	1218.86
Mass of Container and Oven Dry Specimen (Mcs), grams	939.57	939.57
Mass of Container (Mc), grams	211.71	211.71
Mass of Water (Mw), grams:	293.34	279.29
Mass of Solid Particles (Ms), grams:	727.86	727.86
Moisture Content (w), %	40.30%	38.37%

Initial Condition of Specimen

	(1)	(2)	(3)	Average
Diameter Measurements, Inches:	2.842	2.839	2.827	2.836
Height Measurements, Inches:	5.802	5.809	5.805	5.805

Initial Volume of Specimen (Vo), In.3:	36.67
Dry Mass of Specimen After Testing, (Md), grams:	727.86
Dry Unit Weight, (γ d) pcf:	75.61
Specific Gravity of the Solids, (G):	2.32
Volume of Solids, (Vs), Cu. In.:	19.1452
Height of Solids,(Hs),In.:	3.0308
Void Ratio Before Consolidation (Eo):	0.9154
Intitail Degree of Saturation: (So)	102.14%

Saturation - ASTM D4767 Section 8.2

Dial Indicator Reading Prior to Saturation (Rb:) In.	0
Cell Pressure After Saturation, psi:	35.00
Back Presssure After Saturation, psi:	30.00
Pore Pressure B Parameter :	0.99
Dial Indicator Reading After Saturation, (Ra) In.:	-0.009
Change in Height during Saturation, (Delta Hs) In.	-0.009
Change In Volume of Specimen during Saturation (Delta Vsat), In.3:	-0.171

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Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9576**

Point: **C**

Consolidation- ASTM D2435, Section 11.5:

Sample No:	T:	Burette 2:	Burette3:	Rc:
9576	0	24	23.7	-0.009
9576	0.25	19.8	17	
9576	0.5	19.7	16.9	
9576	1	19.7	16.8	
9576	2	19.6	16.8	
9576	4	19.6	16.8	
9576	8	19.5	16.8	
9576	15	19.3	17	0.021
9576	30	19	17	0.021
9576	60	18.6	17.5	0.021
9576	120	18.2	17.8	0.021
9576	240	18	17.9	0.022
9576	420	18	17.9	0.022
9576	1440	17.9	17.9	0.022

Specimen Height After Consolidation, (Hc), In.: 5.78

Volume Change During Consolidation (Delta Vc), In.3: 0.73

Cross-Sectional Area of Specimen After Consolidation (Ac), In.2: 6.24

Triaxial Compression Testing ASTM D 4767

Sample Depth: 32 ft.

Cell Pressure: 90 psi

Back Pressure: 30 psi

Confining Pressure: 60 psi

Strain Rate: 0.006 In/min.

Specimen Height After Consolidation, (Hc), In.: 5.78

Correction for Vert Displacement, In.: 0

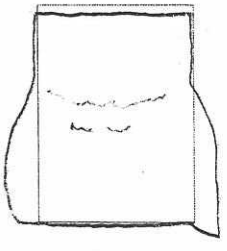
Load due to Friction and Uplift: 23.8 lbs.

Correction for Filter Paper: 0

Thickness of Membrane (tm), In.: 0.012

	$\sigma 1-\sigma 3=$	Deviator Stress at Failure, ksf:	18.80
	$\sigma 3$ f=	Effective Consolidation Stress at Failure, ksf:	8.64
	$\sigma 1=$	Total Major Principal Stress at Failure:	27.44
σ '3f=	$\sigma 3-\Delta \upsilon=$	Effective Minor Principal Stress at Failure,ksf:	8.29
	σ '1f=	Effective Major Principal Stress at Failure, ksf:	27.10
		Axial Strain at Failure:	13.99%

Failure Sketch



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Sample No: **9576**

Point: **C**

Pa: Applied Force	Vertical Displacement Reading In. :	Pore Pressure psi:	Axial Strain (E1):	(P) - Force Adj for U and F lbs:	Corrected Vertical Displac In. :	Correction for Membrane ksf:	(A) Area In.2:	(σ1−σ3) Deviator Stress ksf:	[Δu] Induced Pore Water Pressure ksf:	σ3 Effective Consolidation Stress ksf	σ1 Total Major Principal Stress ksf	σ3 ' Effective Minor Principal Stress ksf	σ1 ' Effective Major Principal Stress ksf	p'	q
23.8	0.000	32.0	0.00%	0.0	0.000	0.00000	6.245	0.00	0.2880	8.64	8.64	8.35	8.35	8.35	0.00
110.2	0.003	38.2	0.05%	86.4	0.003	0.00025	6.248	1.99	1.1808	8.64	10.63	7.46	9.45	8.45	1.00
157.1	0.006	43.8	0.10%	133.3	0.006	0.00051	6.251	3.07	1.9872	8.64	11.71	6.65	9.72	8.19	1.54
189.1	0.009	47.7	0.16%	165.3	0.009	0.00076	6.255	3.80	2.5488	8.64	12.44	6.09	9.90	7.99	1.90
212.7	0.012	51.1	0.21%	188.9	0.012	0.00102	6.258	4.35	3.0384	8.64	12.99	5.60	9.95	7.77	2.17
230.2	0.015	53.2	0.26%	206.4	0.015	0.00127	6.261	4.75	3.3408	8.64	13.39	5.30	10.04	7.67	2.37
243.4	0.018	55.1	0.31%	219.6	0.018	0.00153	6.264	5.05	3.6144	8.64	13.69	5.03	10.07	7.55	2.52
252.3	0.020	56.0	0.35%	228.5	0.020	0.00170	6.266	5.25	3.7440	8.64	13.89	4.90	10.15	7.52	2.62
263.5	0.023	57.3	0.40%	239.7	0.023	0.00195	6.270	5.50	3.9312	8.64	14.14	4.71	10.21	7.46	2.75
278.5	0.027	58.7	0.47%	254.7	0.027	0.00229	6.274	5.84	4.1328	8.64	14.48	4.51	10.35	7.43	2.92
284.1	0.029	59.4	0.50%	260.3	0.029	0.00246	6.276	5.97	4.2336	8.64	14.61	4.41	10.38	7.39	2.98
296.3	0.033	60.5	0.57%	272.5	0.033	0.00280	6.281	6.24	4.3920	8.64	14.88	4.25	10.49	7.37	3.12
301.4	0.035	60.7	0.61%	277.6	0.035	0.00297	6.283	6.36	4.4208	8.64	15.00	4.22	10.58	7.40	3.18
310.7	0.038	61.3	0.66%	286.9	0.038	0.00322	6.286	6.57	4.5072	8.64	15.21	4.13	10.70	7.42	3.28
317.5	0.041	61.7	0.71%	293.7	0.041	0.00348	6.289	6.72	4.5648	8.64	15.36	4.08	10.80	7.44	3.36
325.9	0.044	62.1	0.76%	302.1	0.044	0.00373	6.293	6.91	4.6224	8.64	15.55	4.02	10.93	7.47	3.45
330.4	0.046	62.4	0.80%	306.6	0.046	0.00390	6.295	7.01	4.6656	8.64	15.65	3.97	10.98	7.48	3.50
336.9	0.049	62.7	0.85%	313.1	0.049	0.00415	6.298	7.15	4.7088	8.64	15.79	3.93	11.09	7.51	3.58
345.9	0.053	63.0	0.92%	322.1	0.053	0.00449	6.303	7.35	4.7520	8.64	15.99	3.89	11.24	7.57	3.68
353.7	0.056	63.0	0.97%	329.9	0.056	0.00475	6.306	7.53	4.7520	8.64	16.17	3.89	11.42	7.65	3.76
358.0	0.058	63.2	1.00%	334.2	0.058	0.00492	6.308	7.62	4.7808	8.64	16.26	3.86	11.48	7.67	3.81
414.3	0.087	63.2	1.50%	390.5	0.087	0.00737	6.340	8.86	4.7808	8.64	17.50	3.86	12.72	8.29	4.43
463.6	0.116	62.0	2.01%	439.8	0.116	0.00983	6.373	9.93	4.6080	8.64	18.57	4.03	13.96	9.00	4.96
510.1	0.145	60.3	2.51%	486.3	0.145	0.01229	6.405	10.92	4.3632	8.64	19.56	4.28	15.20	9.74	5.46
554.0	0.174	58.4	3.01%	530.2	0.174	0.01475	6.439	11.84	4.0896	8.64	20.48	4.55	16.39	10.47	5.92
595.2	0.203	56.4	3.51%	571.4	0.203	0.01721	6.472	12.70	3.8016	8.64	21.34	4.84	17.53	11.19	6.35
630.9	0.231	54.5	3.99%	607.1	0.231	0.01958	6.505	13.42	3.5280	8.64	22.06	5.11	18.53	11.82	6.71
664.6	0.260	52.5	4.50%	640.8	0.260	0.02204	6.539	14.09	3.2400	8.64	22.73	5.40	19.49	12.44	7.04
697.1	0.289	50.6	5.00%	673.3	0.289	0.02450	6.573	14.73	2.9664	8.64	23.37	5.67	20.40	13.04	7.36
727.3	0.318	48.7	5.50%	703.5	0.318	0.02696	6.608	15.30	2.6928	8.64	23.94	5.95	21.25	13.60	7.65
755.2	0.347	47.0	6.00%	731.4	0.347	0.02942	6.643	15.82	2.4480	8.64	24.46	6.19	22.02	14.10	7.91
778.6	0.376	45.4	6.50%	754.8	0.376	0.03187	6.679	16.24	2.2176	8.64	24.88	6.42	22.66	14.54	8.12
801.5	0.405	43.8	7.00%	777.7	0.405	0.03433	6.715	16.64	1.9872	8.64	25.28	6.65	23.30	14.97	8.32
823.4	0.434	42.4	7.50%	799.6	0.434	0.03679	6.751	17.02	1.7856	8.64	25.66	6.85	23.87	15.36	8.51
842.8	0.463	41.1	8.01%	819.0	0.463	0.03925	6.788	17.33	1.5984	8.64	25.97	7.04	24.38	15.71	8.67
861.1	0.492	39.8	8.51%	837.3	0.492	0.04171	6.825	17.62	1.4112	8.64	26.26	7.23	24.85	16.04	8.81
876.5	0.520	38.8	8.99%	852.7	0.520	0.04408	6.862	17.85	1.2672	8.64	26.49	7.37	25.22	16.30	8.93
892.1	0.549	37.7	9.49%	868.3	0.549	0.04654	6.900	18.08	1.1088	8.64	26.72	7.53	25.61	16.57	9.04

Report Date: Friday, June 10, 2005

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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

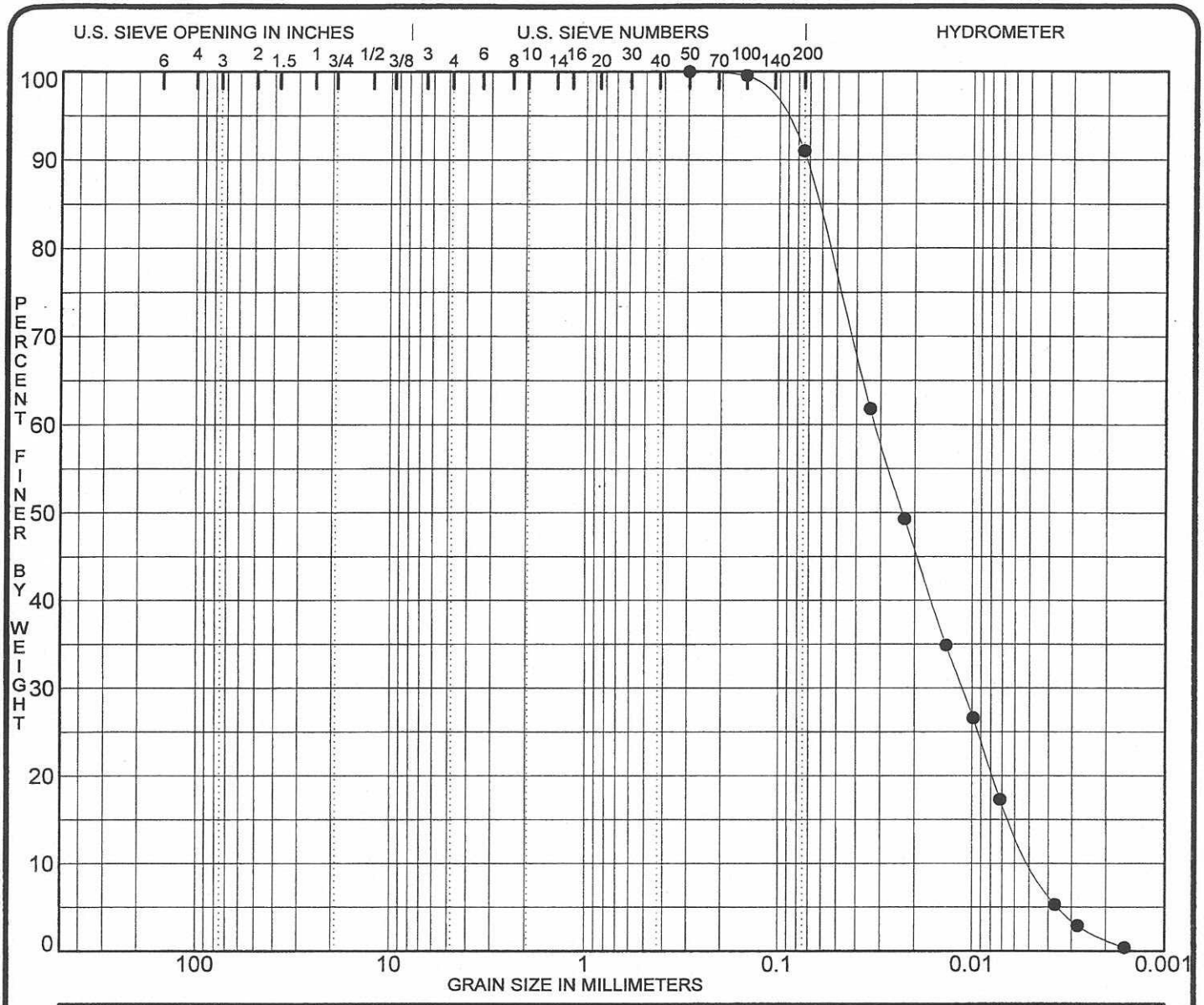
Project: **Kanawha River Landfill**

Sample No: **9576**

Point: **C**

904.0	0.578	36.8	9.99%	880.2	0.578	0.04900	6.938	18.22	0.9792	8.64	26.86	7.66	25.88	16.77	9.11
928.1	0.636	35.3	11.00%	904.3	0.636	0.05391	7.016	18.51	0.7632	8.64	27.15	7.88	26.38	17.13	9.25
948.6	0.694	34.1	12.00%	924.8	0.694	0.05883	7.096	18.71	0.5904	8.64	27.35	8.05	26.76	17.40	9.35
961.7	0.752	33.1	13.00%	937.9	0.752	0.06375	7.178	18.75	0.4464	8.64	27.39	8.19	26.94	17.57	9.38
975.2	0.809	32.4	13.99%	951.4	0.809	0.06858	7.260	18.80	0.3456	8.64	27.44	8.29	27.10	17.69	9.40
985.4	0.867	31.9	14.99%	961.6	0.867	0.07350	7.346	18.78	0.2736	8.64	27.42	8.37	27.14	17.75	9.39
991.4	0.925	31.5	15.99%	967.6	0.925	0.07841	7.434	18.66	0.2160	8.64	27.30	8.42	27.09	17.76	9.33
992.6	0.983	31.6	17.00%	968.8	0.983	0.08333	7.524	18.46	0.2304	8.64	27.10	8.41	26.87	17.64	9.23
999.3	1.041	31.5	18.00%	975.5	1.041	0.08825	7.616	18.36	0.2160	8.64	27.00	8.42	26.78	17.60	9.18
1008.1	1.098	31.2	18.99%	984.3	1.098	0.09308	7.708	18.29	0.1728	8.64	26.93	8.47	26.76	17.61	9.15
1010.0	1.156	30.9	19.99%	986.2	1.156	0.09799	7.805	18.10	0.1296	8.64	26.74	8.51	26.61	17.56	9.05

Report Date: Friday, June 10, 2005



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
● FA-B18	32.0						2.32
		FLY ASH					

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	%<.002
● FA-B18	32.0	0.300	0.032	0.011	0.005	0.0	9.0	91.0	1.4

PROJECT KANAWHA RIVER FLY ASH LANDFILL - JOB NO.

DATE 6/10/05

GRADATION CURVES

American Electric Power Service Corp.

Groveport, OH 43125

JOB NO. _____ DATE: Jun 13, 05

PROJECT KANAWHA RIVER FLY ASH LANDFILL

LOCATION: _____

SOURCE OF MATERIAL FA-B18 DEPTH 32.0 ft.

DESCRIPTION OF MATERIAL FLY ASH

ASTM DESCRIPTION _____

MAX. DRY DENSITY, pcf		OPTIMUM MOISTURE, %	
SPECIFIC GRAVITY	2.32		
SAMPLE HGT., mm	147.320	SAMPLE DIA., mm	71.200
CHAMBER PRESSURE, psi	60.0	BACK PRESSURE, psi	30.0
B-PARAMETER	1.00	EFFECTIVE PRESSURE, psi	30.0
INITIAL HEAD, mm	4633.0		

	BEFORE	AFTER
WATER CONTENT, %	42.7	40.3
WET DENSITY, pcf	107.4	
DRY DENSITY, pcf	75.3	
SATURATION, %	107.04	
VOID RATIO	0.9245	

PERMEABILITY COEFFICIENT K, cm/sec 2.60E-05

FLEXIBLE-MEMBRANE PERMEABILITY TEST

American Electric Power Service Corp.

Groveport, Ohio

AEP

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AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9577**

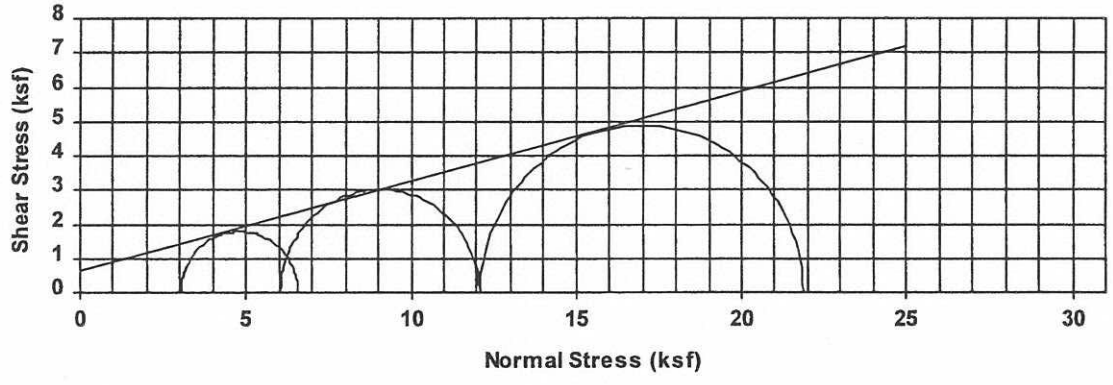
Material Description: Shelby Tube - Boring FA-B18; 52.0' - 54.0' - Gray Clay

silty clay 1

Point Designation	Initial Conditions			Final Conditions			
	Water Content, %	Dry Density, pcf	Degree of Saturation	Water Content, %	Confining Stress, (ksf)	Deviator Stress	Induced Pore Pressure (ksf)
A	38.5%	83.0	103.0%	35.12%	3.024	3.55	2.25
B	34.8%	88.1	105.4%	27.7%	6.048	6.03	4.20
C	33.6%	87.8	100.9%	25.0%	12.096	9.76	8.70

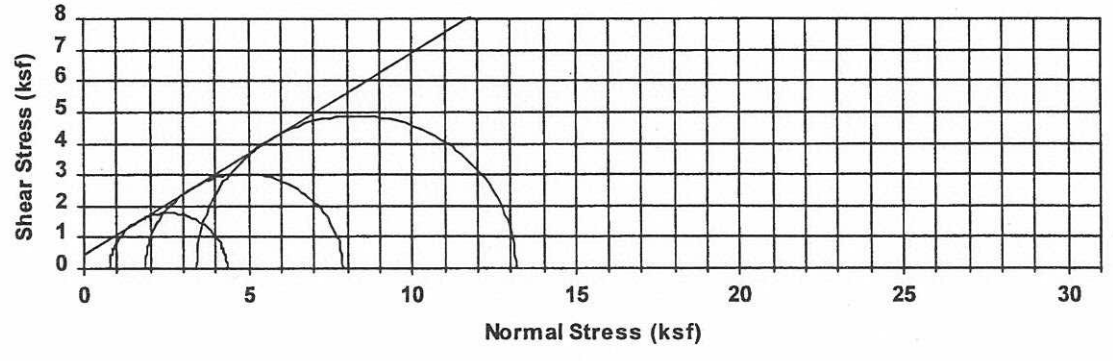
Point Designation	Axial Strain, %	q, (ksf)	Effective Stresses, (ksf)			Total Stresses, (ksf)		
			Major, (ksf)	Minor, (ksf)	p', (ksf)	Major, (ksf)	Minor, (ksf)	p, (ksf)
A	9.5%	1.78	4.33	0.78	2.55	6.58	3.02	4.80
B	14.0%	3.02	7.88	1.84	4.86	12.08	6.05	9.06
C	12.0%	4.88	13.16	3.40	8.28	21.85	12.10	16.97

Total Stress Envelope



ϕ: 14.6 °
c : 0.65 ksf

Effective Stress Envelope



ϕ ' : 32.8 °
c' : 0.46 ksf

Report Date: Friday, June 03, 2005

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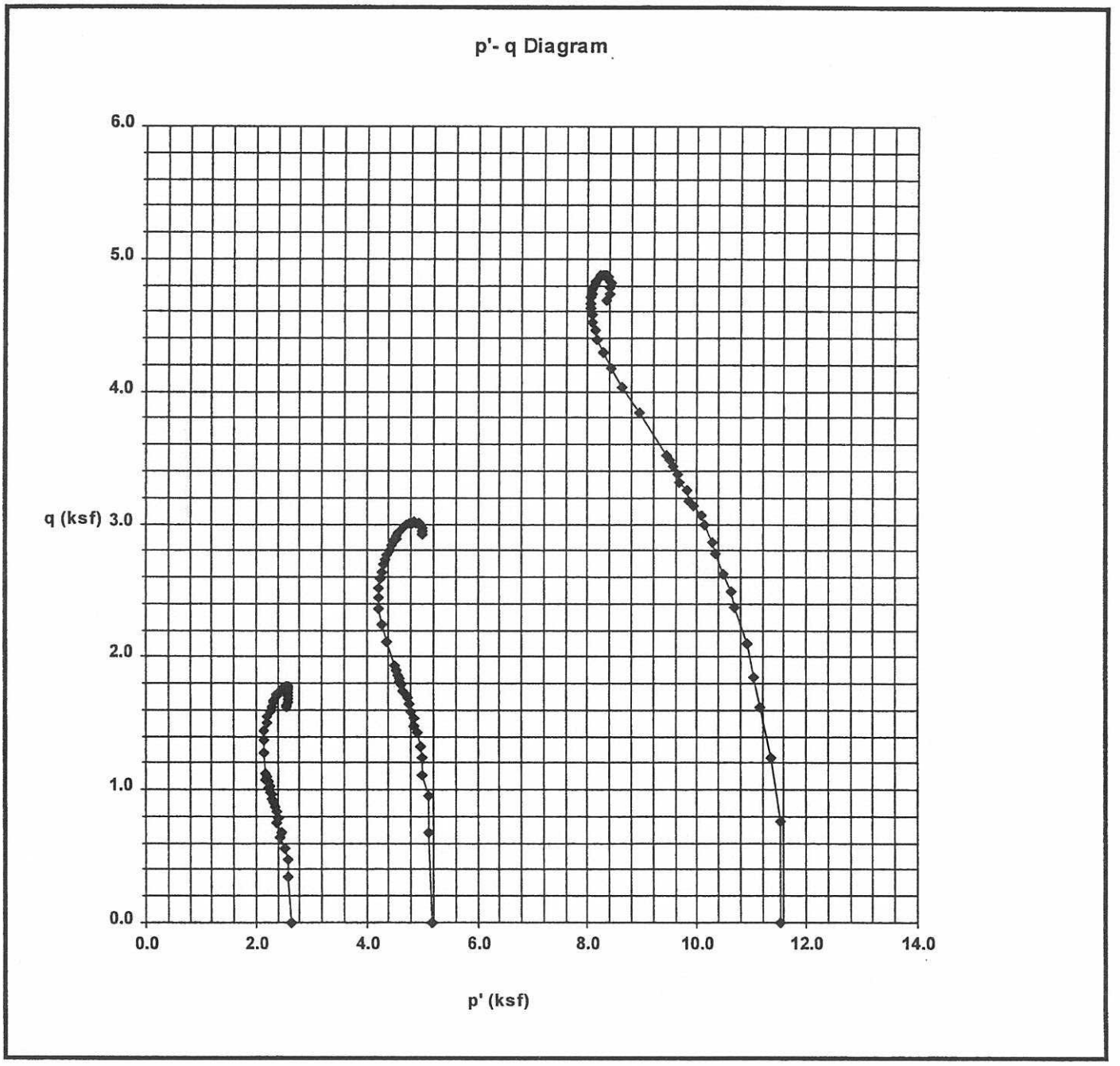
AEP
AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9577**



Report Date: Friday, June 03, 2005

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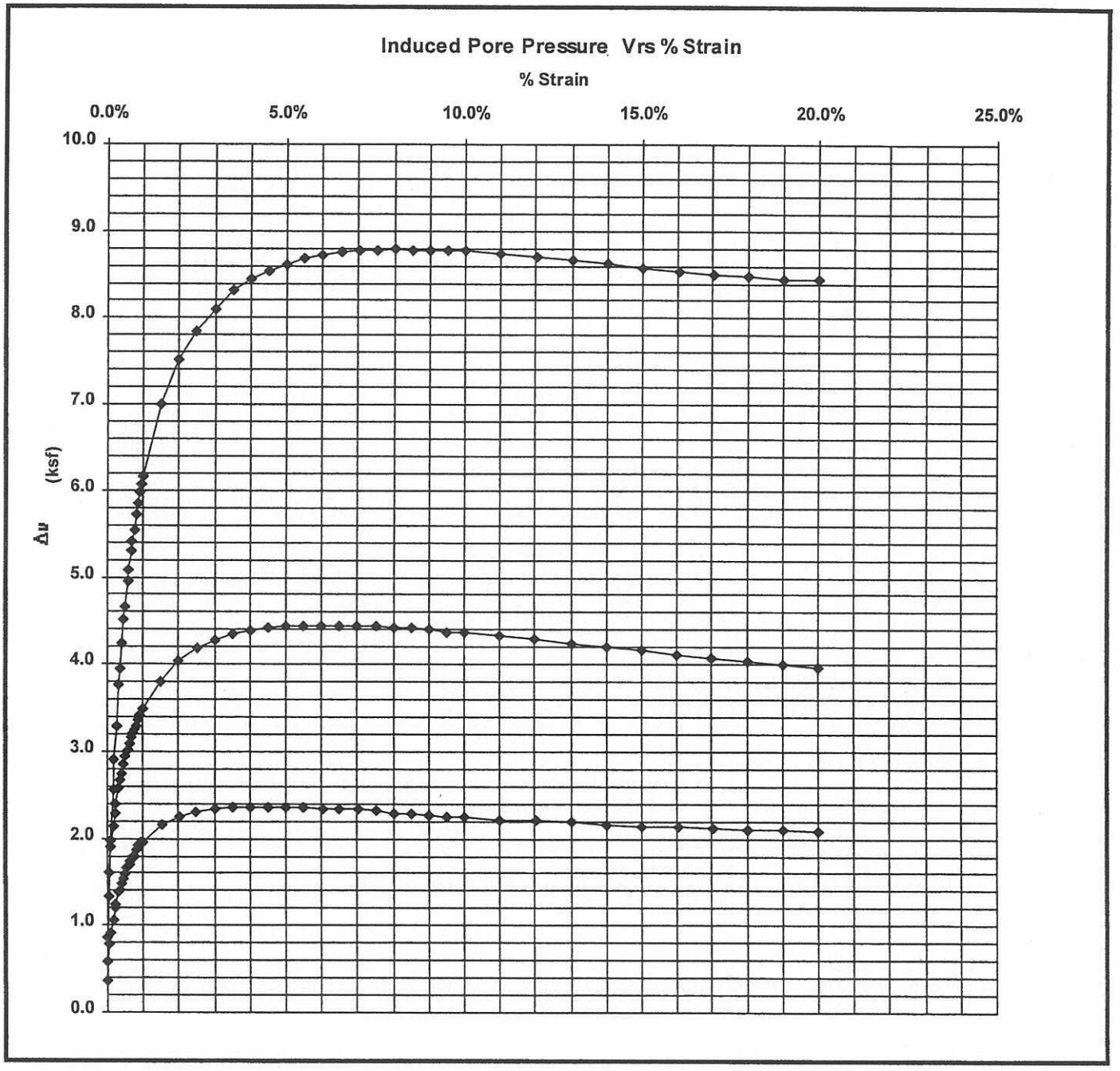
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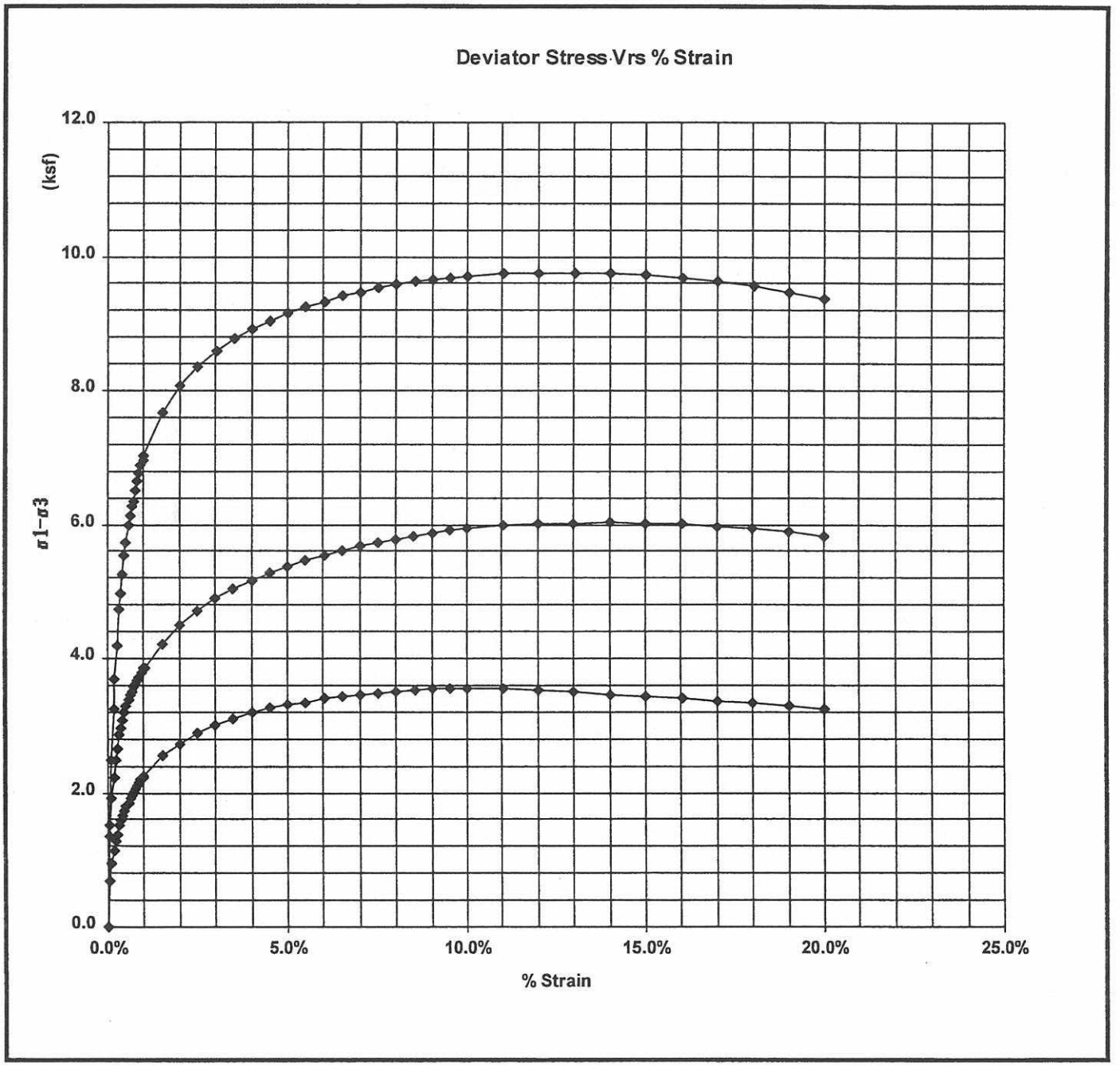
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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9577**



Report Date: Friday, June 03, 2005

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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**
Project: **Kanawha River Landfill**
Sample No: **9577**
Point: **A**

Material Description: Shelby Tube - Boring FA-B18; 52.0' - 54.0' - Gray Clay

Moisture Determination ASTM D2216

	Before Testing	After Testing
Tare No.	#26	#26
Mass of Container and Wet Specimen (Mcws), grams	1289.00	1262.78
Mass of Container and Oven Dry Specimen (Mcs), grams	986.63	986.63
Mass of Container (Mc), grams	200.40	200.40
Mass of Water (Mw), grams:	302.37	276.15
Mass of Solid Particles (Ms), grams:	786.23	786.23
Moisture Content (w), %	38.46%	35.12%

Initial Condition of Specimen

	(1)	(2)	(3)	Average
Diameter Measurements, Inches:	2.842	2.808	2.804	2.818
Height Measurements, Inches:	5.793	5.784	5.783	5.787

Initial Volume of Specimen (Vo), In.3:	36.09
Dry Mass of Specimen After Testing, (Md), grams:	786.23
Dry Unit Weight, (γ d) pcf:	82.99
Specific Gravity of the Solids, (G):	2.64
Volume of Solids, (Vs), Cu. In.:	18.1738
Height of Solids,(Hs),In.:	2.9139
Void Ratio Before Consolidation (Eo):	0.9859
Intitail Degree of Saturation: (So)	102.98%

Saturation - ASTM D4767 Section 8.2

Dial Indicator Reading Prior to Saturation (Rb:) In.	0
Cell Pressure After Saturation, psi:	45.00
Back Presssure After Saturation After, psi:	40.00
Pore Pressure B Parameter :	0.99
Dial Indicator Reading After Saturation, (Ra) In.:	0.027
Change in Height during Saturation, (Delta Hs) In.	0.027
Change In Volume of Specimen during Saturation (Delta Vsat), In.3:	0.505

Report Date: Friday, June 03, 2005

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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9577**

Point: **B**

Consolidation- ASTM D2435, Section 11.5:

Sample No:	T:	Burette 2:	Burette3:	Rc:
9577	0	33.9	34.2	0.054
9577	0.25	33.2	32.9	
9577	0.5	33	32.3	
9577	1	32.7	31.7	
9577	2	32.3	30.7	
9577	4	31.7	29.5	
9577	8	30.9	28.5	
9577	15	29.9	28	0.094
9577	30	28.3	25.2	0.103
9577	60	26	23	0.114
9577	120	23	20.3	0.123
9577	240	19.7	17.6	0.14
9577	420	16.8	15.2	0.155
9577	1440	13.1	12.5	0.169

Specimen Height After Consolidation, (Hc), In.:	5.66
Volume Change During Consolidation (Delta Vc), In.3:	2.59
Cross-Sectional Area of Specimen After Consolidation (Ac), In.2:	5.61

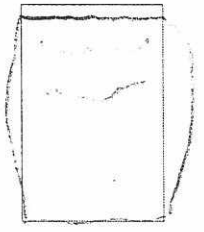
Triaxial Compression Testing ASTM D 4767

Sample Depth:	52	ft.
Cell Pressure:	92	psi
Back Pressure:	50	psi
Confining Pressure:	42	psi
Strain Rate:	0.006	In/min.

Specimen Height After Consolidation, (Hc), In.:	5.66	
Correction for Vert Displacement, In.:	0	
Load due to Friction and Uplift:	22.3	lbs.
Correction for Filter Paper:	0	
Thickness of Membrane (tm), In.:	0.012	

	$\sigma 1-\sigma 3=$	Deviator Stress at Failure, ksf:	6.03
	$\sigma 3$ f=	Effective Consolidation Stress at Failure, ksf:	6.05
	$\sigma 1=$	Total Major Principal Stress at Failure:	12.08
σ '3f=	$\sigma 3-\Delta \upsilon=$	Effective Minor Principal Stress at Failure,ksf:	1.84
	σ '1f=	Effective Major Principal Stress at Failure, ksf:	7.88
		Axial Strain at Failure:	14.01%

Failure Sketch



Report Date: Friday, June 03, 2005

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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9577**

Point: **B**

Pa: Applied Force	Vertical Displacement Reading In. :	Pore Pressure psi:	Axial Strain (E1):	(P) - Force Adj for U and F lbs:	Corrected Vertical Displac In. :	Correction for Membrane ksf:	(A) Area In.2:	(σ1–σ3) Deviator Stress ksf:	[Δυ] Induced Pore Water Pressure ksf:	σ3 Effective Consolidation Stress ksf	σ1 Total Major Principal Stress ksf	σ3 ' Effective Minor Principal Stress ksf	σ1 ' Effective Major Principal Stress ksf	p'	q
22.3	0.000	56.0	0.00%	0.0	0.000	0.00000	5.615	0.00	0.8640	6.05	6.05	5.18	5.18	5.18	0.00
75.4	0.003	61.2	0.05%	53.1	0.003	0.00027	5.618	1.36	1.6128	6.05	7.41	4.44	5.80	5.12	0.68
96.9	0.006	63.2	0.11%	74.6	0.006	0.00055	5.621	1.91	1.9008	6.05	7.96	4.15	6.06	5.10	0.96
108.8	0.009	64.9	0.16%	86.5	0.009	0.00082	5.624	2.21	2.1456	6.05	8.26	3.90	6.12	5.01	1.11
119.0	0.012	65.9	0.21%	96.7	0.012	0.00110	5.627	2.47	2.2896	6.05	8.52	3.76	6.23	5.00	1.24
125.6	0.014	66.6	0.25%	103.3	0.014	0.00128	5.629	2.64	2.3904	6.05	8.69	3.66	6.30	4.98	1.32
134.0	0.018	67.9	0.32%	111.7	0.018	0.00164	5.633	2.85	2.5776	6.05	8.90	3.47	6.32	4.90	1.43
137.7	0.020	68.5	0.35%	115.4	0.020	0.00183	5.635	2.95	2.6640	6.05	9.00	3.38	6.33	4.86	1.47
143.1	0.023	69.1	0.41%	120.8	0.023	0.00210	5.638	3.08	2.7504	6.05	9.13	3.30	6.38	4.84	1.54
147.1	0.026	69.8	0.46%	124.8	0.026	0.00238	5.641	3.18	2.8512	6.05	9.23	3.20	6.38	4.79	1.59
151.6	0.029	70.4	0.51%	129.3	0.029	0.00265	5.644	3.30	2.9376	6.05	9.34	3.11	6.41	4.76	1.65
154.8	0.032	70.9	0.57%	132.5	0.032	0.00292	5.647	3.38	3.0096	6.05	9.42	3.04	6.41	4.73	1.69
157.7	0.035	71.4	0.62%	135.4	0.035	0.00320	5.650	3.45	3.0816	6.05	9.50	2.97	6.41	4.69	1.72
159.5	0.037	71.9	0.65%	137.2	0.037	0.00338	5.652	3.49	3.1536	6.05	9.54	2.89	6.39	4.64	1.75
162.6	0.040	72.4	0.71%	140.3	0.040	0.00365	5.655	3.57	3.2256	6.05	9.62	2.82	6.39	4.61	1.78
164.6	0.043	72.6	0.76%	142.3	0.043	0.00393	5.658	3.62	3.2544	6.05	9.67	2.79	6.41	4.60	1.81
166.9	0.045	72.9	0.80%	144.6	0.045	0.00411	5.660	3.67	3.2976	6.05	9.72	2.75	6.43	4.59	1.84
168.8	0.048	73.3	0.85%	146.5	0.048	0.00439	5.663	3.72	3.3552	6.05	9.77	2.69	6.41	4.55	1.86
171.9	0.052	73.8	0.92%	149.6	0.052	0.00475	5.667	3.80	3.4272	6.05	9.84	2.62	6.42	4.52	1.90
174.3	0.055	74.2	0.97%	152.0	0.055	0.00503	5.670	3.86	3.4848	6.05	9.90	2.56	6.42	4.49	1.93
174.8	0.057	74.2	1.01%	152.5	0.057	0.00521	5.672	3.87	3.4848	6.05	9.91	2.56	6.43	4.50	1.93
189.8	0.085	76.4	1.50%	167.5	0.085	0.00777	5.700	4.22	3.8016	6.05	10.27	2.25	6.47	4.36	2.11
201.2	0.113	78.0	2.00%	178.9	0.113	0.01032	5.729	4.49	4.0320	6.05	10.53	2.02	6.50	4.26	2.24
211.5	0.142	79.1	2.51%	189.2	0.142	0.01297	5.759	4.72	4.1904	6.05	10.77	1.86	6.58	4.22	2.36
219.7	0.170	79.7	3.00%	197.4	0.170	0.01553	5.789	4.90	4.2768	6.05	10.94	1.77	6.67	4.22	2.45
226.5	0.198	80.2	3.50%	204.2	0.198	0.01809	5.818	5.04	4.3488	6.05	11.08	1.70	6.73	4.22	2.52
233.0	0.227	80.5	4.01%	210.7	0.227	0.02074	5.849	5.17	4.3920	6.05	11.21	1.66	6.82	4.24	2.58
238.8	0.255	80.7	4.51%	216.5	0.255	0.02330	5.880	5.28	4.4208	6.05	11.33	1.63	6.91	4.27	2.64
244.2	0.283	80.8	5.00%	221.9	0.283	0.02586	5.910	5.38	4.4352	6.05	11.43	1.61	6.99	4.30	2.69
249.3	0.312	80.9	5.51%	227.0	0.312	0.02851	5.942	5.47	4.4496	6.05	11.52	1.60	7.07	4.33	2.74
253.5	0.340	80.9	6.01%	231.2	0.340	0.03106	5.974	5.54	4.4496	6.05	11.59	1.60	7.14	4.37	2.77
257.9	0.368	80.9	6.50%	235.6	0.368	0.03362	6.005	5.62	4.4496	6.05	11.66	1.60	7.21	4.41	2.81
262.0	0.396	80.8	7.00%	239.7	0.396	0.03618	6.037	5.68	4.4352	6.05	11.73	1.61	7.29	4.45	2.84
265.9	0.425	80.8	7.51%	243.6	0.425	0.03883	6.071	5.74	4.4352	6.05	11.79	1.61	7.35	4.48	2.87
269.2	0.453	80.7	8.00%	246.9	0.453	0.04139	6.103	5.78	4.4208	6.05	11.83	1.63	7.41	4.52	2.89
272.4	0.481	80.7	8.50%	250.1	0.481	0.04395	6.136	5.83	4.4208	6.05	11.87	1.63	7.45	4.54	2.91
275.6	0.510	80.6	9.01%	253.3	0.510	0.04660	6.171	5.86	4.4064	6.05	11.91	1.64	7.51	4.57	2.93
279.1	0.538	80.4	9.51%	256.8	0.538	0.04915	6.205	5.91	4.3776	6.05	11.96	1.67	7.58	4.63	2.96

Report Date: Friday, June 03, 2005

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Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9577**

Point: **B**

281.5	0.566	80.3	10.00%	259.2	0.566	0.05171	6.239	5.93	4.3632	6.05	11.98	1.68	7.62	4.65	2.97
287.1	0.623	80.1	11.01%	264.8	0.623	0.05692	6.309	5.99	4.3344	6.05	12.03	1.71	7.70	4.71	2.99
291.5	0.679	79.8	12.00%	269.2	0.679	0.06204	6.380	6.01	4.2912	6.05	12.06	1.76	7.77	4.76	3.01
294.9	0.736	79.5	13.01%	272.6	0.736	0.06724	6.454	6.01	4.2480	6.05	12.06	1.80	7.81	4.81	3.01
299.1	0.793	79.2	14.01%	276.8	0.793	0.07245	6.530	6.03	4.2048	6.05	12.08	1.84	7.88	4.86	3.02
301.2	0.849	78.9	15.00%	278.9	0.849	0.07757	6.606	6.00	4.1616	6.05	12.05	1.89	7.89	4.89	3.00
305.2	0.906	78.6	16.01%	282.9	0.906	0.08278	6.685	6.01	4.1184	6.05	12.06	1.93	7.94	4.94	3.01
307.1	0.962	78.3	17.00%	284.8	0.962	0.08789	6.765	5.97	4.0752	6.05	12.02	1.97	7.95	4.96	2.99
308.8	1.019	78.0	18.01%	286.5	1.019	0.09310	6.848	5.93	4.0320	6.05	11.98	2.02	7.95	4.98	2.97
310.4	1.076	77.8	19.01%	288.1	1.076	0.09831	6.933	5.89	4.0032	6.05	11.93	2.04	7.93	4.99	2.94
311.7	1.132	77.6	20.00%	289.4	1.132	0.10342	7.019	5.83	3.9744	6.05	11.88	2.07	7.91	4.99	2.92

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Sample No: **9577**

Point: **C**

Material Description:	Shelby Tube - Boring FA-B18; 52.0' - 54.0' - Gray Clay

Moisture Determination ASTM D2216

	Before Testing	After Testing
Tare No.	G	G
Mass of Container and Wet Specimen (Mcws), grams	1330.47	1258.58
Mass of Container and Oven Dry Specimen (Mcs), grams	1047.83	1047.83
Mass of Container (Mc), grams	205.39	205.39
Mass of Water (Mw), grams:	282.64	210.75
Mass of Solid Particles (Ms), grams:	842.44	842.44
Moisture Content (w), %	33.55%	25.02%

Initial Condition of Specimen

	(1)	(2)	(3)	Average
Diameter Measurements, Inches:	2.818	2.838	2.826	2.827
Height Measurements, Inches:	5.828	5.821	5.827	5.825

Initial Volume of Specimen (Vo), In.3:	36.57
Dry Mass of Specimen After Testing, (Md), grams:	842.44
Dry Unit Weight, (γ d) pcf:	87.75
Specific Gravity of the Solids, (G):	2.64
Volume of Solids, (Vs), Cu. In.:	19.4731
Height of Solids,(Hs),In.:	3.1016
Void Ratio Before Consolidation (Eo):	0.8781
Intitail Degree of Saturation: (So)	100.86%

Saturation - ASTM D4767 Section 8.2

Dial Indicator Reading Prior to Saturation (Rb:) In.	0
Cell Pressure After Saturation, psi:	45.00
Back Presssure After Saturation, psi:	40.00
Pore Pressure B Parameter :	1
Dial Indicator Reading After Saturation, (Ra) In.:	0.034
Change in Height during Saturation, (Delta Hs) In.	0.034
Change In Volume of Specimen during Saturation (Delta Vsat), In.3:	0.640

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Consolidation- ASTM D2435, Section 11.5:

Sample No:	T:	Burette 2:	Burette3:	Rc:
9577	0	44.7	44	0.034
9577	0.25	43.7	42.9	
9577	0.5	43.4	42.6	
9577	1	43	42.2	
9577	2	42.4	41.6	
9577	4	41.5	40.7	
9577	8	40.3	39.5	
9577	15	39	38.1	0.093
9577	30	36.4	35.5	0.104
9577	60	33.1	32.3	0.119
9577	120	28.2	27.6	0.141
9577	240	22.7	22.5	0.169
9577	420	18.1	18.2	0.196
9577	1440	14	14.3	0.22

Specimen Height After Consolidation, (Hc), In.: 5.61

Volume Change During Consolidation (Delta Vc), In.3: 3.69

Cross-Sectional Area of Specimen After Consolidation (Ac), In.2: 5.75

Triaxial Compression Testing ASTM D 4767

Sample Depth: 52 ft.

Cell Pressure: 124 psi

Back Pressure: 40 psi

Confining Pressure: 84 psi

Strain Rate: 0.006 In/min.

Specimen Height After Consolidation, (Hc), In.: 5.61

Correction for Vert Displacement, In.: 0

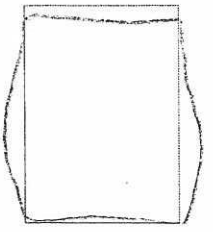
Load due to Friction and Uplift: 27.4 lbs.

Correction for Filter Paper: 0

Thickness of Membrane (tm), In.: 0.012

$\sigma 1-\sigma 3=$	Deviator Stress at Failure, ksf:	9.76
$\sigma 3$ f=	Effective Consolidation Stress at Failure, ksf:	12.10
$\sigma 1=$	Total Major Principal Stress at Failure:	21.85
σ '3f= $\sigma 3-\Delta u=$	Effective Minor Principal Stress at Failure,ksf:	3.40
σ '1f=	Effective Major Principal Stress at Failure, ksf:	13.16
	Axial Strain at Failure:	12.01%

Failure Sketch



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Pa: Applied Force	Vertical Displacement Reading In. :	Pore Pressure psi:	Axial Strain (E1):	(P) - Force Adj for U and F lbs:	Corrected Vertical Displac In. :	Correction for Membrane ksf:	(A) Area In.2:	(σ1−σ3) Deviator Stress ksf:	[Δu] Induced Pore Water Pressure ksf:	σ3 Effective Consolidation Stress ksf	σ1 Total Major Principal Stress ksf	σ3 ' Effective Minor Principal Stress ksf	σ1 ' Effective Major Principal Stress ksf	p'	q
27.4	0.000	44.0	0.00%	0.0	0.000	0.00000	5.753	0.00	0.5760	12.10	12.10	11.52	11.52	11.52	0.00
88.2	0.003	49.3	0.05%	60.8	0.003	0.00027	5.756	1.52	1.3392	12.10	13.62	10.76	12.28	11.52	0.76
126.5	0.006	53.7	0.11%	99.1	0.006	0.00055	5.759	2.48	1.9728	12.10	14.57	10.12	12.60	11.36	1.24
157.3	0.009	57.8	0.16%	129.9	0.009	0.00082	5.762	3.25	2.5632	12.10	15.34	9.53	12.78	11.16	1.62
175.2	0.011	60.2	0.20%	147.8	0.011	0.00100	5.764	3.69	2.9088	12.10	15.79	9.19	12.88	11.03	1.85
195.7	0.014	62.8	0.25%	168.3	0.014	0.00128	5.767	4.20	3.2832	12.10	16.30	8.81	13.01	10.91	2.10
217.6	0.018	66.2	0.32%	190.2	0.018	0.00164	5.771	4.74	3.7728	12.10	16.84	8.32	13.07	10.70	2.37
227.1	0.020	67.4	0.36%	199.7	0.020	0.00182	5.774	4.98	3.9456	12.10	17.07	8.15	13.13	10.64	2.49
238.4	0.023	69.4	0.41%	211.0	0.023	0.00210	5.777	5.26	4.2336	12.10	17.35	7.86	13.12	10.49	2.63
250.2	0.026	71.4	0.46%	222.8	0.026	0.00237	5.780	5.55	4.5216	12.10	17.64	7.57	13.12	10.35	2.77
257.2	0.028	72.4	0.50%	229.8	0.028	0.00255	5.782	5.72	4.6656	12.10	17.82	7.43	13.15	10.29	2.86
267.8	0.032	74.4	0.57%	240.4	0.032	0.00292	5.786	5.98	4.9536	12.10	18.08	7.14	13.12	10.13	2.99
273.6	0.034	75.3	0.61%	246.2	0.034	0.00310	5.788	6.12	5.0832	12.10	18.22	7.01	13.13	10.07	3.06
280.2	0.037	76.8	0.66%	252.8	0.037	0.00337	5.791	6.28	5.2992	12.10	18.38	6.80	13.08	9.94	3.14
283.1	0.039	77.6	0.70%	255.7	0.039	0.00355	5.793	6.35	5.4144	12.10	18.45	6.68	13.03	9.86	3.18
289.4	0.042	78.5	0.75%	262.0	0.042	0.00383	5.796	6.51	5.5440	12.10	18.60	6.55	13.06	9.80	3.25
295.0	0.045	79.8	0.80%	267.6	0.045	0.00410	5.799	6.64	5.7312	12.10	18.74	6.36	13.01	9.68	3.32
300.1	0.048	80.6	0.86%	272.7	0.048	0.00437	5.803	6.76	5.8464	12.10	18.86	6.25	13.01	9.63	3.38
305.0	0.051	81.5	0.91%	277.6	0.051	0.00465	5.806	6.88	5.9760	12.10	18.98	6.12	13.00	9.56	3.44
308.6	0.054	82.2	0.96%	281.2	0.054	0.00492	5.809	6.97	6.0768	12.10	19.06	6.02	12.99	9.50	3.48
311.5	0.056	82.8	1.00%	284.1	0.056	0.00510	5.811	7.04	6.1632	12.10	19.13	5.93	12.97	9.45	3.52
338.8	0.084	88.6	1.50%	311.4	0.084	0.00765	5.840	7.67	6.9984	12.10	19.77	5.10	12.77	8.93	3.84
356.7	0.112	92.2	2.00%	329.3	0.112	0.01021	5.870	8.07	7.5168	12.10	20.16	4.58	12.65	8.61	4.03
370.5	0.140	94.5	2.50%	343.1	0.140	0.01276	5.900	8.36	7.8480	12.10	20.46	4.25	12.61	8.43	4.18
382.3	0.169	96.3	3.01%	354.9	0.169	0.01540	5.932	8.60	8.1072	12.10	20.70	3.99	12.59	8.29	4.30
391.4	0.197	97.8	3.51%	364.0	0.197	0.01795	5.962	8.77	8.3232	12.10	20.87	3.77	12.55	8.16	4.39
399.6	0.225	98.6	4.01%	372.2	0.225	0.02050	5.994	8.92	8.4384	12.10	21.02	3.66	12.58	8.12	4.46
406.9	0.253	99.3	4.51%	379.5	0.253	0.02305	6.025	9.05	8.5392	12.10	21.14	3.56	12.60	8.08	4.52
413.9	0.281	99.8	5.01%	386.5	0.281	0.02561	6.057	9.16	8.6112	12.10	21.26	3.48	12.65	8.07	4.58
420.3	0.309	100.3	5.51%	392.9	0.309	0.02816	6.089	9.26	8.6832	12.10	21.36	3.41	12.68	8.04	4.63
425.5	0.337	100.6	6.01%	398.1	0.337	0.03071	6.121	9.33	8.7264	12.10	21.43	3.37	12.70	8.04	4.67
431.1	0.365	100.8	6.51%	403.7	0.365	0.03326	6.154	9.41	8.7552	12.10	21.51	3.34	12.75	8.05	4.71
436.0	0.393	100.9	7.01%	408.6	0.393	0.03581	6.187	9.47	8.7696	12.10	21.57	3.33	12.80	8.06	4.74
441.1	0.421	101.0	7.51%	413.7	0.421	0.03836	6.220	9.54	8.7840	12.10	21.64	3.31	12.85	8.08	4.77
445.5	0.449	101.1	8.01%	418.1	0.449	0.04091	6.254	9.59	8.7984	12.10	21.68	3.30	12.88	8.09	4.79
449.7	0.477	101.0	8.51%	422.3	0.477	0.04347	6.288	9.63	8.7840	12.10	21.72	3.31	12.94	8.13	4.81
453.8	0.505	101.0	9.01%	426.4	0.505	0.04602	6.323	9.67	8.7840	12.10	21.76	3.31	12.98	8.14	4.83
457.1	0.533	101.0	9.51%	429.7	0.533	0.04857	6.357	9.68	8.7840	12.10	21.78	3.31	13.00	8.15	4.84

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460.6	0.561	100.9	10.01%	433.2	0.561	0.05112	6.393	9.71	8.7696	12.10	21.80	3.33	13.03	8.18	4.85
467.5	0.617	100.7	11.01%	440.1	0.617	0.05622	6.465	9.75	8.7408	12.10	21.84	3.36	13.10	8.23	4.87
473.2	0.673	100.4	12.01%	445.8	0.673	0.06133	6.538	9.76	8.6976	12.10	21.85	3.40	13.16	8.28	4.88
478.6	0.730	100.2	13.02%	451.2	0.730	0.06652	6.614	9.76	8.6688	12.10	21.85	3.43	13.18	8.31	4.88
483.9	0.786	99.9	14.02%	456.5	0.786	0.07162	6.691	9.75	8.6256	12.10	21.85	3.47	13.22	8.35	4.88
488.2	0.842	99.6	15.02%	460.8	0.842	0.07673	6.770	9.72	8.5824	12.10	21.82	3.51	13.24	8.38	4.86
491.5	0.898	99.3	16.02%	464.1	0.898	0.08183	6.850	9.67	8.5392	12.10	21.77	3.56	13.23	8.39	4.84
495.2	0.954	99.0	17.02%	467.8	0.954	0.08693	6.933	9.63	8.4960	12.10	21.73	3.60	13.23	8.41	4.81
498.2	1.010	98.9	18.02%	470.8	1.010	0.09204	7.017	9.57	8.4816	12.10	21.67	3.61	13.18	8.40	4.78
499.6	1.066	98.7	19.02%	472.2	1.066	0.09714	7.104	9.47	8.4528	12.10	21.57	3.64	13.12	8.38	4.74
501.0	1.122	98.7	20.02%	473.6	1.122	0.10224	7.193	9.38	8.4528	12.10	21.48	3.64	13.02	8.33	4.69

Report Date: Friday, June 03, 2005

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AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9577**

Point: **A**

Consolidation- ASTM D2435, Section 11.5:

Sample No:	T:	Burette 2:	Burette3:	Rc:
9577	0	23.7	23.7	0.027
9577	0.25	23.2	23.4	
9577	0.5	23.1	23.3	
9577	1	22.8	23.2	
9577	2	22.5	22.9	
9577	4	22.1	22.6	
9577	8	21.6	22.2	
9577	15	21	21.7	0.051
9577	30	19.9	20.8	0.057
9577	60	18.6	19.3	0.066
9577	120	17	17.6	0.074
9577	240	15.4	15.7	0.083
9577	420	14.1	14.1	0.091
9577	1440	12.2	12	0.1

Specimen Height After Consolidation, (Hc), In.:	5.69
Volume Change During Consolidation (Delta Vc), In.3:	1.42
Cross-Sectional Area of Specimen After Consolidation (Ac), In.2:	6.01

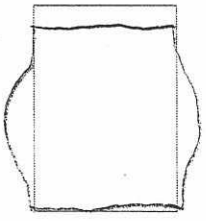
Triaxial Compression Testing ASTM D 4767

Sample Depth:	52	ft.
Cell Pressure:	61	psi
Back Pressure:	40	psi
Confining Pressure:	21	psi
Strain Rate:	0.006	in./min.

Specimen Height After Consolidation, (Hc), In.:	5.69
Correction for Vert Displacement, In.:	0
Load due to Friction and Uplift:	12.7 lbs.
Correction for Filter Paper:	0
Thickness of Membrane (tm), In.:	0.012

$\sigma 1-\sigma 3=$		Deviator Stress at Failure, ksf:	3.55
$\sigma 3$ f=		Effective Consolidation Stress at Failure, ksf:	3.02
	$\sigma 1=$	Total Major Principal Stress at Failure:	6.58
σ '3f=	$\sigma 3-\Delta \upsilon=$	Effective Minor Principal Stress at Failure,ksf:	0.78
	σ '1f=	Effective Major Principal Stress at Failure, ksf:	4.33
		Axial Strain at Failure:	9.51%

Failure Sketch



Report Date: Friday, June 03, 2005

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Company: **AEP**

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Sample No: **9577**

Point: **A**

Pa: Applied Force	Vertical Displacement Reading In. :	Pore Pressure psi:	Axial Strain (E1):	(P) - Force Adj for U and F lbs:	Corrected Vertical Displac In. :	Correction for Membrane ksf:	(A) Area In.2:	(σ1−σ3) Deviator Stress ksf:	[Δu] Induced Pore Water Pressure ksf:	σ3 Effective Consolidation Stress ksf	σ1 Total Major Principal Stress ksf	σ3 ' Effective Minor Principal Stress ksf	σ1 ' Effective Major Principal Stress ksf	p'	q
12.7	0.000	42.6	0.00%	0.0	0.000	0.00000	6.009	0.00	0.3744	3.02	3.02	2.65	2.65	2.65	0.00
41.2	0.003	45.4	0.05%	28.5	0.003	0.00026	6.012	0.68	0.7776	3.02	3.71	2.25	2.93	2.59	0.34
52.5	0.006	46.4	0.11%	39.8	0.006	0.00053	6.015	0.95	0.9216	3.02	3.98	2.10	3.05	2.58	0.48
60.0	0.009	47.3	0.16%	47.3	0.009	0.00079	6.018	1.13	1.0512	3.02	4.15	1.97	3.10	2.54	0.57
66.2	0.012	48.4	0.21%	53.5	0.012	0.00105	6.022	1.28	1.2096	3.02	4.30	1.81	3.09	2.45	0.64
70.0	0.014	48.6	0.25%	57.3	0.014	0.00123	6.024	1.37	1.2384	3.02	4.39	1.79	3.15	2.47	0.68
75.9	0.018	49.6	0.32%	63.2	0.018	0.00158	6.028	1.51	1.3824	3.02	4.53	1.64	3.15	2.40	0.75
78.9	0.020	49.8	0.35%	66.2	0.020	0.00176	6.030	1.58	1.4112	3.02	4.60	1.61	3.19	2.40	0.79
82.3	0.023	50.3	0.40%	69.6	0.023	0.00202	6.033	1.66	1.4832	3.02	4.68	1.54	3.20	2.37	0.83
85.6	0.026	50.7	0.46%	72.9	0.026	0.00229	6.036	1.74	1.5408	3.02	4.76	1.48	3.22	2.35	0.87
88.5	0.029	51.1	0.51%	75.8	0.029	0.00255	6.040	1.80	1.5984	3.02	4.83	1.43	3.23	2.33	0.90
90.7	0.032	51.6	0.56%	78.0	0.032	0.00281	6.043	1.86	1.6704	3.02	4.88	1.35	3.21	2.28	0.93
93.5	0.035	51.8	0.62%	80.8	0.035	0.00308	6.046	1.92	1.6992	3.02	4.95	1.32	3.25	2.29	0.96
95.0	0.037	52.1	0.65%	82.3	0.037	0.00325	6.048	1.96	1.7424	3.02	4.98	1.28	3.24	2.26	0.98
97.7	0.040	52.5	0.70%	85.0	0.040	0.00352	6.051	2.02	1.8000	3.02	5.04	1.22	3.24	2.23	1.01
99.5	0.043	52.5	0.76%	86.8	0.043	0.00378	6.055	2.06	1.8000	3.02	5.08	1.22	3.28	2.25	1.03
101.7	0.046	52.9	0.81%	89.0	0.046	0.00404	6.058	2.11	1.8576	3.02	5.14	1.17	3.28	2.22	1.06
103.5	0.049	53.3	0.86%	90.8	0.049	0.00431	6.061	2.15	1.9152	3.02	5.18	1.11	3.26	2.19	1.08
105.2	0.052	53.3	0.91%	92.5	0.052	0.00457	6.064	2.19	1.9152	3.02	5.22	1.11	3.30	2.20	1.10
106.9	0.055	53.6	0.97%	94.2	0.055	0.00483	6.068	2.23	1.9584	3.02	5.25	1.07	3.30	2.18	1.12
107.9	0.057	53.6	1.00%	95.2	0.057	0.00501	6.070	2.25	1.9584	3.02	5.28	1.07	3.32	2.19	1.13
121.1	0.086	55.0	1.51%	108.4	0.086	0.00756	6.101	2.55	2.1600	3.02	5.57	0.86	3.41	2.14	1.28
129.5	0.114	55.6	2.00%	116.8	0.114	0.01002	6.132	2.73	2.2464	3.02	5.76	0.78	3.51	2.14	1.37
136.7	0.142	56.0	2.50%	124.0	0.142	0.01248	6.163	2.88	2.3040	3.02	5.91	0.72	3.60	2.16	1.44
142.8	0.171	56.2	3.01%	130.1	0.171	0.01503	6.195	3.01	2.3328	3.02	6.03	0.69	3.70	2.20	1.50
147.7	0.199	56.4	3.50%	135.0	0.199	0.01749	6.227	3.10	2.3616	3.02	6.13	0.66	3.77	2.21	1.55
152.0	0.228	56.4	4.01%	139.3	0.228	0.02004	6.260	3.18	2.3616	3.02	6.21	0.66	3.85	2.25	1.59
155.9	0.256	56.4	4.50%	143.2	0.256	0.02250	6.292	3.25	2.3616	3.02	6.28	0.66	3.92	2.29	1.63
159.0	0.285	56.4	5.01%	146.3	0.285	0.02505	6.326	3.31	2.3616	3.02	6.33	0.66	3.97	2.32	1.65
161.8	0.313	56.4	5.50%	149.1	0.313	0.02751	6.359	3.35	2.3616	3.02	6.37	0.66	4.01	2.34	1.67
165.0	0.342	56.3	6.01%	152.3	0.342	0.03006	6.393	3.40	2.3472	3.02	6.42	0.68	4.08	2.38	1.70
167.5	0.370	56.3	6.51%	154.8	0.370	0.03252	6.427	3.44	2.3472	3.02	6.46	0.68	4.11	2.39	1.72
169.6	0.399	56.2	7.02%	156.9	0.399	0.03507	6.462	3.46	2.3328	3.02	6.49	0.69	4.15	2.42	1.73
171.5	0.427	56.1	7.51%	158.8	0.427	0.03753	6.497	3.48	2.3184	3.02	6.51	0.71	4.19	2.45	1.74
173.8	0.455	55.9	8.00%	161.1	0.455	0.03999	6.531	3.51	2.2896	3.02	6.54	0.73	4.25	2.49	1.76
175.4	0.484	55.9	8.51%	162.7	0.484	0.04254	6.568	3.52	2.2896	3.02	6.55	0.73	4.26	2.50	1.76
177.2	0.512	55.8	9.00%	164.5	0.512	0.04500	6.603	3.54	2.2752	3.02	6.57	0.75	4.29	2.52	1.77
178.8	0.541	55.6	9.51%	166.1	0.541	0.04755	6.641	3.55	2.2464	3.02	6.58	0.78	4.33	2.55	1.78

Report Date: Friday, June 03, 2005

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Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9577**

Point: **A**

179.7	0.569	55.6	10.01%	167.0	0.569	0.05001	6.677	3.55	2.2464	3.02	6.58	0.78	4.33	2.55	1.78
181.8	0.626	55.4	11.01%	169.1	0.626	0.05502	6.752	3.55	2.2176	3.02	6.58	0.81	4.36	2.58	1.78
182.8	0.683	55.3	12.01%	170.1	0.683	0.06003	6.829	3.53	2.2032	3.02	6.55	0.82	4.35	2.58	1.76
183.7	0.740	55.2	13.01%	171.0	0.740	0.06504	6.908	3.50	2.1888	3.02	6.52	0.84	4.33	2.59	1.75
184.1	0.797	55.0	14.02%	171.4	0.797	0.07005	6.988	3.46	2.1600	3.02	6.49	0.86	4.33	2.59	1.73
184.4	0.854	54.9	15.02%	171.7	0.854	0.07506	7.071	3.42	2.1456	3.02	6.45	0.88	4.30	2.59	1.71
185.6	0.911	54.8	16.02%	172.9	0.911	0.08007	7.155	3.40	2.1312	3.02	6.42	0.89	4.29	2.59	1.70
185.6	0.968	54.7	17.02%	172.9	0.968	0.08507	7.241	3.35	2.1168	3.02	6.38	0.91	4.26	2.58	1.68
186.6	1.024	54.6	18.01%	173.9	1.024	0.09000	7.328	3.33	2.1024	3.02	6.35	0.92	4.25	2.59	1.66
186.6	1.081	54.6	19.01%	173.9	1.081	0.09501	7.419	3.28	2.1024	3.02	6.30	0.92	4.20	2.56	1.64
187.3	1.138	54.5	20.01%	174.6	1.138	0.10002	7.512	3.25	2.0880	3.02	6.27	0.94	4.18	2.56	1.62

Report Date: Friday, June 03, 2005

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AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **9577**

Point: **B**

Material Description:	Shelby Tube - Boring FA-B18; 52.0' - 54.0' - Gray Clay

Moisture Determination ASTM D2216

	Before Testing	After Testing
Tare No.	M	M
Mass of Container and Wet Specimen (Mcws), grams	1317.63	1259.51
Mass of Container and Oven Dry Specimen (Mcs), grams	1033.40	1033.40
Mass of Container (Mc), grams	216.12	216.12
Mass of Water (Mw), grams:	284.23	226.11
Mass of Solid Particles (Ms), grams:	817.28	817.28
Moisture Content (w), %	34.78%	27.67%

Initial Condition of Specimen

	(1)	(2)	(3)	Average
Diameter Measurements, Inches:	2.768	2.785	2.784	2.779
Height Measurements, Inches:	5.822	5.828	5.834	5.828

Initial Volume of Specimen (Vo), In.3:	35.35
Dry Mass of Specimen After Testing, (Md), grams:	817.28
Dry Unit Weight, (γ d) pcf:	88.08
Specific Gravity of the Solids, (G):	2.64
Volume of Solids, (Vs), Cu. In.:	18.8916
Height of Solids,(Hs),In.:	3.1146
Void Ratio Before Consolidation (Eo):	0.8712
Intitail Degree of Saturation: (So)	105.39%

Saturation - ASTM D4767 Section 8.2

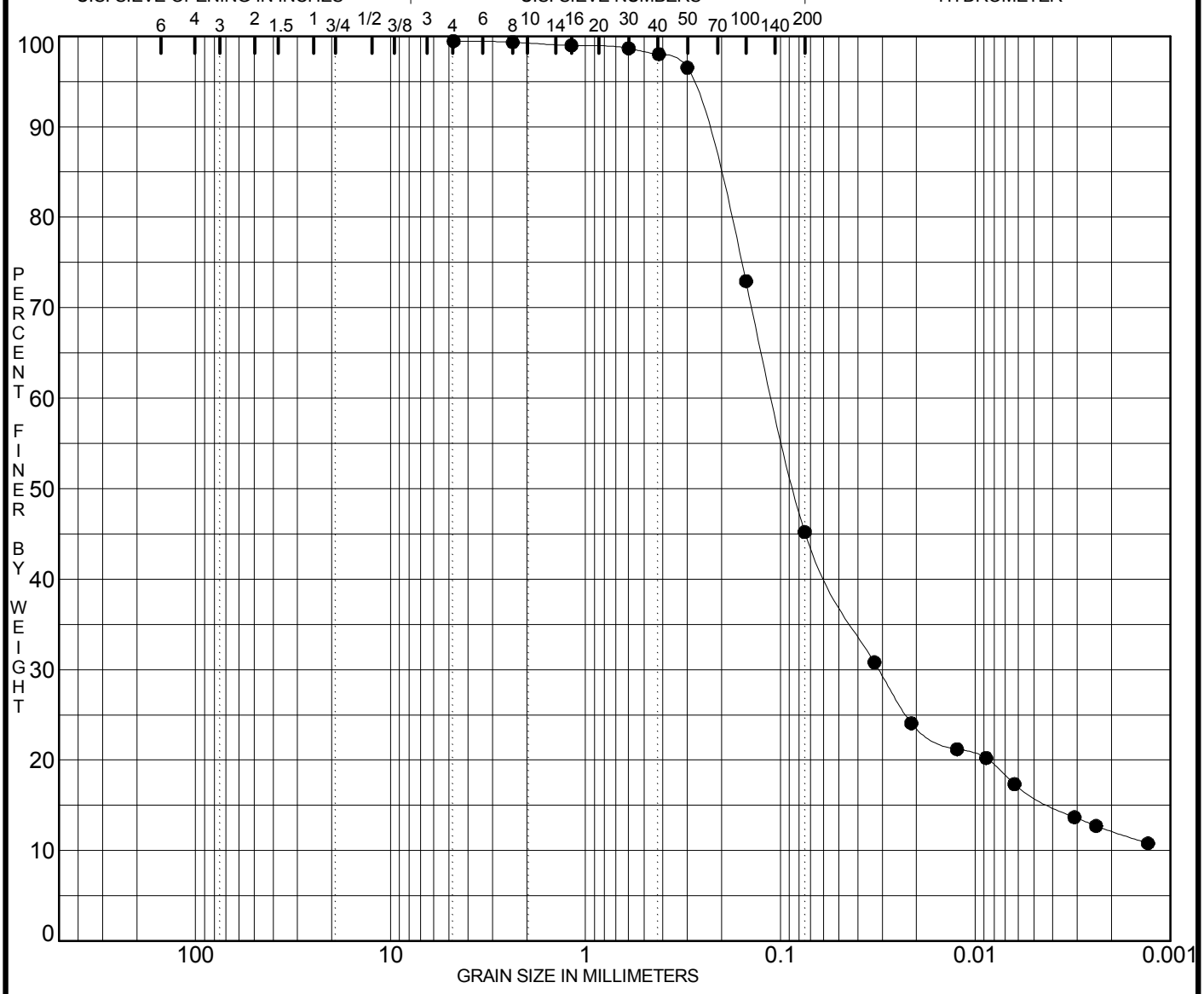
Dial Indicator Reading Prior to Saturation (Rb:) In.	0
Cell Pressure After Saturation, psi:	55.00
Back Presssure After Saturation, psi:	50.00
Pore Pressure B Parameter:	1
Dial Indicator Reading After Saturation, (Ra) In.:	0.054
Change in Height during Saturation, (Delta Hs) In.	0.054
Change In Volume of Specimen during Saturation (Delta Vsat), In.3:	0.983

Report Date: Friday, June 03, 2005

ARCADIS

Appendix E 5

Additional Geotechnical Data



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
● **B-14-01**	**14.0**		**16.5**				
		SS-6; Fly ash					
		N 439,079.0 E 1,848,763.7					
		ELEVATION 629.8					

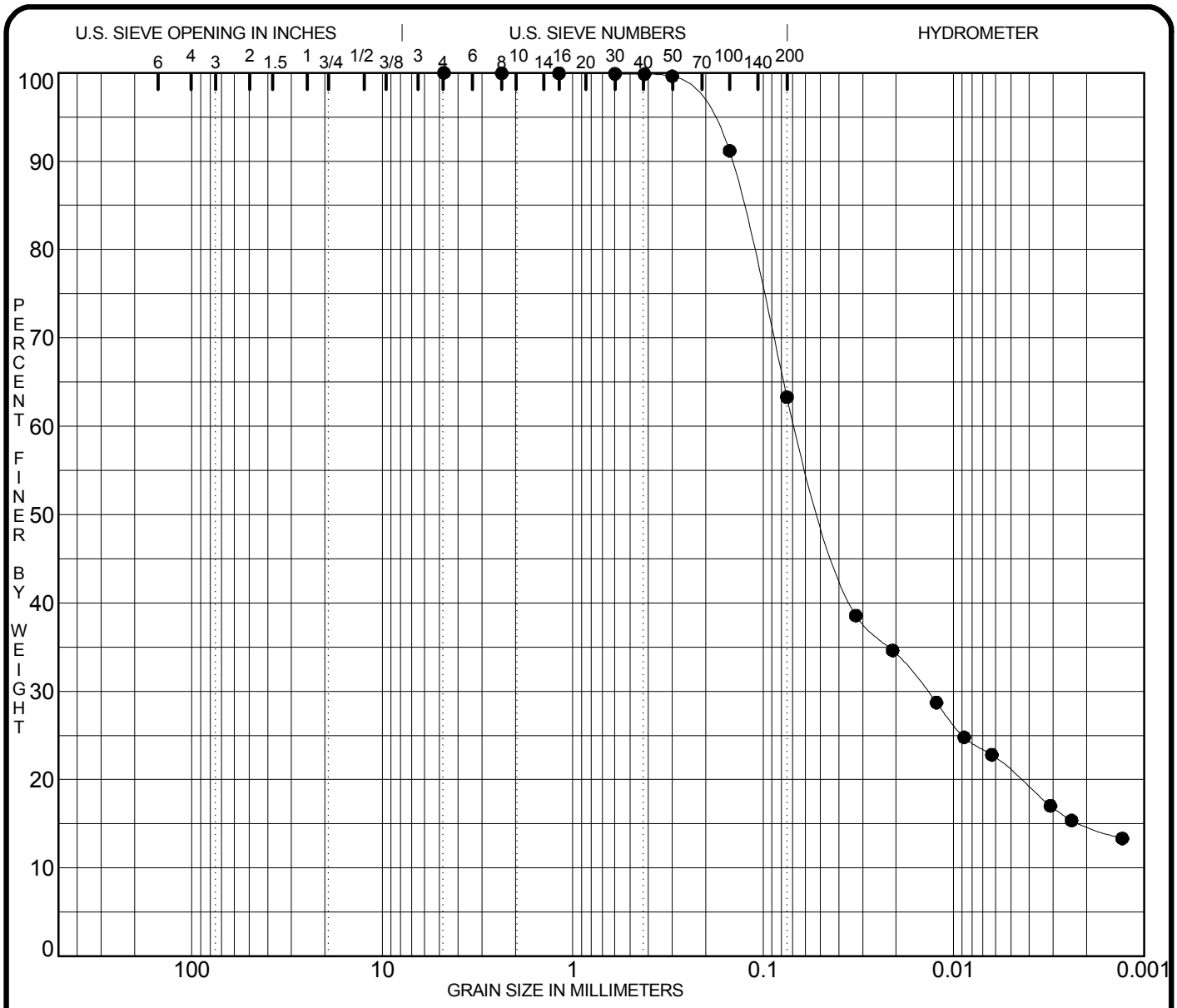
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	%<.002
● **B-14-01**	**14.0**	**4.750**	**0.109**	**0.031**		**0.0**	**54.3**	**45.2**	**12.1**

PROJECT **KANAWHA RIVER PLANT - FLY ASH** JOB NO.

DATE **4/20/15**

GRADATION CURVES

American Electric Power Service Corp.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
● **B-14-01**	**16.5**		**21.9**	**28.0**	**23.1**	**4.9**	
		SANDY SILT ML					
		SS-7; Dark brown sand					
		N 439,079.0 E 1,848,763.7					
		ELEVATION 629.8					

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	%<.002
● **B-14-01**	**16.5**	**4.750**	**0.067**	**0.014**		**0.0**	**36.7**	**63.3**	**14.8**

PROJECT **KANAWHA RIVER PLANT - FLY ASH**

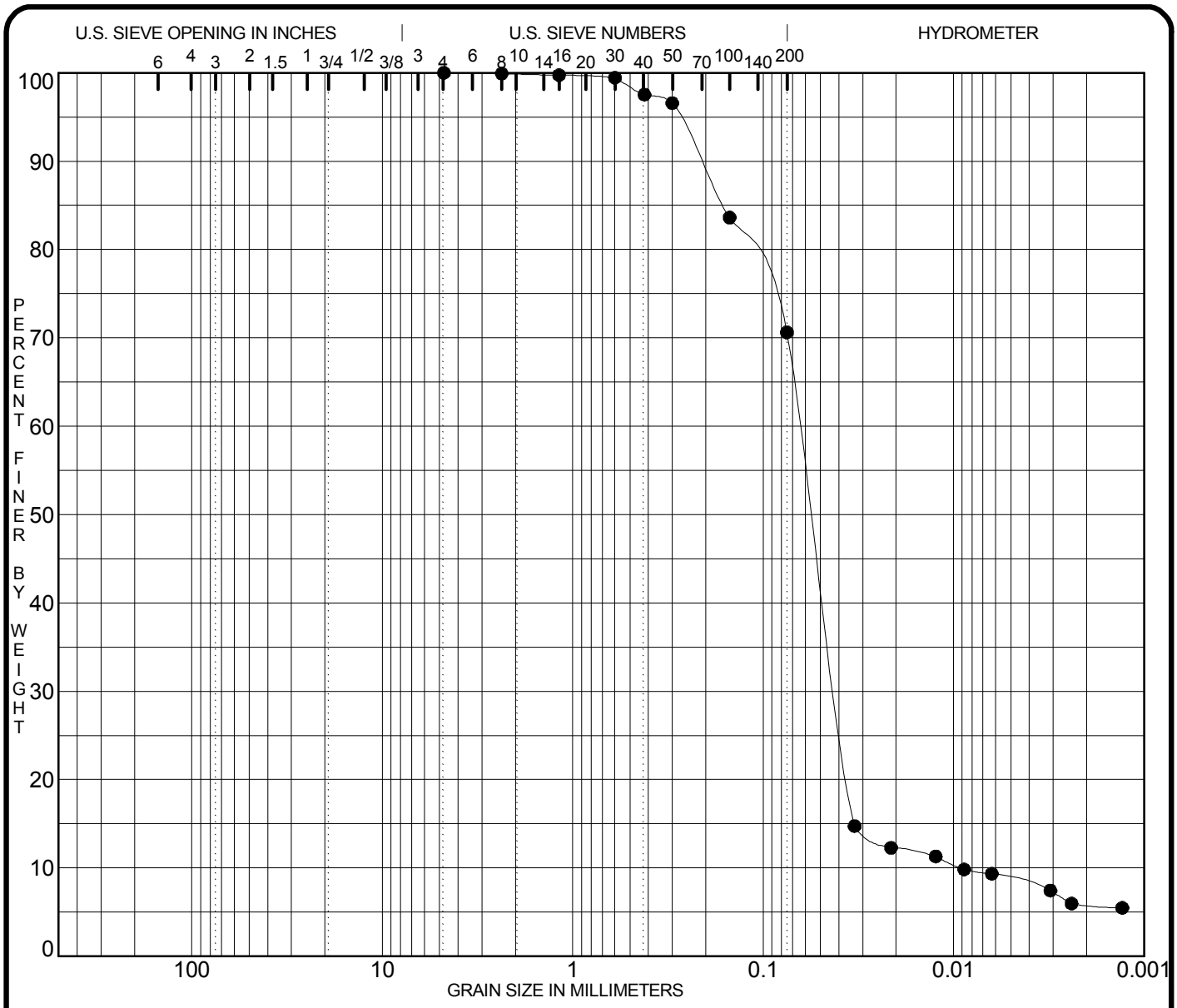
JOB NO.

DATE **4/20/15**

GRADATION CURVES

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AEP



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
● **B-14-01**	**34.0**		**30.0**	**NP**	**NP**	**NP**	
		SILT with SAND ML					
		SS-14; Brown Sand					
		N 439,079.0 E 1,848,763.7					
		ELEVATION 629.8					

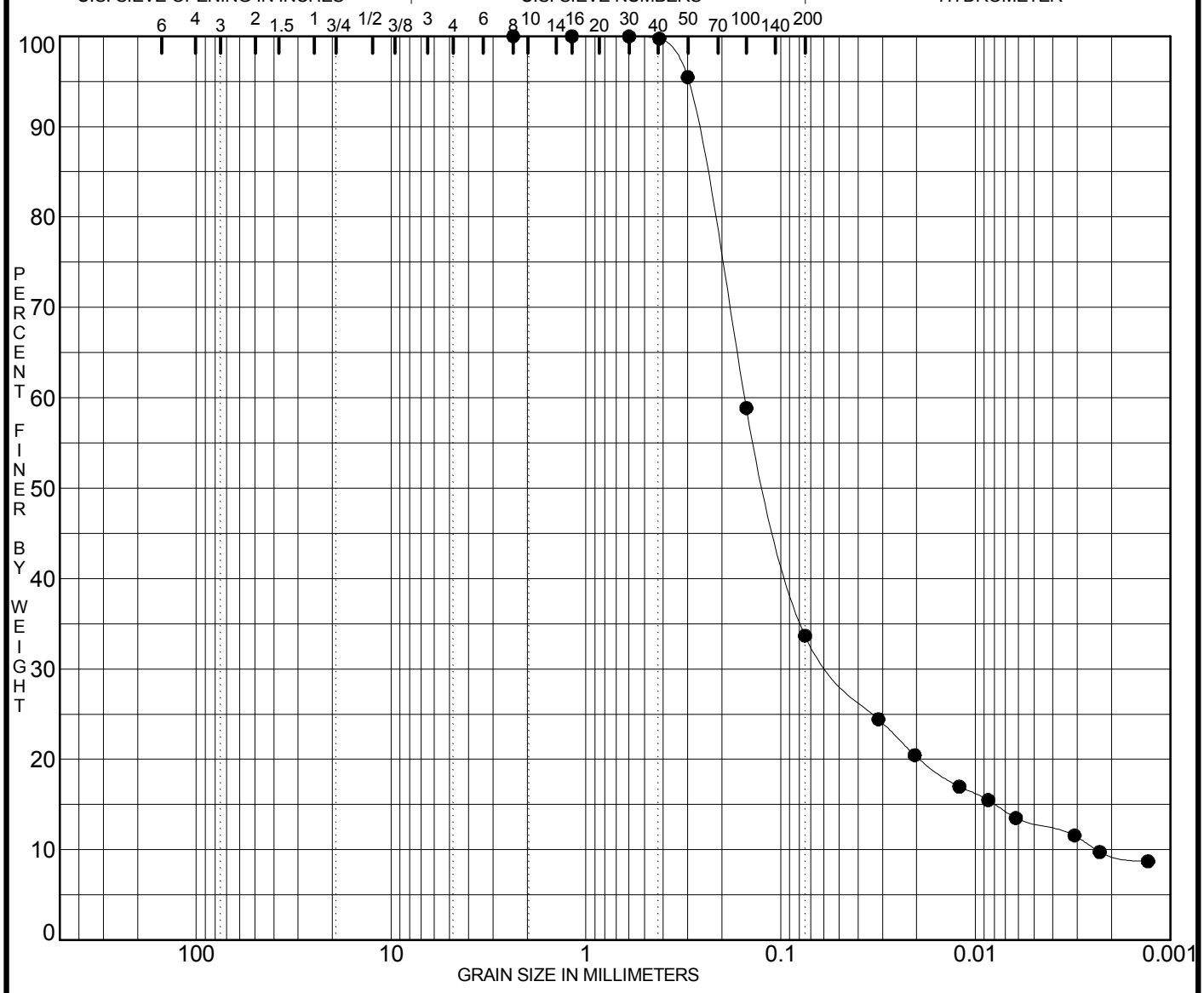
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	%<.002
● **B-14-01**	**34.0**	**4.750**	**0.064**	**0.041**	**0.009**	**0.0**	**29.4**	**70.6**	**5.8**

PROJECT **KANAWHA RIVER PLANT - FLY ASH** JOB NO.

DATE **4/20/15**

GRADATION CURVES

American Electric Power Service Corp.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
● **B-14-01**	**49.0**		**26.6**	**NP**	**NP**	**NP**	
		SILTY SAND SM					
		SS-20; Brown silty sand					
		N 439,079.0 E 1,848,763.7					
		ELEVATION 629.8					

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	%<.002
● **B-14-01**	**49.0**	**2.360**	**0.153**	**0.053**	**0.002**	**0.0**	**66.3**	**33.7**	**9.5**

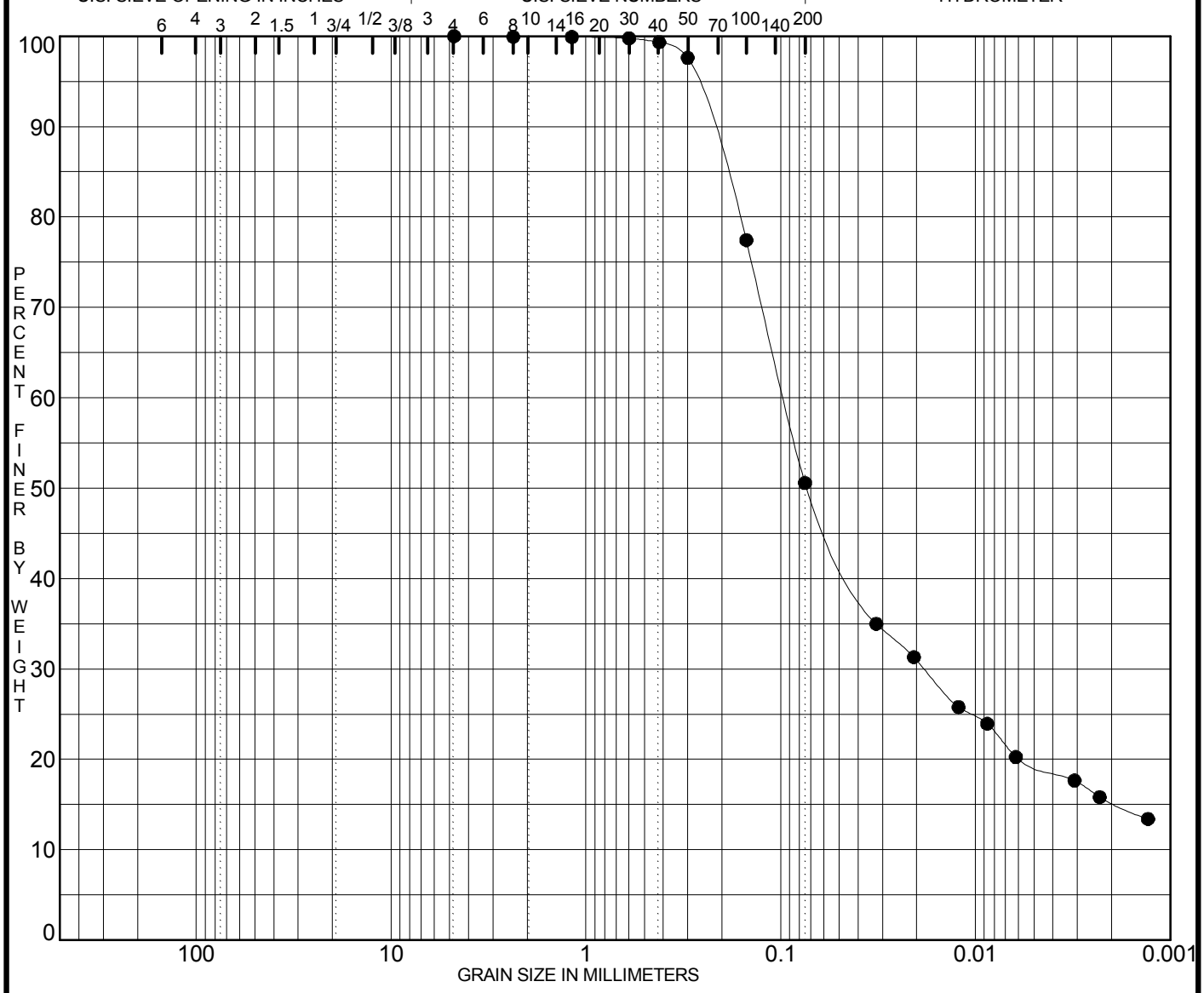
PROJECT **KANAWHA RIVER PLANT - FLY ASH** JOB NO.

DATE **4/20/15**

GRADATION CURVES

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
● **B-14-02**	**9.0**		**13.8**				
		SS-4; Fly ash					
		N 438,951.7 E 1,848,733.1					
		ELEVATION 629.9					

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	%<.002
● **B-14-02**	**9.0**	**4.750**	**0.096**	**0.018**		**0.0**	**49.4**	**50.6**	**15.2**

PROJECT **KANAWHA RIVER PLANT - FLY ASH**

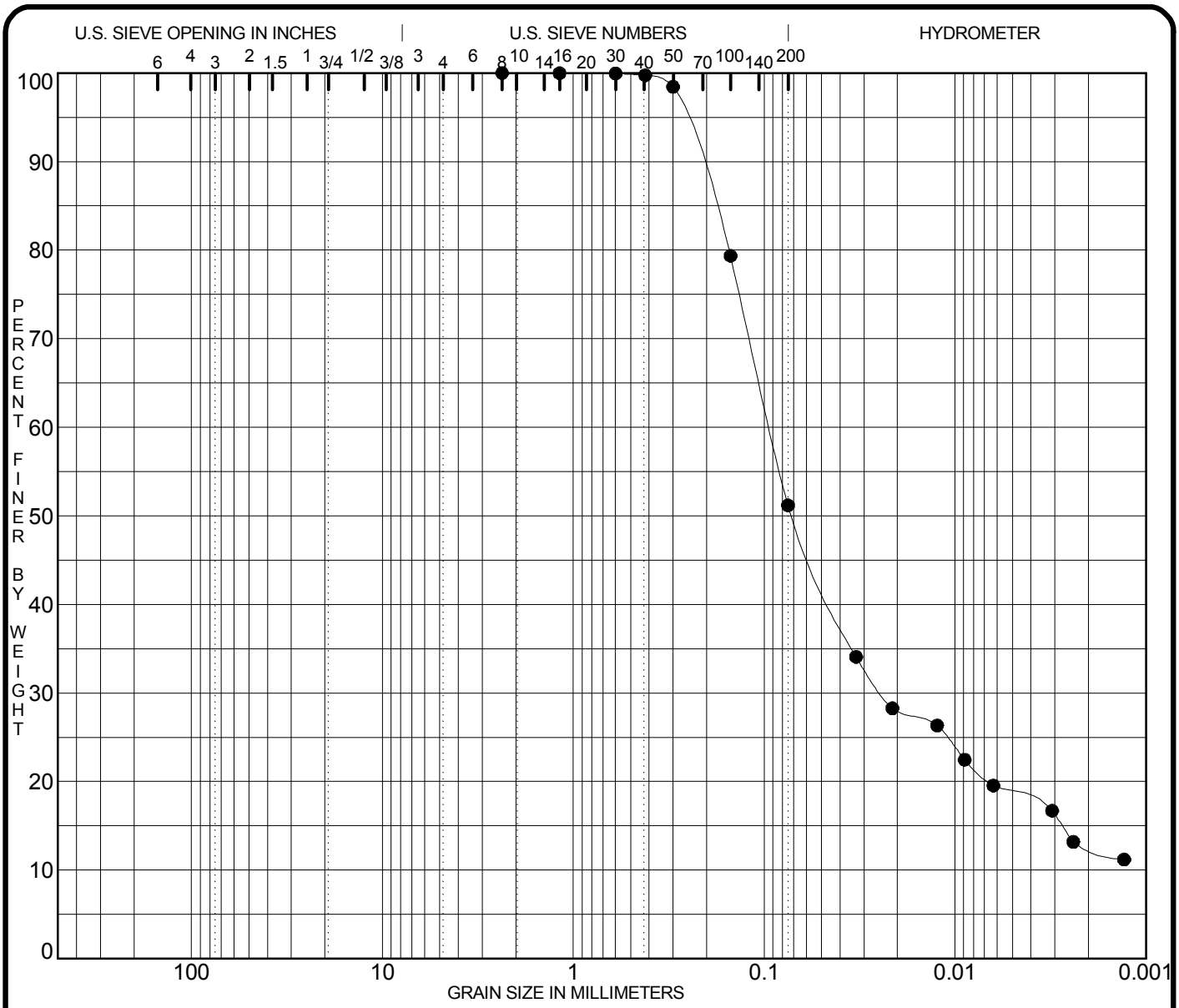
JOB NO.

DATE **4/20/15**

GRADATION CURVES

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
●	**B-14-02**	**11.5**		**15.7**	**21.5**	**19.7**	**1.8**	
			SANDY SILT ML					
			SS-5; Silty sand w/ organic odor					
			N 438,951.7 E 1,848,733.1					
			ELEVATION 629.9					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	%<.002
●	**B-14-02**	**11.5**	**2.360**	**0.093**	**0.024**		**0.0**	**48.8**	**51.2**	**12.6**

PROJECT **KANAWHA RIVER PLANT - FLY ASH**

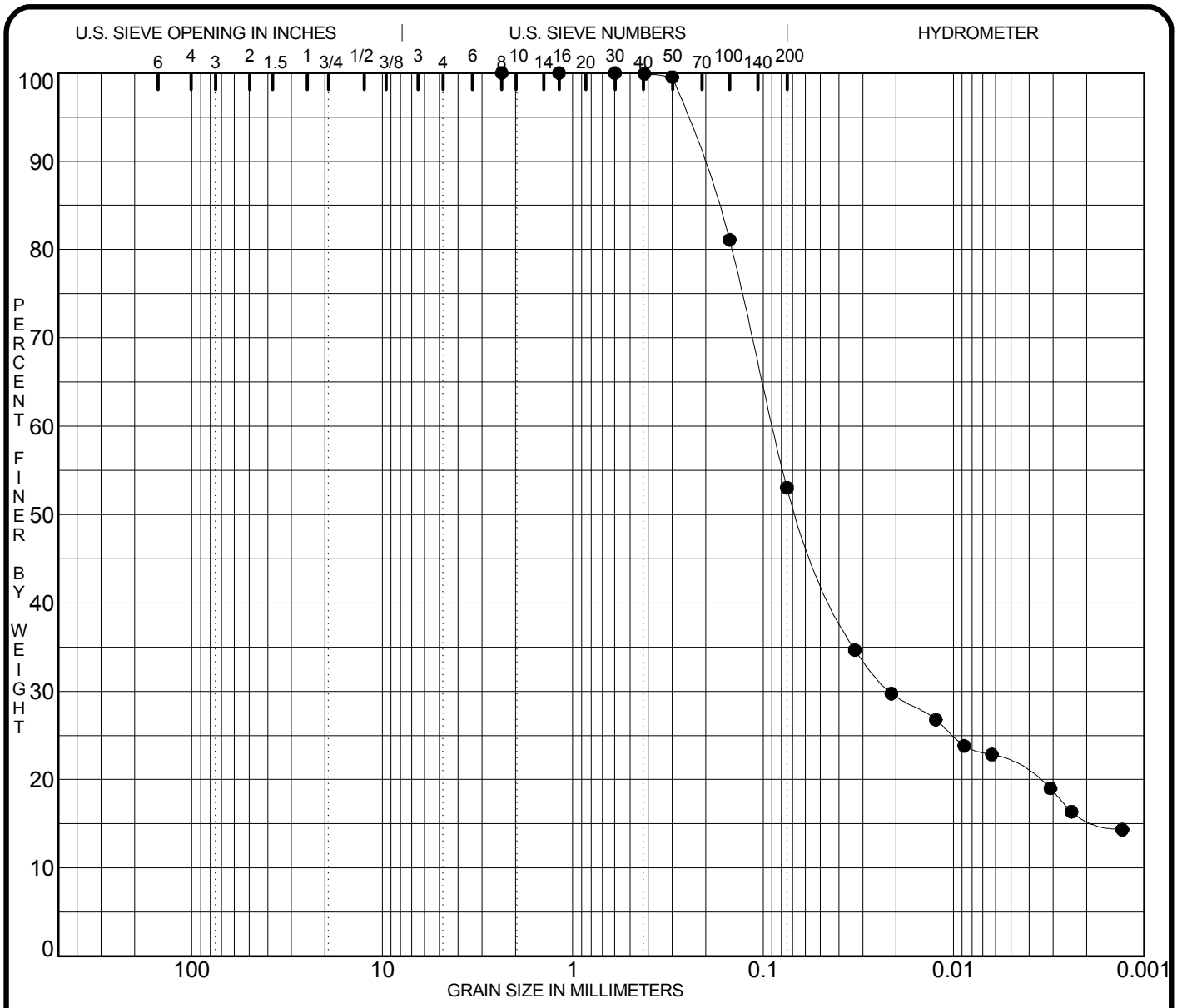
JOB NO.

DATE **4/20/15**

GRADATION CURVES

American Electric Power Service Corp.

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
●	**B-14-02**	**14.0**		**15.2**	**21.6**	**19.8**	**1.8**	
			SANDY SILT ML					
			SS-6; Brown fine sand w/ clay and silt					
			N 438,951.7 E 1,848,733.1					
			ELEVATION 629.9					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	%<.002
●	**B-14-02**	**14.0**	**2.360**	**0.089**	**0.022**		**0.0**	**47.0**	**53.0**	**15.8**

PROJECT **KANAWHA RIVER PLANT - FLY ASH**

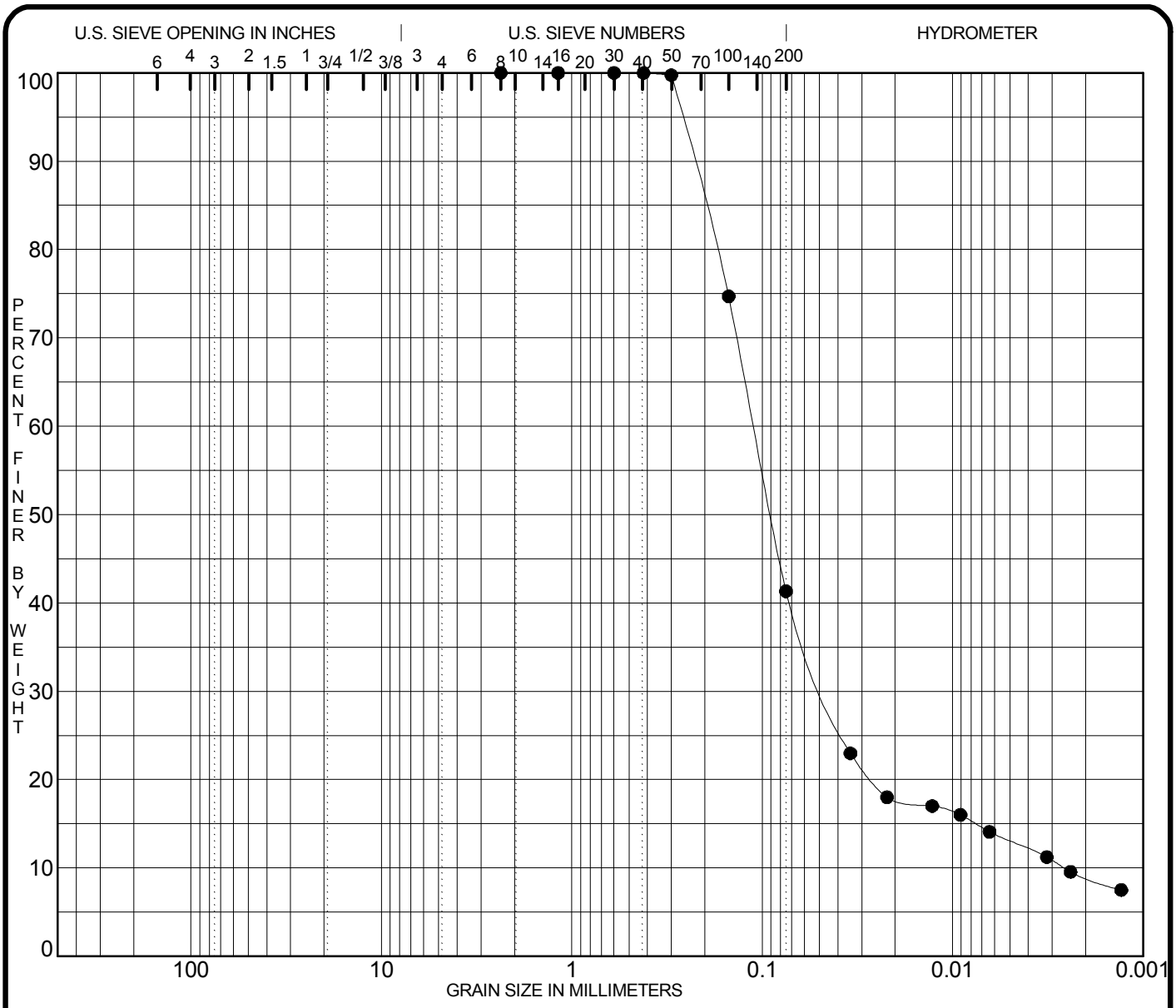
JOB NO.

DATE **4/20/15**

GRADATION CURVES

American Electric Power Service Corp.

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
● **B-14-02**	**34.0**		**17.0**	**NP**	**NP**	**NP**	
		SILTY SAND SM					
		SS-14; Brown sand and silt					
		N 438,951.7 E 1,848,733.1					
		ELEVATION 629.9					

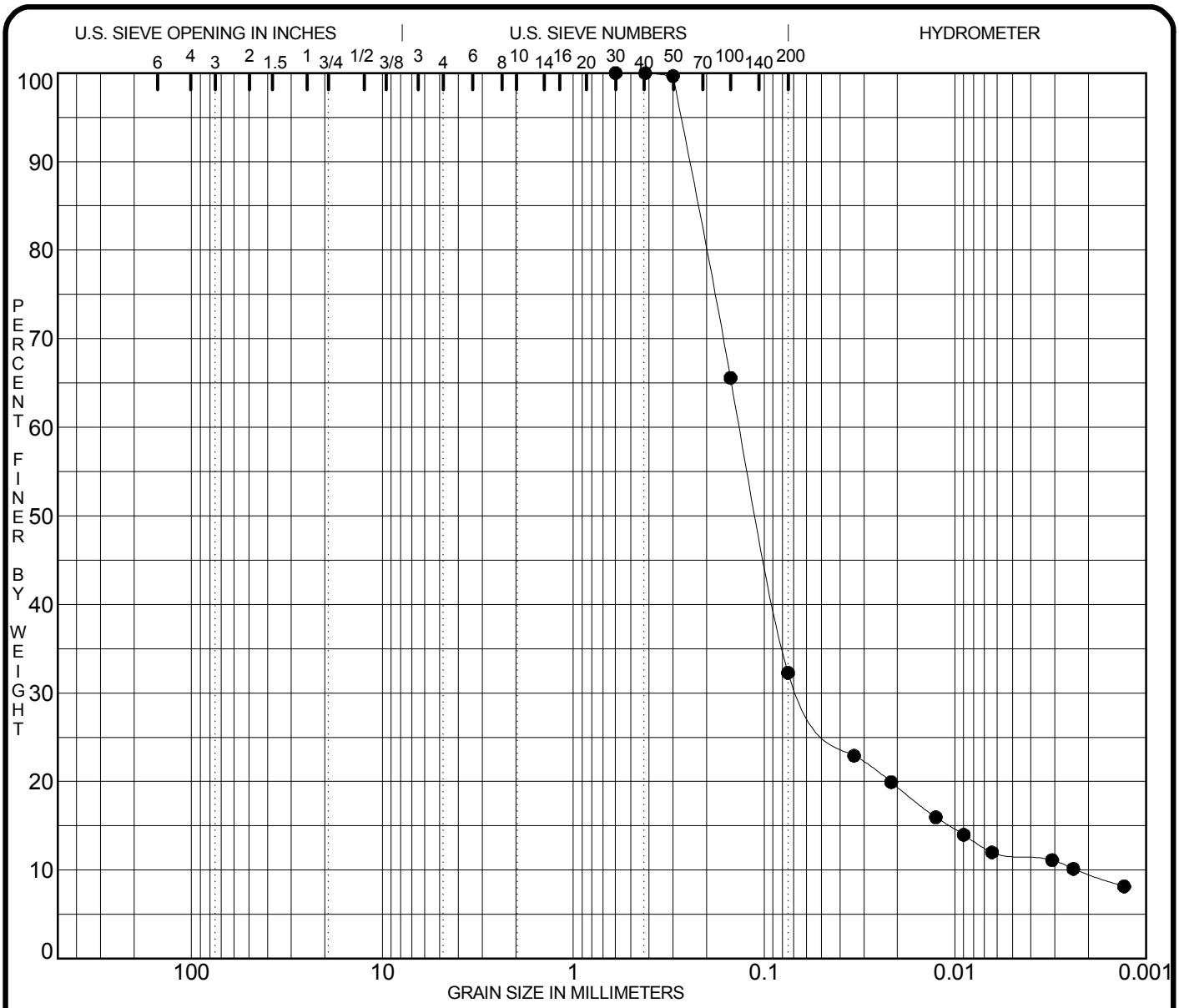
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	%<.002
● **B-14-02**	**34.0**	**2.360**	**0.111**	**0.046**	**0.003**	**0.0**	**58.7**	**41.3**	**8.9**

PROJECT **KANAWHA RIVER PLANT - FLY ASH** JOB NO.

DATE **4/20/15**

GRADATION CURVES

American Electric Power Service Corp.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
● **B-14-02**	**36.5**		**26.8**	**NP**	**NP**	**NP**	
		SILTY SAND SM					
		SS-15; Brown sand w/ trace clay					
		N 438,951.7 E 1,848,733.1					
		ELEVATION 629.9					

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	%<.002
● **B-14-02**	**36.5**	**0.600**	**0.134**	**0.062**	**0.002**	**0.0**	**67.7**	**32.3**	**9.6**

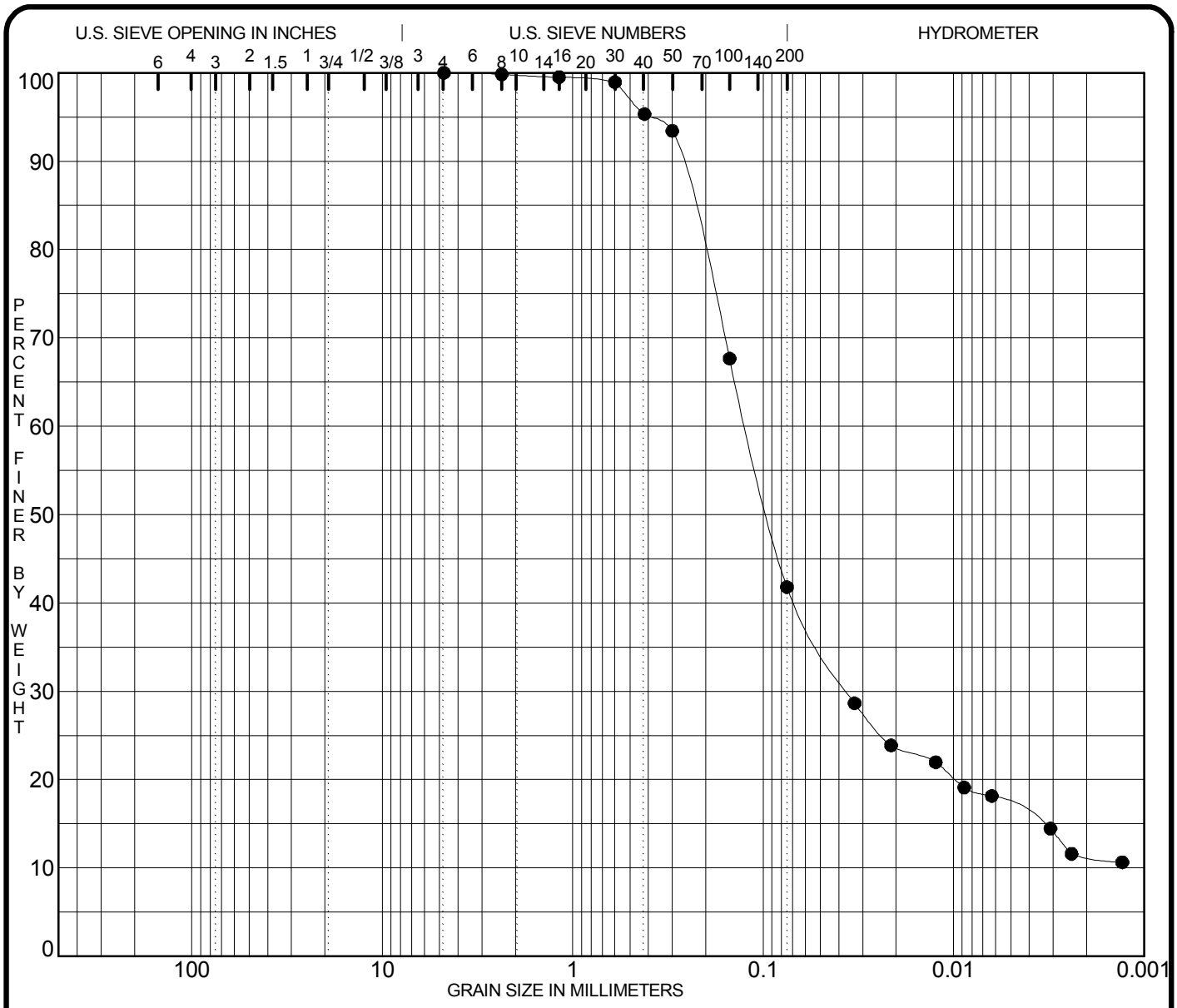
PROJECT **KANAWHA RIVER PLANT - FLY ASH** JOB NO.

DATE **4/20/15**

GRADATION CURVES

American Electric Power Service Corp.

AEP



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
● **B-14-03**	**9.0**		**8.8**				
		SS-4; Fly ash and Sand					
		N 438,826.1 E 1,848,712.3					
		ELEVATION 631.8					

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	%<.002
● **B-14-03**	**9.0**	**4.750**	**0.122**	**0.036**		**0.0**	**58.2**	**41.8**	**11.3**

PROJECT **KANAWHA RIVER PLANT - FLY ASH**

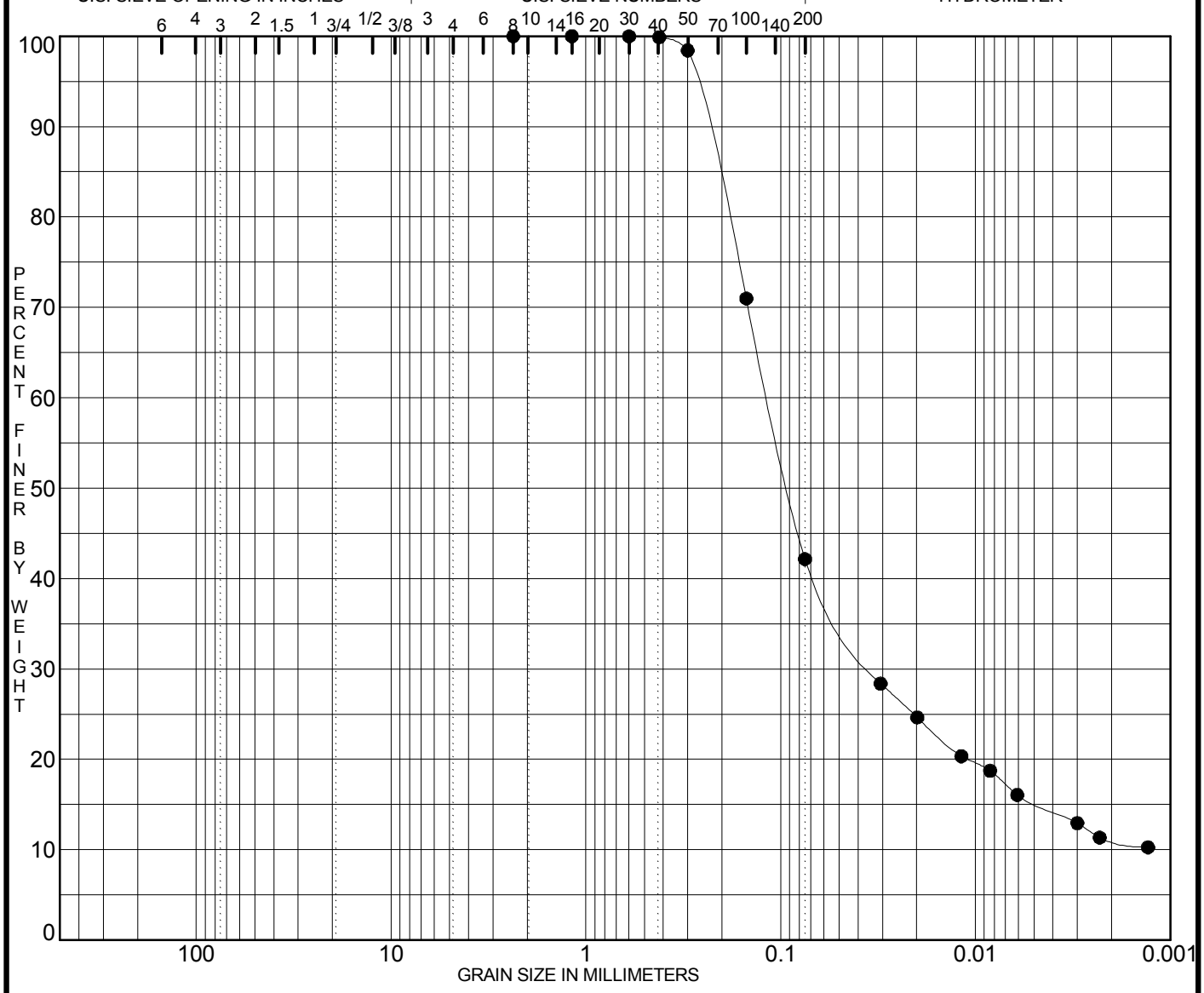
JOB NO.

DATE **4/20/15**

GRADATION CURVES

American Electric Power Service Corp.

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
● **B-14-03**	**10.0**		**26.0**	**NP**	**NP**	**NP**	
		SILTY SAND SM					
		SS-10; Brown Silty sand					
		N 438,826.1 E 1,848,712.3					
		ELEVATION 631.8					

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	%<.002
● **B-14-03**	**10.0**	**2.360**	**0.115**	**0.034**		**0.0**	**57.8**	**42.2**	**11.1**

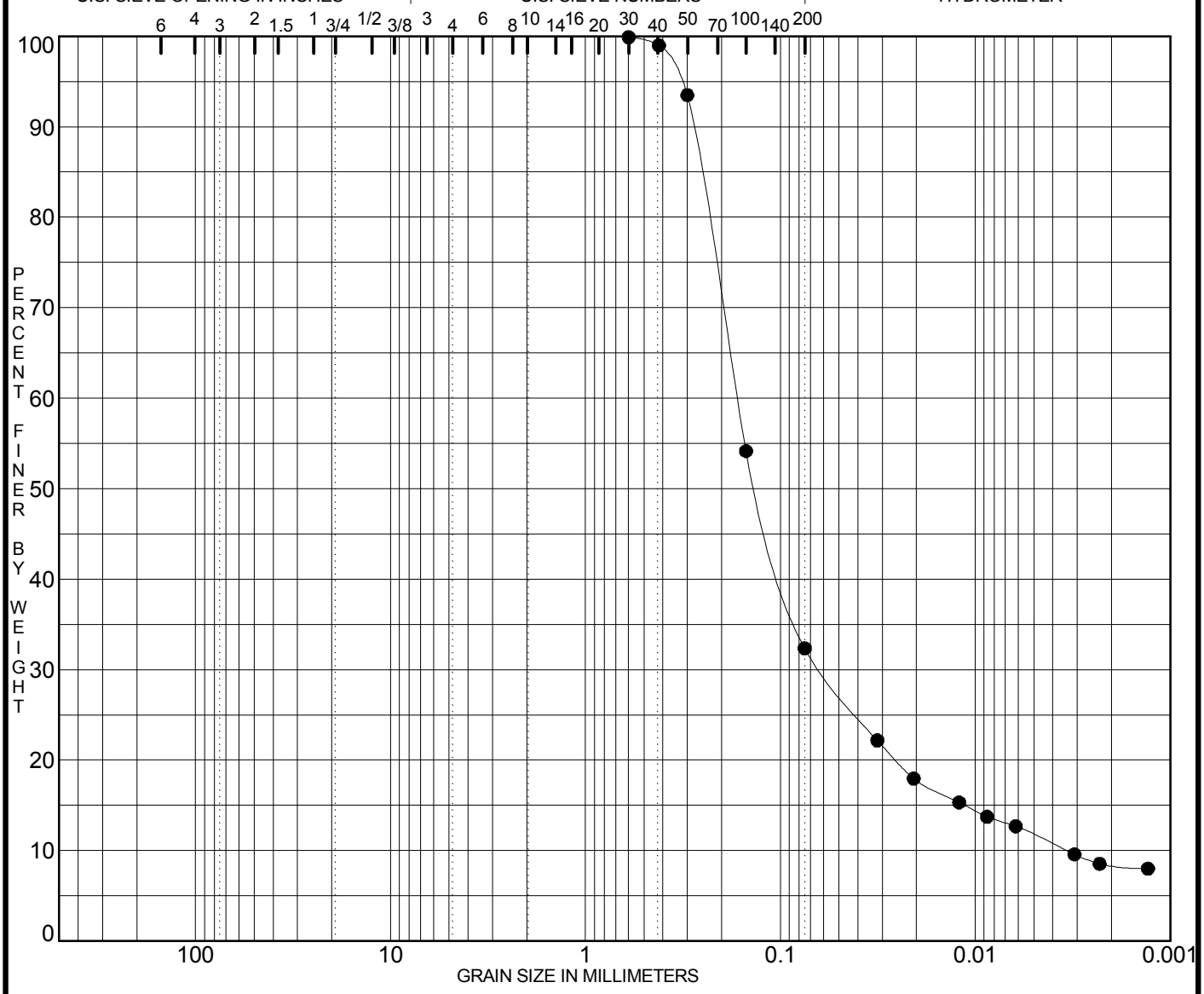
PROJECT **KANAWHA RIVER PLANT - FLY ASH** JOB NO.

DATE **4/20/15**

GRADATION CURVES

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
● **B-14-03**	**16.5**		**10.9**	**NP**	**NP**	**NP**	
		SILTY SAND SM					
		SS-7; Light brown sand					
		N 438,826.1 E 1,848,712.3					
		ELEVATION 631.8					

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	%<.002
● **B-14-03**	**16.5**	**0.600**	**0.166**	**0.061**	**0.003**	**0.0**	**67.5**	**32.4**	**8.4**

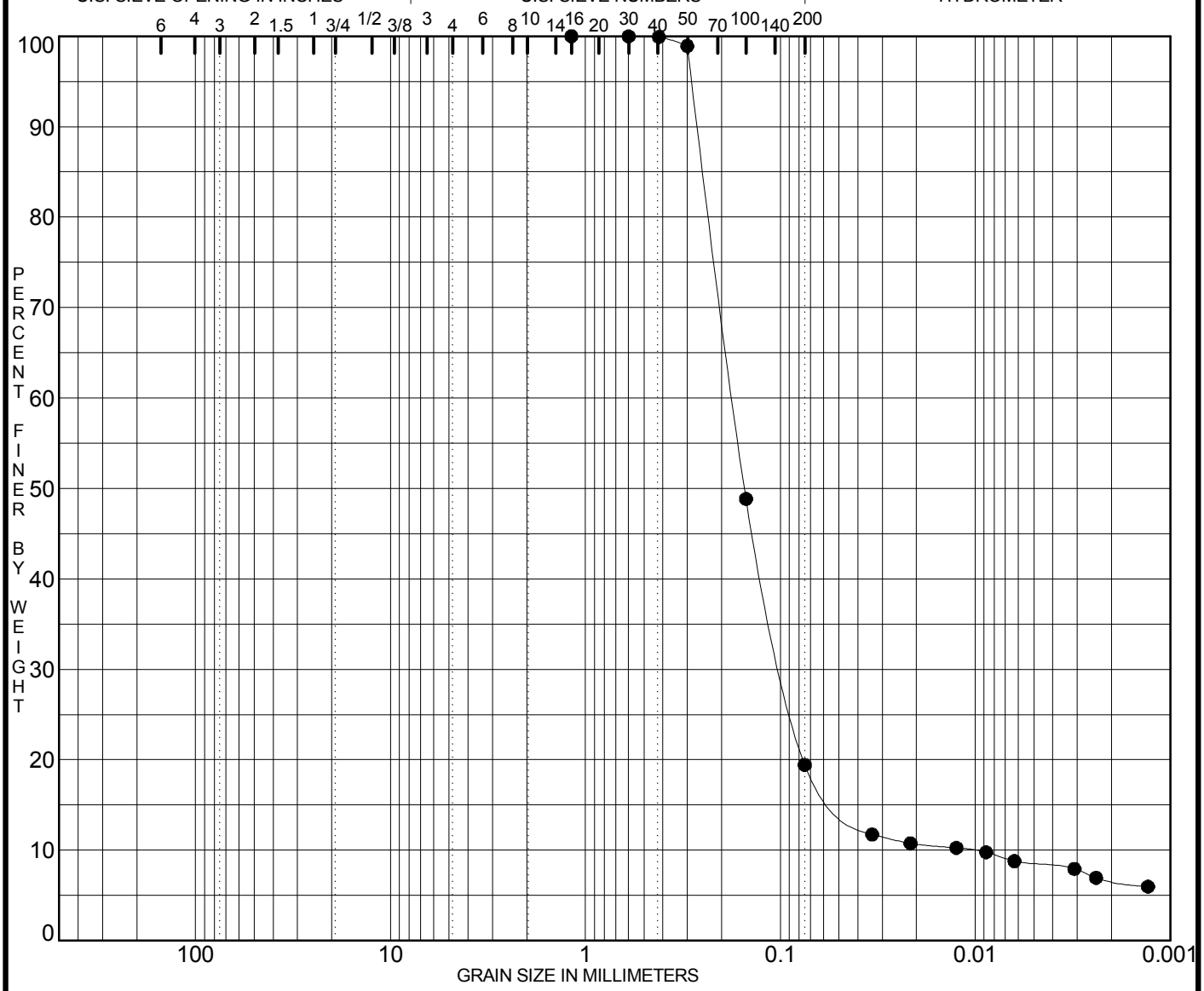
PROJECT **KANAWHA RIVER PLANT - FLY ASH** JOB NO.

DATE **4/20/15**

GRADATION CURVES

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	MC%	LL	PL	PI	Sp.Gr.
● **B-14-03**	**34.0**		**30.0**	**NP**	**NP**	**NP**	
		SILTY SAND SM					
		SS-14; Brown Sand					
		N 438,826.1 E 1,848,712.3					
		ELEVATION 631.8					

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Fines	%<.002
● **B-14-03**	**34.0**	**1.180**	**0.175**	**0.096**	**0.010**	**0.0**	**80.6**	**19.4**	**6.7**

PROJECT **KANAWHA RIVER PLANT - FLY ASH**

JOB NO.

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GRADATION CURVES

American Electric Power Service Corp.

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
4001 BIXBY ROAD
GROVEPORT, OHIO 43125
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AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

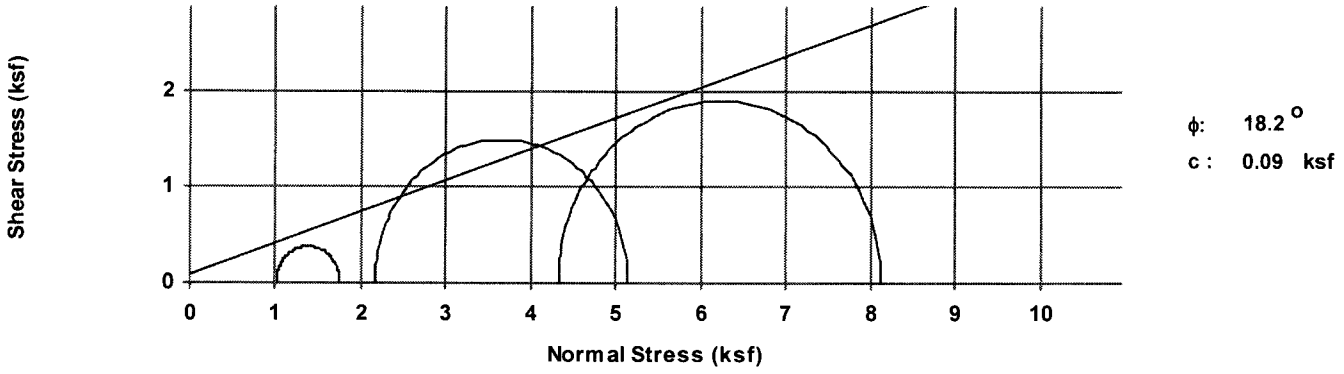
Sample No: **12772**

Material Description: Shelby Tube - Boring B-1402 - Sample 13; 31.5'-33.5' - Dark Brown Sandy Clay and silt

Point Designation	Initial Conditions			Final Conditions			
	Water Content, %	Dry Density, pcf	Degree of Saturation	Water Content, %	Confining Stress, (ksf)	Deviator Stress	Induced Pore Pressure (ksf)
A	14.9%	91.0	48.1%	23.81%	1.008	0.74	1.68
B	20.8%	98.4	81.0%	22.6%	2.16	2.98	2.36
C	17.1%	92.7	57.7%	23.7%	4.32	3.80	3.74

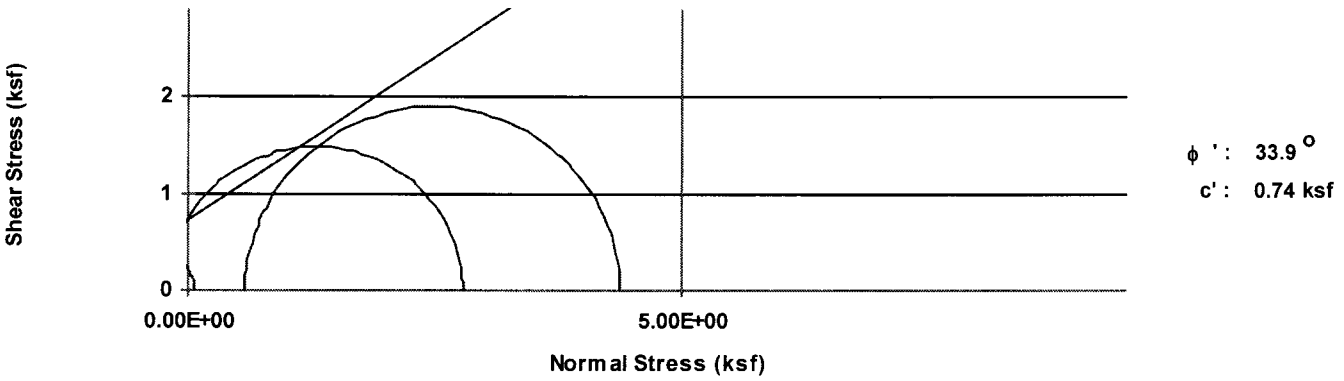
Point Designation	Axial Strain, %	q, (ksf)	Effective Stresses, (ksf)			Total Stresses, (ksf)		
			Major, (ksf)	Minor, (ksf)	p', (ksf)	Major, (ksf)	Minor, (ksf)	p, (ksf)
A	5.9%	0.37	0.07	-0.68	-0.31	1.75	1.01	1.38
B	5.9%	1.49	2.78	-0.20	1.29	5.14	2.16	3.65
C	7.0%	1.90	4.38	0.58	2.48	8.12	4.32	6.22

Total Stress Envelope



ϕ: 18.2 °
c : 0.09 ksf

Effective Stress Envelope



ϕ ' : 33.9 °
c' : 0.74 ksf

Report Date: Tuesday, April 21, 2015

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CIVIL AND MINING ENGINEERING DIVISION
CIVIL LABORATORY SECTION
AMERICAN ELECTRIC POWER SERVICE CORPORATION
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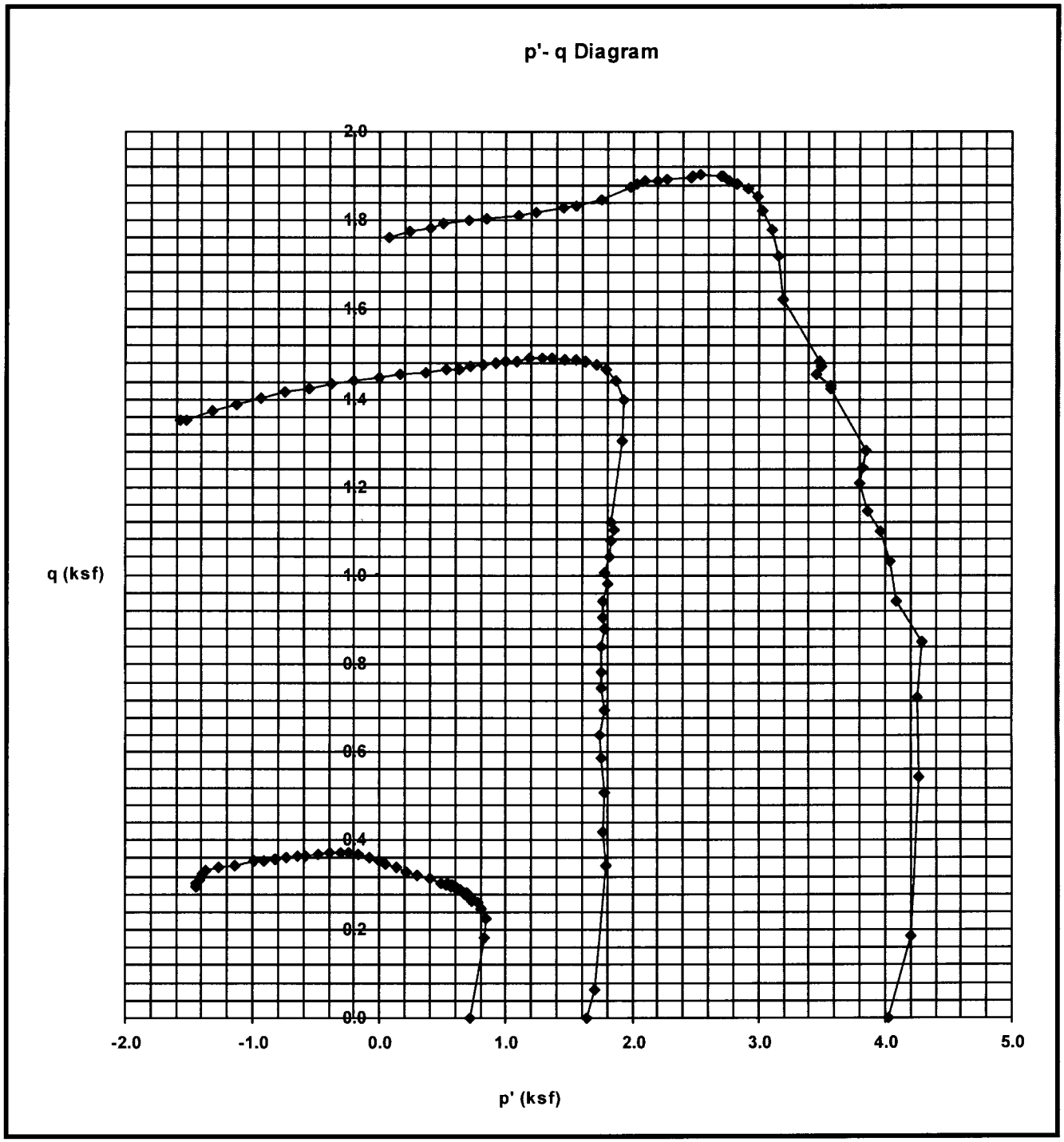
AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **12772**



Report Date: Tuesday, April 21, 2015

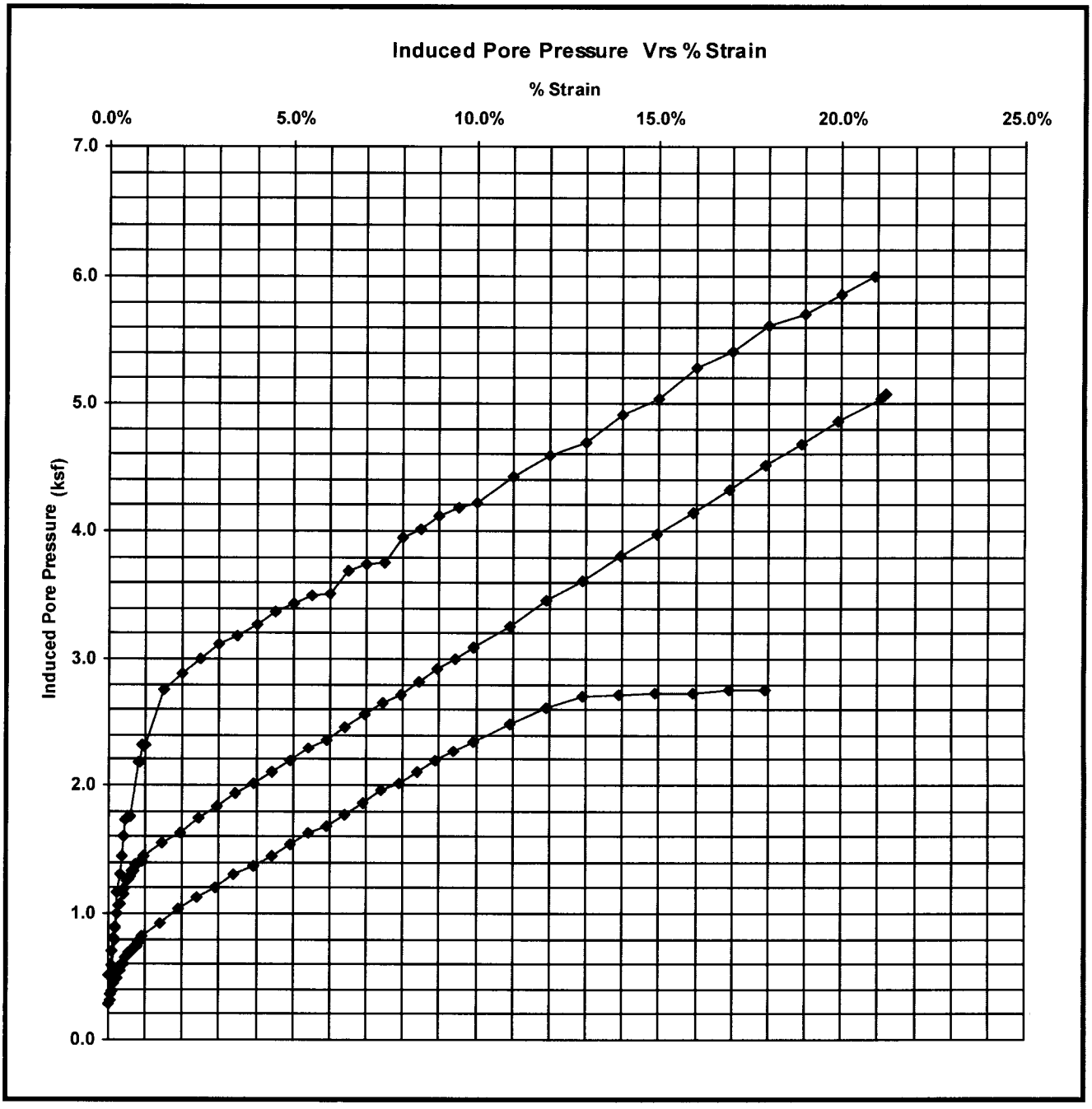
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Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **12772**



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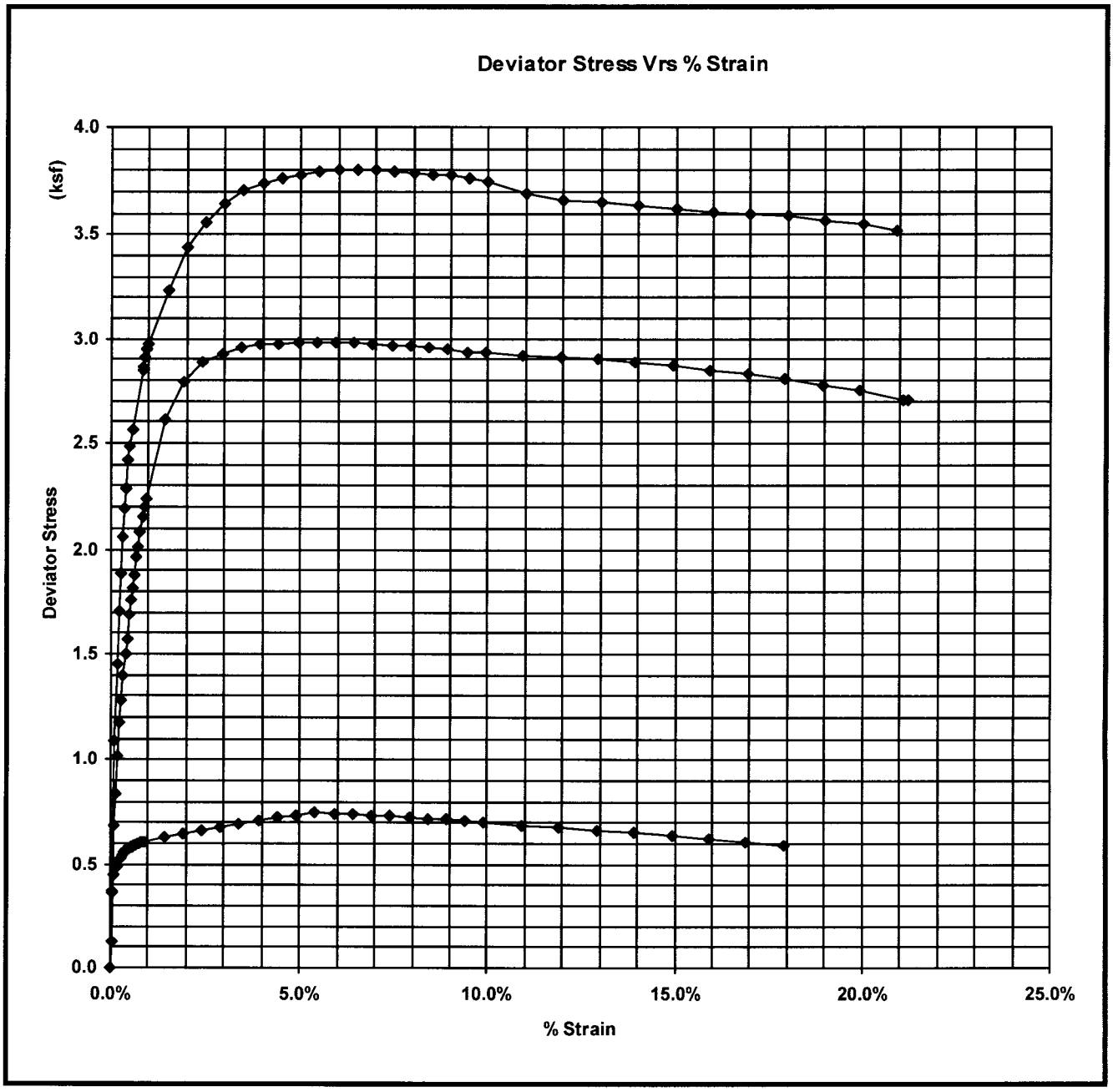
AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **12772**



Report Date: Tuesday, April 21, 2015

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AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**
Project: **Kanawha River Landfill**
Sample No: **12772**
Point: **A**

Material Description: Shelby Tube - Boring B-1402 - Sample 13; 31.5'-33.5' - Dark Brown Sandy Clay and silt

Moisture Determination ASTM D2216

	Before Testing	After Testing
Tare No.	T-2	T-2
Mass of Container and Wet Specimen (Mcws), grams	1057.63	1132.00
Mass of Container and Over Dry Specimen (Mcs), grams	933.91	933.91
Mass of Container (Mc), grams	102.02	102.02
Mass of Water (Mw), grams:	123.72	198.09
Mass of Solid Particles (Ms), grams:	831.89	831.89
Moisture Content (w), %	14.87%	23.81%

Initial Condition of Speciman ASTM D2435

	(1)	(2)	(3)	Average
Diameter Measurents, Inches:	2.87	2.87	2.87	2.870
Height Measurements, Inches:	5.38	5.385	5.39	5.385

Initial Volume of Specimen (Vo), In.3:	34.84
Dry Mass of Specimen After Testing, (Md), grams:	831.89
Dry Unit Weight, (γ d) pcf:	90.97
Specific Gravity of the Solids, (G):	2.65
Volume of Solids, (Vs), Cu. In.:	19.1567
Height of Solids,(Hs),In.:	2.9612
Void Ratio Before Consolidation (Eo):	0.8185
Intitail Degree of Saturation: (So)	48.15%

Saturation - ASTM D4767 Section 8.2

Dial Indicator Reading Prior to Saturation (Rb:) In.	0
Cell Pressure AfterSaturation, psi:	49.50
Back Presssure After Saturation After, psi:	45.00
Pore Pressure Paramenter B:	1
Dial Indicator Reading After Saturation, (Ra) In.:	0.002
Change in Height during Satureation, (Delta Hs) In.	0.002
Change In Volume of Specimen during Saturation (Delta Vsat), In.3:	0.039

Report Date: Tuesday, April 21, 2015

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AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**
Project: **Kanawha River Landfill**
Sample No: **12772**
Point: **A**

Consolidation- ASTM D2435, Section 11.5:

Sample No	T	Burette 2	Burette3	Rc
12772	0	24.1	24	0.002
12772	0.25	23.9	23.6	
12772	0.5	23.9	23.6	
12772	1	23.8	23.6	
12772	2	23.8	23.6	
12772	4	23.7	23.6	
12772	8	23.7	23.6	
12772	15	23.7	23.7	0.005
12772	30	23.7	23.7	0.005
12772	60	23.6	23.6	0.006
12772	120	23.6	23.6	0.006
12772	1080	23.6	23.6	0.007

Specimen Height After Consolidation, (Hc), In.: 5.38

Volume Change During Consolidation (Delta Vc), In.3: 0.05

Cross-Sectional Area of Specimen After Consolidation (Ac), In.2: 6.46

Triaxial Compression Testing ASTM D 4767

Sample Depth: 31.5 ft.
Cell Pressure: 52 psi
Back Pressure: 45 psi
Confining Pressure: 7 psi
Strain Rate: 0.006 in./min.

Specimen Height After Consolidation, (Hc), In.: 5.38
Correction for Vert Displacement, In.: 0.005
Load due to Friction and Uplift: 8.6 lbs.
Correction for Filter Paper: 0
Thickness of Membrane (tm), In.: 0.012

	$\sigma 1-\sigma 3=$	Deviator Stress at Failure, ksf:	0.74
	$\sigma 3$ f=	Effective Consolidation Stress at Failure, ksf:	1.01
	$\sigma 1=$	Total Major Principal Stress at Failure:	1.75
σ '3f=	$\sigma 3-\Delta \upsilon=$	Effective Minor Principal Stress at Failure,ksf:	-0.68
	σ '1f=	Effective Major Principal Stress at Failure, ksf:	0.07
		Axial Strain at Failure:	5.91%

Failure Sketch

Report Date: Tuesday, April 21, 2015

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AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **12772**

Point: **A**

Pa: Applied Force	Vertical Displacement Reading In. :	Pore Pressure psi:	Axial Strain (E1):	(P) - Force Adj for U and F lbs:	Corrected Vertical Displac In. :	Correction for Membrane ksf:	(A) Area In.2:	(σ1−σ3) Deviator Stress ksf:	[Δu] Induced Pore Water Pressure ksf:	σ3 Effective Consolidation Stress ksf	σ1 Total Major Principal Stress ksf	σ3 Effective Minor Principal Stress ksf	σ1 ' Effective Major Principal Stress ksf	p'	q
8.6	0.005	47.0	0.01%	0.0	0.000	0.00004	6.461	0.00	0.2880	1.01	1.01	0.72	0.72	0.72	0.00
24.9	0.008	47.5	0.06%	16.3	0.003	0.00030	6.464	0.36	0.3600	1.01	1.37	0.65	1.01	0.83	0.18
28.9	0.011	47.7	0.10%	20.3	0.006	0.00050	6.467	0.45	0.3888	1.01	1.46	0.62	1.07	0.84	0.23
30.7	0.013	48.1	0.16%	22.1	0.008	0.00075	6.470	0.49	0.4464	1.01	1.50	0.56	1.05	0.81	0.25
32.0	0.017	48.4	0.22%	23.4	0.012	0.00106	6.474	0.52	0.4896	1.01	1.53	0.52	1.04	0.78	0.26
32.6	0.019	48.8	0.26%	24.0	0.014	0.00124	6.477	0.53	0.5472	1.01	1.54	0.46	0.99	0.73	0.27
33.2	0.021	48.8	0.30%	24.6	0.016	0.00147	6.480	0.55	0.5472	1.01	1.55	0.46	1.01	0.73	0.27
33.9	0.025	49.2	0.37%	25.3	0.020	0.00177	6.484	0.56	0.6048	1.01	1.57	0.40	0.96	0.68	0.28
34.2	0.027	49.2	0.41%	25.6	0.022	0.00195	6.487	0.57	0.6048	1.01	1.57	0.40	0.97	0.69	0.28
34.6	0.030	49.5	0.47%	26.0	0.025	0.00226	6.491	0.57	0.6480	1.01	1.58	0.36	0.93	0.65	0.29
34.9	0.033	49.6	0.52%	26.3	0.028	0.00249	6.494	0.58	0.6624	1.01	1.59	0.35	0.93	0.64	0.29
35.1	0.035	49.8	0.56%	26.5	0.030	0.00269	6.496	0.58	0.6912	1.01	1.59	0.32	0.90	0.61	0.29
35.3	0.037	49.8	0.60%	26.7	0.032	0.00290	6.499	0.59	0.6912	1.01	1.60	0.32	0.91	0.61	0.29
35.6	0.040	50.1	0.66%	27.0	0.035	0.00317	6.503	0.59	0.7344	1.01	1.60	0.27	0.87	0.57	0.30
35.8	0.043	50.1	0.71%	27.2	0.038	0.00341	6.506	0.60	0.7344	1.01	1.61	0.27	0.87	0.57	0.30
36.0	0.046	50.2	0.75%	27.4	0.041	0.00364	6.509	0.60	0.7488	1.01	1.61	0.26	0.86	0.56	0.30
36.1	0.049	50.4	0.81%	27.5	0.044	0.00393	6.513	0.60	0.7776	1.01	1.61	0.23	0.83	0.53	0.30
36.3	0.051	50.4	0.86%	27.7	0.046	0.00416	6.516	0.61	0.7776	1.01	1.62	0.23	0.84	0.53	0.30
36.3	0.054	50.7	0.90%	27.7	0.049	0.00436	6.519	0.61	0.8208	1.01	1.62	0.19	0.79	0.49	0.30
37.7	0.081	51.4	1.41%	29.1	0.076	0.00678	6.552	0.63	0.9216	1.01	1.64	0.09	0.72	0.40	0.32
38.6	0.108	52.2	1.91%	30.0	0.103	0.00920	6.586	0.65	1.0368	1.01	1.65	-0.03	0.62	0.29	0.32
39.5	0.135	52.8	2.41%	30.9	0.130	0.01162	6.620	0.66	1.1232	1.01	1.67	-0.12	0.55	0.22	0.33
40.5	0.161	53.4	2.91%	31.9	0.156	0.01402	6.654	0.68	1.2096	1.01	1.68	-0.20	0.47	0.14	0.34
41.6	0.188	54.1	3.41%	33.0	0.183	0.01642	6.688	0.69	1.3104	1.01	1.70	-0.30	0.39	0.04	0.35
42.6	0.215	54.5	3.90%	34.0	0.210	0.01882	6.723	0.71	1.3680	1.01	1.72	-0.36	0.35	-0.01	0.35
43.6	0.242	55.1	4.41%	35.0	0.237	0.02128	6.759	0.72	1.4544	1.01	1.73	-0.45	0.28	-0.08	0.36
44.5	0.269	55.7	4.91%	35.9	0.264	0.02364	6.793	0.74	1.5408	1.01	1.75	-0.53	0.20	-0.16	0.37
45.2	0.296	56.3	5.41%	36.6	0.291	0.02608	6.830	0.75	1.6272	1.01	1.75	-0.62	0.13	-0.25	0.37
45.4	0.323	56.7	5.91%	36.8	0.318	0.02850	6.866	0.74	1.6848	1.01	1.75	-0.68	0.07	-0.31	0.37
45.6	0.350	57.3	6.41%	37.0	0.345	0.03090	6.903	0.74	1.7712	1.01	1.75	-0.76	-0.02	-0.39	0.37
45.6	0.376	57.9	6.91%	37.0	0.371	0.03329	6.939	0.73	1.8576	1.01	1.74	-0.85	-0.12	-0.48	0.37
45.7	0.404	58.6	7.42%	37.1	0.399	0.03574	6.978	0.73	1.9584	1.01	1.74	-0.95	-0.22	-0.59	0.36
45.9	0.430	59.0	7.91%	37.3	0.425	0.03813	7.015	0.73	2.0160	1.01	1.74	-1.01	-0.28	-0.64	0.36
45.9	0.457	59.6	8.41%	37.3	0.452	0.04053	7.053	0.72	2.1024	1.01	1.73	-1.09	-0.37	-0.73	0.36
46.0	0.484	60.2	8.91%	37.4	0.479	0.04293	7.092	0.72	2.1888	1.01	1.72	-1.18	-0.46	-0.82	0.36
46.0	0.511	60.8	9.41%	37.4	0.506	0.04535	7.131	0.71	2.2752	1.01	1.72	-1.27	-0.56	-0.91	0.35
46.1	0.538	61.3	9.91%	37.5	0.533	0.04775	7.171	0.71	2.3472	1.01	1.71	-1.34	-0.63	-0.99	0.35
46.0	0.592	62.3	10.91%	37.4	0.587	0.05261	7.252	0.69	2.4912	1.01	1.70	-1.48	-0.79	-1.14	0.35

Report Date: Tuesday, April 21, 2015

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AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **12772**

Point: **A**

46.1	0.645	63.2	11.91%	37.5	0.640	0.05740	7.333	0.68	2.6208	1.01	1.69	-1.61	-0.93	-1.27	0.34
46.0	0.699	63.8	12.91%	37.4	0.694	0.06222	7.418	0.66	2.7072	1.01	1.67	-1.70	-1.04	-1.37	0.33
46.1	0.753	63.9	13.91%	37.5	0.748	0.06706	7.504	0.65	2.7216	1.01	1.66	-1.71	-1.06	-1.39	0.33
46.0	0.807	64.0	14.91%	37.4	0.802	0.07186	7.592	0.64	2.7360	1.01	1.65	-1.73	-1.09	-1.41	0.32
45.9	0.861	64.0	15.91%	37.3	0.856	0.07670	7.683	0.62	2.7360	1.01	1.63	-1.73	-1.11	-1.42	0.31
45.9	0.914	64.1	16.91%	37.3	0.909	0.08151	7.775	0.61	2.7504	1.01	1.62	-1.74	-1.13	-1.44	0.30
45.8	0.968	64.1	17.91%	37.2	0.963	0.08635	7.870	0.59	2.7504	1.01	1.60	-1.74	-1.15	-1.45	0.30

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AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**
Project: **Kanawha River Landfill**
Sample No: **12772**
Point: **B**

Material Description: Shelby Tube - Boring B-1402 - Sample 13; 31.5'-33.5' - Dark Brown Sandy Clay and silt

Moisture Determination ASTM D2216

	Before Testing	After Testing
Tare No.	C	C
Mass of Container and Wet Specimen (Mcws), grams	1376.57	1393.83
Mass of Container and Over Dry Specimen (Mcs), grams	1177.81	1177.81
Mass of Container (Mc), grams	222.88	222.88
Mass of Water (Mw), grams:	198.76	216.02
Mass of Solid Particles (Ms), grams:	954.93	954.93
Moisture Content (w), %	20.81%	22.62%

Initial Condition of Speciman ASTM D2435

	(1)	(2)	(3)	Average
Diameter Measurents, Inches:	2.863	2.869	2.866	2.866
Height Measurements, Inches:	5.725	5.735	5.73	5.730

Initial Volume of Specimen (Vo), In.3:	36.97
Dry Mass of Specimen After Testing, (Md), grams:	954.93
Dry Unit Weight, (γ d) pcf:	98.41
Specific Gravity of the Solids, (G):	2.65
Volume of Solids, (Vs), Cu. In.:	21.9901
Height of Solids,(Hs),In.:	3.4087
Void Ratio Before Consolidation (Eo):	0.6810
Intitail Degree of Saturation: (So)	80.99%

Saturation - ASTM D4767 Section 8.2

Dial Indicator Reading Prior to Saturation (Rb:) In.	0
Cell Pressure AfterSaturation, psi:	50.00
Back Presssure After Saturation After, psi:	45.00
Pore Pressure Paramenter B:	1
Dial Indicator Reading After Saturation, (Ra) In.:	0.02
Change in Height during Satureation, (Delta Hs) In.	0.02
Change In Volume of Specimen during Saturation (Delta Vsat), In.3:	0.387

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AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**
Project: **Kanawha River Landfill**
Sample No: **12772**
Point: **B**

Consolidation- ASTM D2435, Section 11.5:

Sample No	T	Burette 2	Burette3	Rc
12772	0	24	24.2	0.02
12772	0.25	22.2	23.2	
12772	0.5	21.9	22.9	
12772	1	21.6	22.8	
12772	2	21.5	22.7	
12772	4	21.4	22.6	
12772	8	21.3	22.5	
12772	15	21.2	22.4	0.032
12772	30	21.2	22.3	0.034
12772	60	21.2	22.2	0.034
12772	120	21.3	21.9	0.036
12772	1080	21.3	21.8	0.037

Specimen Height After Consolidation, (Hc), In.: 5.69

Volume Change During Consolidation (Delta Vc), In.3: 0.31

Cross-Sectional Area of Specimen After Consolidation (Ac), In.2: 6.37

Triaxial Compression Testing ASTM D 4767

Sample Depth: 32 ft.
Cell Pressure: 60 psi
Back Pressure: 45 psi
Confining Pressure: 15 psi
Strain Rate: 0.006 In/min.

Specimen Height After Consolidation, (Hc), In.: 5.69
Correction for Vert Displacement, In.: 0.004
Load due to Friction and Uplift: 11.9 lbs.
Correction for Filter Paper: 0
Thickness of Membrane (tm), In.: 0.012

$\sigma 1-\sigma 3=$	Deviator Stress at Failure, ksf:	2.98
$\sigma 3$ f=	Effective Consolidation Stress at Failure, ksf:	2.16
$\sigma 1=$	Total Major Principal Stress at Failure:	5.14
σ '3f= $\sigma 3-\Delta \upsilon=$	Effective Minor Principal Stress at Failure,ksf:	-0.20
σ '1f=	Effective Major Principal Stress at Failure, ksf:	2.78
	Axial Strain at Failure:	5.93%

Failure Sketch

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AEP
AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **12772**

Point: **B**

Pa: Applied Force	Vertical Displacement Reading In. :	Pore Pressure psi:	Axial Strain (E1):	(P) - Force Adj for U and F lbs:	Corrected Vertical Displac In. :	Correction for Membrane ksf:	(A) Area In.2:	(σ1−σ3) Deviator Stress ksf:	[Δυ] Induced Pore Water Pressure ksf:	σ3 Effective Consolidation Stress ksf	σ1 Total Major Principal Stress ksf	σ3 Effective Minor Principal Stress ksf	σ1 ' Effective Major Principal Stress ksf	p'	q
11.9	0.004	48.6	0.00%	0.0	0.000	0.00000	6.370	0.00	0.5184	2.16	2.16	1.64	1.64	1.64	0.00
17.6	0.006	48.6	0.03%	5.7	0.002	0.00014	6.372	0.13	0.5184	2.16	2.29	1.64	1.77	1.71	0.06
42.2	0.009	49.9	0.09%	30.3	0.005	0.00046	6.377	0.68	0.7056	2.16	2.84	1.45	2.14	1.80	0.34
48.9	0.011	50.6	0.13%	37.0	0.007	0.00061	6.379	0.83	0.8064	2.16	2.99	1.35	2.19	1.77	0.42
56.9	0.014	51.2	0.18%	45.0	0.010	0.00087	6.382	1.01	0.8928	2.16	3.17	1.27	2.28	1.77	0.51
64.0	0.017	51.9	0.24%	52.1	0.013	0.00114	6.386	1.17	0.9936	2.16	3.33	1.17	2.34	1.75	0.59
68.8	0.020	52.4	0.28%	56.9	0.016	0.00136	6.388	1.28	1.0656	2.16	3.44	1.09	2.38	1.74	0.64
73.9	0.023	52.5	0.33%	62.0	0.019	0.00159	6.391	1.40	1.0800	2.16	3.56	1.08	2.48	1.78	0.70
78.4	0.026	53.0	0.39%	66.5	0.022	0.00189	6.395	1.50	1.1520	2.16	3.66	1.01	2.50	1.76	0.75
81.7	0.028	53.3	0.43%	69.8	0.024	0.00206	6.398	1.57	1.1952	2.16	3.73	0.96	2.53	1.75	0.78
86.9	0.032	53.7	0.49%	75.0	0.028	0.00237	6.402	1.68	1.2528	2.16	3.84	0.91	2.59	1.75	0.84
90.4	0.035	53.8	0.54%	78.5	0.031	0.00261	6.405	1.76	1.2672	2.16	3.92	0.89	2.66	1.77	0.88
92.7	0.037	54.0	0.58%	80.8	0.033	0.00280	6.407	1.81	1.2960	2.16	3.97	0.86	2.68	1.77	0.91
95.8	0.040	54.3	0.63%	83.9	0.036	0.00305	6.411	1.88	1.3392	2.16	4.04	0.82	2.70	1.76	0.94
99.5	0.043	54.3	0.68%	87.6	0.039	0.00329	6.414	1.96	1.3392	2.16	4.12	0.82	2.78	1.80	0.98
101.7	0.046	54.6	0.73%	89.8	0.042	0.00355	6.417	2.01	1.3824	2.16	4.17	0.78	2.79	1.78	1.01
105.0	0.048	54.6	0.78%	93.1	0.044	0.00377	6.420	2.08	1.3824	2.16	4.24	0.78	2.86	1.82	1.04
108.3	0.052	54.8	0.84%	96.4	0.048	0.00406	6.424	2.16	1.4112	2.16	4.32	0.75	2.91	1.83	1.08
110.4	0.055	54.8	0.89%	98.5	0.051	0.00431	6.428	2.20	1.4112	2.16	4.36	0.75	2.95	1.85	1.10
112.0	0.057	55.1	0.93%	100.1	0.053	0.00450	6.430	2.24	1.4544	2.16	4.40	0.71	2.94	1.82	1.12
129.5	0.085	55.8	1.43%	117.6	0.081	0.00692	6.463	2.61	1.5552	2.16	4.77	0.60	3.22	1.91	1.31
138.4	0.114	56.3	1.93%	126.5	0.110	0.00934	6.496	2.80	1.6272	2.16	4.96	0.53	3.33	1.93	1.40
143.3	0.142	57.1	2.42%	131.4	0.138	0.01177	6.529	2.89	1.7424	2.16	5.05	0.42	3.30	1.86	1.44
146.1	0.171	57.7	2.93%	134.2	0.167	0.01424	6.563	2.93	1.8288	2.16	5.09	0.33	3.26	1.80	1.47
148.2	0.199	58.4	3.43%	136.3	0.195	0.01663	6.596	2.96	1.9296	2.16	5.12	0.23	3.19	1.71	1.48
149.6	0.227	59.0	3.92%	137.7	0.223	0.01905	6.631	2.97	2.0160	2.16	5.13	0.14	3.12	1.63	1.49
150.6	0.256	59.6	4.43%	138.7	0.252	0.02149	6.666	2.97	2.1024	2.16	5.13	0.06	3.03	1.55	1.49
151.6	0.284	60.2	4.93%	139.7	0.280	0.02391	6.701	2.98	2.1888	2.16	5.14	-0.03	2.95	1.46	1.49
152.7	0.313	60.9	5.43%	140.8	0.309	0.02635	6.736	2.98	2.2896	2.16	5.14	-0.13	2.85	1.36	1.49
153.5	0.341	61.4	5.93%	141.6	0.337	0.02877	6.772	2.98	2.3616	2.16	5.14	-0.20	2.78	1.29	1.49
154.3	0.370	62.1	6.43%	142.4	0.366	0.03119	6.808	2.98	2.4624	2.16	5.14	-0.30	2.68	1.19	1.49
154.8	0.398	62.8	6.93%	142.9	0.394	0.03363	6.845	2.97	2.5632	2.16	5.13	-0.40	2.57	1.08	1.49
155.5	0.427	63.4	7.43%	143.6	0.423	0.03605	6.882	2.97	2.6496	2.16	5.13	-0.49	2.48	0.99	1.48
156.1	0.455	63.9	7.92%	144.2	0.451	0.03845	6.919	2.96	2.7216	2.16	5.12	-0.56	2.40	0.92	1.48
156.7	0.484	64.6	8.42%	144.8	0.480	0.04089	6.957	2.96	2.8224	2.16	5.12	-0.66	2.29	0.82	1.48
157.2	0.512	65.3	8.93%	145.3	0.508	0.04333	6.995	2.95	2.9232	2.16	5.11	-0.76	2.18	0.71	1.47
157.5	0.541	65.8	9.43%	145.6	0.537	0.04575	7.033	2.94	2.9952	2.16	5.10	-0.84	2.10	0.63	1.47
158.5	0.569	66.5	9.92%	146.6	0.565	0.04816	7.072	2.94	3.0960	2.16	5.10	-0.94	2.00	0.53	1.47

Report Date: Tuesday, April 21, 2015

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AEP AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **12772**

Point: **B**

159.6	0.626	67.6	10.93%	147.7	0.622	0.05303	7.152	2.92	3.2544	2.16	5.08	-1.09	1.83	0.37	1.46
161.0	0.683	69.0	11.92%	149.1	0.679	0.05788	7.233	2.91	3.4560	2.16	5.07	-1.30	1.61	0.16	1.46
162.4	0.740	70.1	12.92%	150.5	0.736	0.06274	7.316	2.90	3.6144	2.16	5.06	-1.45	1.45	0.00	1.45
163.6	0.797	71.4	13.93%	151.7	0.793	0.06759	7.401	2.88	3.8016	2.16	5.04	-1.64	1.24	-0.20	1.44
164.9	0.854	72.6	14.92%	153.0	0.850	0.07244	7.488	2.87	3.9744	2.16	5.03	-1.81	1.06	-0.38	1.43
165.9	0.910	73.8	15.92%	154.0	0.906	0.07728	7.577	2.85	4.1472	2.16	5.01	-1.99	0.86	-0.56	1.42
167.2	0.967	75.0	16.92%	155.3	0.963	0.08212	7.668	2.83	4.3200	2.16	4.99	-2.16	0.67	-0.74	1.42
167.9	1.024	76.3	17.92%	156.0	1.020	0.08697	7.761	2.81	4.5072	2.16	4.97	-2.35	0.46	-0.94	1.40
168.5	1.081	77.5	18.92%	156.6	1.077	0.09183	7.857	2.78	4.6800	2.16	4.94	-2.52	0.26	-1.13	1.39
169.2	1.138	78.7	19.92%	157.3	1.134	0.09669	7.955	2.75	4.8528	2.16	4.91	-2.69	0.06	-1.32	1.38
169.4	1.204	80.0	21.07%	157.5	1.200	0.10228	8.071	2.71	5.0400	2.16	4.87	-2.88	-0.17	-1.53	1.35
169.6	1.212	80.3	21.21%	157.7	1.208	0.10296	8.086	2.71	5.0832	2.16	4.87	-2.92	-0.22	-1.57	1.35

Report Date: Tuesday, April 21, 2015

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CIVIL AND MINING ENGINEERING DIVISION
CIVIL LABORATORY SECTION
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AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**
Project: **Kanawha River Landfill**
Sample No: **12772**
Point: **C**

Material Description: Shelby Tube - Boring B-1402 - Sample 13; 31.5'-33.5' - Dark Brown Sandy Clay and silt

Moisture Determination ASTM D2216

	Before Testing	After Testing
Tare No.	R-3	R-3
Mass of Container and Wet Specimen (Mcws), grams	1204.90	1261.31
Mass of Container and Over Dry Specimen (Mcs), grams	1060.78	1060.78
Mass of Container (Mc), grams	216.17	216.17
Mass of Water (Mw), grams:	144.12	200.53
Mass of Solid Particles (Ms), grams:	844.61	844.61
Moisture Content (w), %	17.06%	23.74%

Initial Condition of Speciman ASTM D2435

	(1)	(2)	(3)	Average
Diameter Measurents, Inches:	2.88	2.865	2.866	2.870
Height Measurements, Inches:	5.36	5.365	5.363	5.363

Initial Volume of Specimen (Vo), In.3:	34.70
Dry Mass of Specimen After Testing, (Md), grams:	844.61
Dry Unit Weight, (γ d) pcf:	92.73
Specific Gravity of the Solids, (G):	2.65
Volume of Solids, (Vs), Cu. In.:	19.4496
Height of Solids,(Hs),In.:	3.0058
Void Ratio Before Consolidation (Eo):	0.7841
Intitail Degree of Saturation: (So)	57.67%

Saturation - ASTM D4767 Section 8.2

Dial Indicator Reading Prior to Saturation (Rb:) In.	-0.983
Cell Pressure AfterSaturation, psi:	50.00
Back Presssure After Saturation After, psi:	45.00
Pore Pressure Paramenter B:	0.97
Dial Indicator Reading After Saturation, (Ra) In.:	-0.955
Change in Height during Satureation, (Delta Hs) In.	0.028
Change In Volume of Specimen during Saturation (Delta Vsat), In.3:	0.544

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Company: **AEP**
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Sample No: **12772**
Point: **C**

Consolidation- ASTM D2435, Section 11.5:

Sample No	T	Burette 2	Burette3	Rc
12772	0	23	23.4	-0.955
12772	0.25	18.1	18.1	
12772	0.5	17.6	17.7	
12772	1	17.3	17.5	
12772	2	17.1	17.3	
12772	4	17	17.2	
12772	8	17	17	
12772	15	16.9	17	-0.905
12772	30	16.8	16.8	-0.904
12772	60	16.7	16.7	-0.904
12772	120	16.6	16.7	-0.902
12772	1080	16.6	16.6	-0.902

Specimen Height After Consolidation, (Hc), In.: 5.28

Volume Change During Consolidation (Delta Vc), In.3: 0.81

Cross-Sectional Area of Specimen After Consolidation (Ac), In.2: 6.31

Triaxial Compression Testing
ASTM D 4767

Sample Depth: 32.75 ft.
Cell Pressure: 75 psi
Back Pressure: 45 psi
Confining Pressure: 30 psi
Strain Rate: 0.006 In/min.

Specimen Height After Consolidation, (Hc), In.: 5.28
Correction for Vert Displacement, In.: 0
Load due to Friction and Uplift: 11.2 lbs.
Correction for Filter Paper: 0
Thickness of Membrane (tm), In.: 0.012

$\sigma 1-\sigma 3=$	Deviator Stress at Failure, ksf:	3.80
$\sigma 3$ f=	Effective Consolidation Stress at Failure, ksf:	4.32
$\sigma 1=$	Total Major Principal Stress at Failure:	8.12
σ '3f= $\sigma 3-\Delta \upsilon=$	Effective Minor Principal Stress at Failure,ksf:	0.58
σ '1f=	Effective Major Principal Stress at Failure, ksf:	4.38
	Axial Strain at Failure:	6.99%

Failure Sketch

Report Date: Tuesday, April 21, 2015

FOSSIL AND HYDRO GENERATION
CIVIL AND MINING ENGINEERING DIVISION
CIVIL LABORATORY SECTION
AMERICAN ELECTRIC POWER SERVICE CORPORATION
4001 BIXBY ROAD
GROVEPORT, OHIO 43125
(614) 836-4200

AEP AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **12772**

Point: **C**

Pa: Applied Force	Vertical Displacement Reading In. :	Pore Pressure psi:	Axial Strain (E1):	(P) - Force Adj for U and F lbs:	Corrected Vertical Displac In. :	Correction for Membrane ksf:	(A) Area In.2:	(σ1−σ3) Deviator Stress ksf:	[Δu] Induced Pore Water Pressure ksf:	σ3 Effective Consolidation Stress ksf	σ1 Total Major Principal Stress ksf	σ3 Effective Minor Principal Stress ksf	σ1 ' Effective Major Principal Stress ksf	p'	q
11.2	0.000	47.0	0.00%	0.0	0.000	0.00000	6.315	0.00	0.2880	4.32	4.32	4.03	4.03	4.03	0.00
27.6	0.002	47.1	0.05%	16.4	0.002	0.00022	6.317	0.37	0.3024	4.32	4.69	4.02	4.39	4.20	0.19
58.9	0.005	49.1	0.10%	47.7	0.005	0.00048	6.321	1.09	0.5904	4.32	5.41	3.73	4.82	4.27	0.54
75.1	0.008	50.5	0.16%	63.9	0.008	0.00078	6.325	1.45	0.7920	4.32	5.77	3.53	4.98	4.26	0.73
86.2	0.011	51.1	0.20%	75.0	0.011	0.00098	6.327	1.71	0.8784	4.32	6.03	3.44	5.15	4.29	0.85
94.1	0.013	53.1	0.25%	82.9	0.013	0.00120	6.330	1.88	1.1664	4.32	6.20	3.15	5.04	4.10	0.94
102.0	0.016	54.1	0.31%	90.8	0.016	0.00150	6.334	2.06	1.3104	4.32	6.38	3.01	5.07	4.04	1.03
107.9	0.019	55.1	0.36%	96.7	0.019	0.00174	6.337	2.20	1.4544	4.32	6.52	2.87	5.06	3.96	1.10
112.1	0.021	56.1	0.40%	100.9	0.021	0.00196	6.340	2.29	1.5984	4.32	6.61	2.72	5.01	3.87	1.14
117.9	0.024	57.0	0.46%	106.7	0.024	0.00225	6.344	2.42	1.7280	4.32	6.74	2.59	5.01	3.80	1.21
121.0	0.026	57.1	0.50%	109.8	0.026	0.00244	6.346	2.49	1.7424	4.32	6.81	2.58	5.07	3.82	1.24
124.5	0.030	57.2	0.56%	113.3	0.030	0.00275	6.350	2.57	1.7568	4.32	6.89	2.56	5.13	3.85	1.28
137.4	0.044	60.1	0.83%	126.2	0.044	0.00402	6.367	2.85	2.1744	4.32	7.17	2.15	5.00	3.57	1.43
137.9	0.045	60.1	0.85%	126.7	0.045	0.00414	6.369	2.86	2.1744	4.32	7.18	2.15	5.01	3.58	1.43
140.4	0.048	61.1	0.91%	129.2	0.048	0.00445	6.373	2.91	2.3184	4.32	7.23	2.00	4.92	3.46	1.46
142.0	0.051	61.0	0.96%	130.8	0.051	0.00467	6.376	2.95	2.3040	4.32	7.27	2.02	4.97	3.49	1.47
143.1	0.053	61.1	1.00%	131.9	0.053	0.00486	6.378	2.97	2.3184	4.32	7.29	2.00	4.97	3.49	1.49
155.7	0.079	64.1	1.50%	144.5	0.079	0.00731	6.411	3.24	2.7504	4.32	7.56	1.57	4.81	3.19	1.62
165.4	0.106	65.0	2.00%	154.2	0.106	0.00977	6.444	3.44	2.8800	4.32	7.76	1.44	4.88	3.16	1.72
171.8	0.132	65.8	2.50%	160.6	0.132	0.01217	6.476	3.56	2.9952	4.32	7.88	1.32	4.88	3.10	1.78
176.6	0.158	66.6	3.00%	165.4	0.158	0.01462	6.510	3.64	3.1104	4.32	7.96	1.21	4.85	3.03	1.82
180.4	0.185	67.1	3.50%	169.2	0.185	0.01704	6.543	3.71	3.1824	4.32	8.03	1.14	4.84	2.99	1.85
182.9	0.211	67.7	4.00%	171.7	0.211	0.01950	6.578	3.74	3.2688	4.32	8.06	1.05	4.79	2.92	1.87
185.0	0.238	68.4	4.50%	173.8	0.238	0.02193	6.612	3.76	3.3696	4.32	8.08	0.95	4.71	2.83	1.88
186.7	0.264	68.9	4.99%	175.5	0.264	0.02435	6.647	3.78	3.4416	4.32	8.10	0.88	4.66	2.77	1.89
188.6	0.290	69.3	5.50%	177.4	0.290	0.02681	6.682	3.80	3.4992	4.32	8.12	0.82	4.62	2.72	1.90
189.8	0.317	69.4	5.99%	178.6	0.317	0.02922	6.717	3.80	3.5136	4.32	8.12	0.81	4.61	2.71	1.90
191.2	0.343	70.6	6.49%	180.0	0.343	0.03166	6.753	3.81	3.6864	4.32	8.13	0.63	4.44	2.54	1.90
192.0	0.369	71.0	6.99%	180.8	0.369	0.03410	6.789	3.80	3.7440	4.32	8.12	0.58	4.38	2.48	1.90
192.8	0.396	71.1	7.49%	181.6	0.396	0.03654	6.826	3.79	3.7584	4.32	8.11	0.56	4.36	2.46	1.90
193.5	0.423	72.4	8.00%	182.3	0.423	0.03901	6.864	3.79	3.9456	4.32	8.11	0.37	4.16	2.27	1.89
194.4	0.449	72.9	8.49%	183.2	0.449	0.04141	6.901	3.78	4.0176	4.32	8.10	0.30	4.08	2.19	1.89
195.4	0.475	73.6	8.99%	184.2	0.475	0.04385	6.939	3.78	4.1184	4.32	8.10	0.20	3.98	2.09	1.89
195.9	0.502	74.0	9.50%	184.7	0.502	0.04632	6.977	3.77	4.1760	4.32	8.09	0.14	3.91	2.03	1.88
196.2	0.528	74.3	10.00%	185.0	0.528	0.04874	7.016	3.75	4.2192	4.32	8.07	0.10	3.85	1.97	1.87
195.9	0.581	75.7	11.00%	184.7	0.581	0.05361	7.095	3.70	4.4208	4.32	8.02	-0.10	3.59	1.75	1.85
196.5	0.633	76.9	11.99%	185.3	0.633	0.05847	7.175	3.66	4.5936	4.32	7.98	-0.27	3.39	1.56	1.83
198.6	0.686	77.6	12.99%	187.4	0.686	0.06334	7.257	3.65	4.6944	4.32	7.97	-0.37	3.28	1.45	1.83

Report Date: Tuesday, April 21, 2015

FOSSIL AND HYDRO GENERATION
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AMERICAN ELECTRIC POWER

Test Report for Consolidated-Undrained Triaxial Compresion Test - ASTM D 4767

Company: **AEP**

Project: **Kanawha River Landfill**

Sample No: **12772**

Point: **C**

200.2	0.739	79.1	14.00%	189.0	0.739	0.06823	7.342	3.64	4.9104	4.32	7.96	-0.59	3.05	1.23	1.82
201.9	0.792	80.0	15.00%	190.7	0.792	0.07313	7.429	3.62	5.0400	4.32	7.94	-0.72	2.90	1.09	1.81
203.6	0.845	81.7	16.00%	192.4	0.845	0.07800	7.517	3.61	5.2848	4.32	7.93	-0.96	2.64	0.84	1.80
205.6	0.898	82.6	16.99%	194.4	0.898	0.08286	7.607	3.60	5.4144	4.32	7.92	-1.09	2.50	0.70	1.80
207.7	0.951	84.0	18.00%	196.5	0.951	0.08775	7.701	3.59	5.6160	4.32	7.91	-1.30	2.29	0.50	1.79
209.3	1.003	84.6	18.99%	198.1	1.003	0.09258	7.795	3.57	5.7024	4.32	7.89	-1.38	2.18	0.40	1.78
211.0	1.056	85.7	19.99%	199.8	1.056	0.09748	7.893	3.55	5.8608	4.32	7.87	-1.54	2.01	0.23	1.77
211.9	1.104	86.7	20.91%	200.7	1.104	0.10194	7.984	3.52	6.0048	4.32	7.84	-1.68	1.83	0.07	1.76

Report Date: Tuesday, April 21, 2015

APPENDIX C

Geotechnical Boring Logs



Site Map: Kanawha River Plant
Monitoring Well Locations
Drawn By: Dan Murphy
Date: September 23, 2025

N
W E
S

0 150 300
Feet

Note: Digitial Elevation Model was taken from LiDAR (2018) available through the WV Elevation and LiDAR Download Tool and from July 2025 Topographic survey from AGE Engineering.

AMERICAN ELECTRIC POWER

Final boring Logs to be provided by EHS/AEP

EHS Support

Boring/Well ID: 2515

Project / Site: KCP Bot Ash Pond

Location / Address:

Date Started: 10/24/25 | Date Finished: 10/24/25

Ground Surface Elevation (ft msl): | Top of Casing Elevation (msl):

Coordinates (x, y): | Total Depth (ft): 53'

Drilling Method: Geoprobe 3230 | Borehole Diameter (in):

Rig Type: | Casing Diameter (in) / Type:

Drilling Co.: | Sampler Diameter (in) / Type:

Drilled by: Brandon Cottrell | Logged by: KS

Sketch Map

Client:

Project Number:

EHS Support PM:

Elevation (msl)	Depth (feet)	Lithologic Column	Lithologic Description	Sample Number	Sampler Type	Recovery (ft)	Blow Counts	PID (ppm) Scan	PID (ppm) Head Space	Notes
	0-5'									
	5-10'		Brown SILT (ML) dry / med stiff / non plastic trace SAND / CLAY / Mica			5.0/5.0	5/10			Start @ 5.0 Blow Counts: 5'-7': 5-8-9-9 7'-9': 11-9-9-10 9'-11': 8-7-8-8
	10-15		10'-15' - SAA Dry 10-12 Few SAND >6-15% 12-14 Few clay			5.0/5.0	10/15			
	15-20		15-20' SAA (wet @ 15.7) 16.8-17.5 Silty Sand (SM) 17.8-18.0 - Sand bed / lense 18.0-19.6 SILT SAA wet			5.0/5.0	15/20			Brown slow dilatancy med stiff wet @ 19.6 Inclusion / nodule (<1") of coal
	20-25		20-25 SAA wet few sand trace clay Brown 21.9 Silty SAND (SM-SW) med dense - loose fine-med grain, wet, sub-SubA, slow dilatancy At 23.5 coarse to fine sand wet coal stems @ 23.9			4.2/5.0	20/25			
	25-30		25-30 SAA wet (coal stems throughout) 26.5 - Brown Silt (ML) med stiff, wet, Rapid dilatancy, trace sand / clay / mica			4.7/5.0	25-30			

DTW in boring during drilling (ft bgs):

DTW in boring after drilling (ft):

DTP in boring during drilling (ft bgs):

DTP in boring after drilling (ft bgs):

Product Thickness (ft):

Boring: 2515

Page: 1

EHS Support

APPENDIX D

Geotechnical Laboratory Test Reports

AEP/EFA KANAWHA RIVER/WV
SUMMARY OF SOIL DATA

Sample Identification	Sample Depth	Sample Type	Soil Classi-fication	As-R'cvd Moisture Content %	Atterberg Limits				Grain Size Distribution			Compaction		Gs	Unit Weight		Permeability (cm/sec)	Additional Tests Conducted (See Notes)
					LL	PL	PI	LI	% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer 0.002 mm	Max. Dry Density (pcf)	Optimum Moisture %		Dry Density (pcf)	Moisture Content %		
MW-2505 D	5.5-7.5'	UD	CL	14.4	22	13	9	0.11	97.9	56.9	20.0	-	-	2.72			-	T
MW-2505 D	10.0-12.0'	UD	SM	11.9	NP	NP	NP	NP	100.0	36.2	8.4	-	-	2.69	112.8	13.0	-	T
MW-2505 D	10.0-12.0'	UD	-	-	-	-	-	-	-	-	-	-	-	-	118.4	13.5	-	C
MW-2505 D	34.0-36.0'	UD										-	-				-	DS
MW-2511 D	14.0-16.0'	UD	SM	11.7	NP	NP	NP	NP	100.0	34.0	9.4	-	-	2.70	111.6	12.9	-	T
MW-2511 D	26.0-28.0'	UD										-	-	2.71	-	-	-	T

ABBREVIATIONS: LIQUID LIMIT (LL)
PLASTIC LIMIT (PL)
PLASTICITY INDEX (PI)
LIQUIDITY INDEX (LI)
SPECIFIC GRAVITY (Gs)

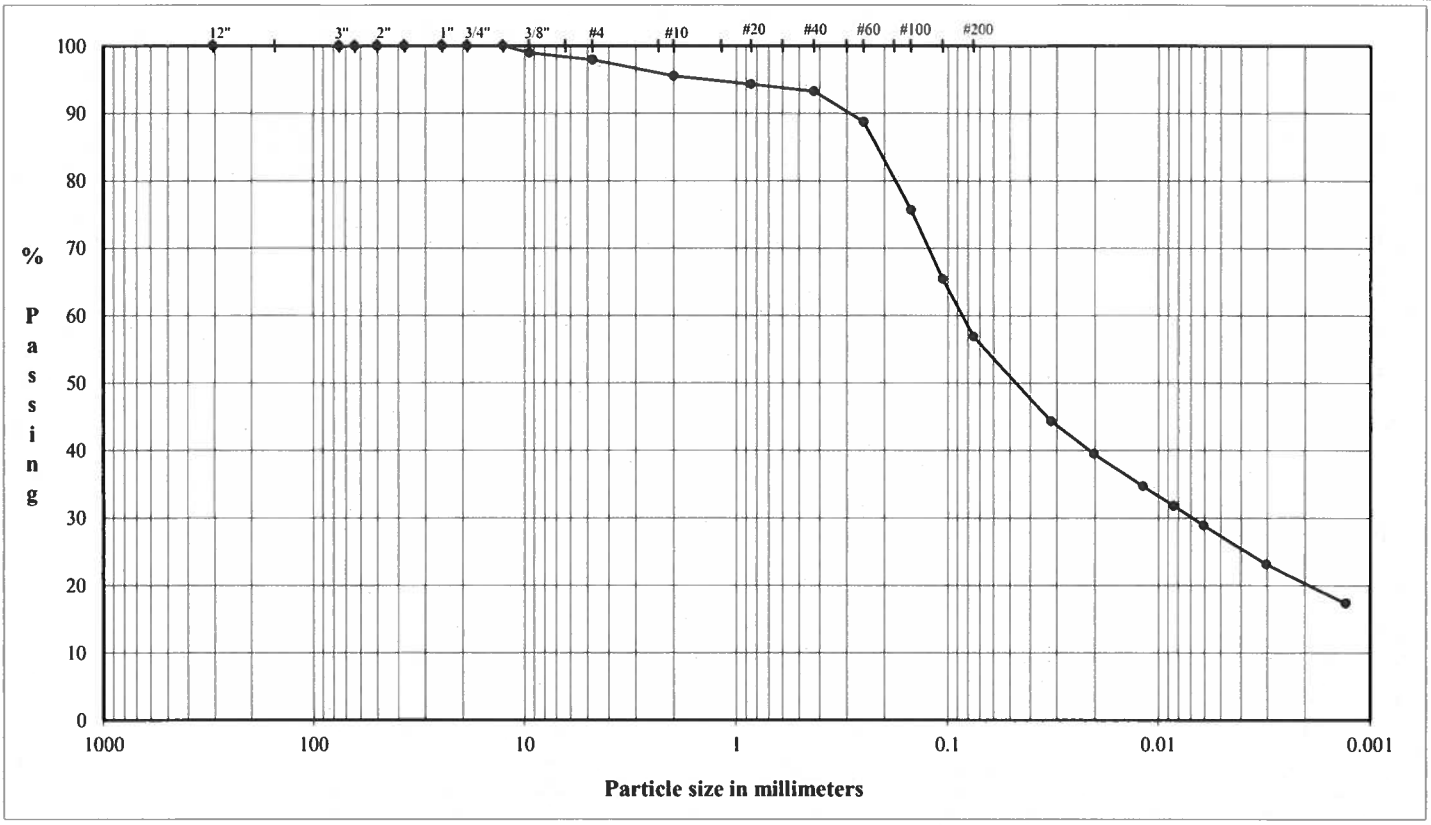
NOTES: T = TRIAXIAL TEST
U = UNCONFINED COMPRESSION TEST
C = CONSOLIDATION TEST
DS = DIRECT SHEAR TEST

NOVEMBER 2025 US-0041868.3860

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **AEP/EFA KANAWHA RIVER/WV**
SAMPLE ID: **MW-2505 D** Depth: **5.5-7.5'**
TYPE: **UD**



COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

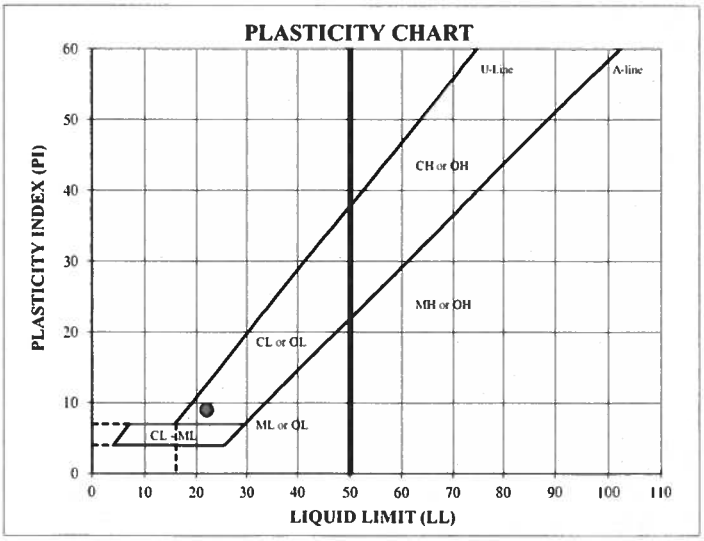
	Particle Size (mm)	% Passing	Particle Size Classification	Particle Size Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.0
0.50"	12.7	100.0		
0.375"	9.5	99.0		
#4	4.8	97.9	Fine Gravel	2.1
#10	2.00	95.5	Coarse Sand	2.4
#20	0.85	94.3		
#40	0.43	93.3	Medium Sand	2.2
#60	0.25	88.7		
#100	0.15	75.7		
#140	0.106	65.4		
#200	0.032	56.9	Fine Sand	36.4

Hydrometer Analysis

(mm)	%Finer		
0.032	44.3		
0.020	39.5		
0.012	34.7	Fines	
0.0085	31.8	Silt or Clay	56.9
0.0061	28.9		
0.0030	23.1		
0.0013	17.3		

DESCRIPTION: SILTY CLAY and SAND, fine to coarse, trace fine gravel; brown.

USCS: CL



ATTERBERG LIMITS

Method - B (Dry preparation)

M_c	LL	PL	PI	LI
14.4	22	13	9	0.11

LL (oven-dried) / < 0.75 = ORGANIC (OL,OH)

TECH	CJ/EK/TT
DATE	11/17/25
CHECK	
REVIEW	
APPROVE	

SPECIFIC GRAVITY OF SOILS
ASTM D854
PYCNOMETER METHOD

PROJECT TITLE	AEP/EFA KANAWHA RIVER/WV		
PROJECT NUMBER	US-0041868.3860	**SAMPLE ID**	MW-2505D
		SAMPLE DEPTH	5.5-7.5'
TESTED FOR	Gs	**SAMPLE TYPE**	UD

HYGROSCOPIC MOISTURE CONTENT OF MATERIAL PASSING THE #4 SIEVE

Weight of Soil and Tare, Initial (g)	191.84
Weight of Soil and Tare, Final (g)	191.19
Weight of Tare (g)	62.23
Weight of Moisture (g)	0.65
Weight of Dry Soil (g)	128.96
Hygroscopic Moisture Content	0.5%

Test Method		Method - B
Pycnometer Number		6
Weight of Pycnometer (g)		187.40
Volume of Pycnometer (mL)		499.33
Weight of Pycnometer and Water (g)		685.65
Mass of Pycnometer and Water at the Test Temperture	(A)	685.30
Observed Temperature (Tb), for (Mb) (°C)		24.6
Weight of Soil, Water & Pycnometer (g)	(B)	733.29
Temperature (°C)		24.6
Density of Water @ Tested Temperature (g/mL)		0.9972
Tare Number		-
Weight of Dry Soil Slurry plus Tare (g)		214.84
Weight of Tare (g)		139.04
Weight of Dry Soil (g)	(C)	75.80
Temperature Coefficient		0.9979
SPECIFIC GRAVITY (G)		2.720

G @ 20 °C = [C/(A-(B - C))]*(K)

METHOD - A WET METHOD
METHOD - B OVEN-DRIED METHOD

METHOD OF AIR REMOVAL: VACUUM

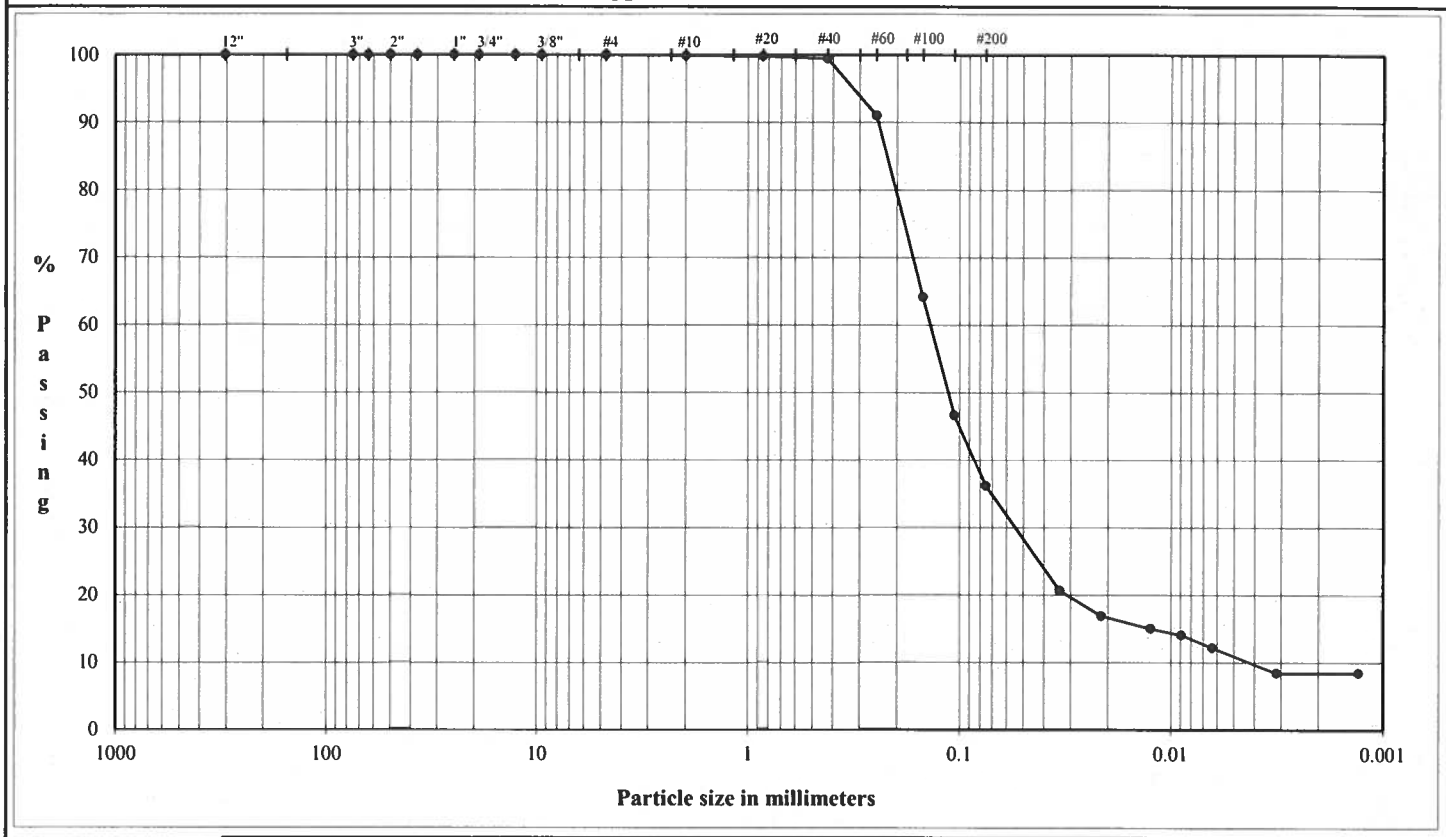
Maximum Particle Size of Reduced Sample	Specimen Dry Mass (g) when using 500 mL Pycnometer (Minimum)	(Maximum)
No. 100	30	75
No. 40	40	100
No. 10	50	125
No. 4	75	200
3/8 in.	165	300

TECH	CJ
DATE	11/20/25
CHECK	
REVIEW	
APPROVE	

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **AEP/EFA KANAWHA RIVER/WV**
SAMPLE ID: **MW-2505D** Depth: **10.0-12.0'**
TYPE: **UD**



COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.0
0.50"	12.7	100.0		
0.375"	9.5	100.0		
#4	4.8	100.0	Fine Gravel	0.0
#10	2.00	99.8	Coarse Sand	0.2
#20	0.85	99.8		
#40	0.43	99.4	Medium Sand	0.4
#60	0.25	91.0		
#100	0.15	64.1		
#140	0.106	46.6		
#200	0.034	36.2	Fine Sand	63.2

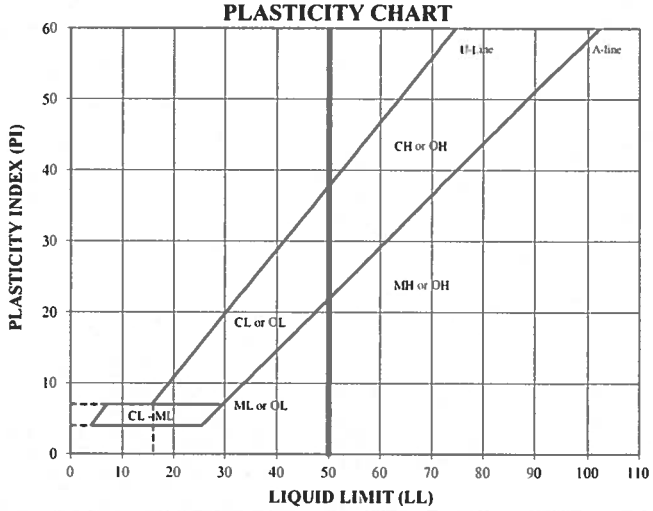
Hydrometer Analysis

(mm)	%Finer		
0.034	20.6		
0.022	16.9		
0.013	15.0	Fines	
0.0089	14.1	Silt or Clay	36.2
0.0063	12.2		
0.0031	8.4		
0.0013	8.4		

DESCRIPTION: fine SAND and SILT; brown.

USCS: SM

PLASTICITY CHART



ATTERBERG LIMITS

Method - B (Dry preparation)

M_c	LL	PL	PI	LI
11.9	NP	NP	NP	NP

LL (oven-dried) / < 0.75 = ORGANIC (OL OH)

TECH	CJ/TB
DATE	11/6/25
CHECK	DA
REVIEW	
APPROVE	

SPECIFIC GRAVITY OF SOILS
ASTM D854
PYCNOMETER METHOD

PROJECT TITLE			
PROJECT NUMBER	US-0041868.3860	**SAMPLE ID**	MW-2505D
		SAMPLE DEPTH	10.0-12.0'
TESTED FOR	Gs	**SAMPLE TYPE**	UD

HYGROSCOPIC MOISTURE CONTENT OF MATERIAL PASSING THE #4 SIEVE

Weight of Soil and Tare, Initial (g)	212.26
Weight of Soil and Tare, Final (g)	212.02
Weight of Tare (g)	62.73
Weight of Moisture (g)	0.24
Weight of Dry Soil (g)	149.29
Hygroscopic Moisture Content	0.2%

Test Method		Method - B
Pycnometer Number		22
Weight of Pycnometer (g)		165.59
Volume of Pycnometer (mL)		499.43
Weight of Pycnometer and Water (g)		663.99
Mass of Pycnometer and Water at the Test Temperture	(A)	663.87
Observed Temperature (Tb), for (Mb) (°C)		22.3
Weight of Soil, Water & Pycnometer (g)	(B)	712.37
Temperature (°C)		22.3
Density of Water @ Tested Temperature (g/mL)		0.9977
Tare Number		-
Weight of Dry Soil Slurry plus Tare (g)		216.48
Weight of Tare (g)		139.41
Weight of Dry Soil (g)	(C)	77.07
Temperature Coefficient		0.9979

SPECIFIC GRAVITY (G) 2.692

G @ 20 °C = [C/(A-(B - C))]*(K)

METHOD - A WET METHOD
METHOD - B OVEN-DRIED METHOD

METHOD OF AIR REMOVAL: VACUUM

Maximum Particle Size of Reduced Sample	Specimen Dry Mass (g) when using 500 mL Pycnometer (Minimum)	(Maximum)
No. 100	30	75
No. 40	40	100
No. 10	50	125
No. 4	75	200
3/8 in.	165	300

TECH	CJ
DATE	11/10/25
CHECK	DA
REVIEW	JJ
APPROVE	

Boring or Test Pit: MW-2505D	Boring or Test Pit: MW-2505D	Boring or Test Pit: MW-2505D
Sample: -	Sample: -	Sample: -
Depth: 10.0-12.0 ft	Depth: 10.0-12.0 ft	Depth: 10.0-12.0 ft
Point No.: 1	Point No.: 2	Point No.: 3

Initial			Initial			Initial		
Length =	6.119	in	Length =	5.940	in	Length =	6.058	in
Diameter =	2.870	in	Diameter =	2.861	in	Diameter =	2.871	in
Wet Mass =	3.008	lb	Wet Mass =	2.863	lb	Wet Mass =	2.754	lb
Area =	6.469	in^2	Area =	6.429	in^2	Area =	6.474	in^2
Volume =	39.585	in^3	Volume =	38.187	in^3	Volume =	39.218	in^3
Specific Gravity =	2.69	(ASTM D854)	Specific Gravity =	2.69	(ASTM D854)	Specific Gravity =	2.69	(ASTM D854)
Dry Mass of Solids =	2.623	lb	Dry Mass of Solids =	2.567	lb	Dry Mass of Solids =	2.444	lb
Moisture Content =	14.7%		Moisture Content =	11.5%		Moisture Content =	12.7%	
Wet Unit Weight =	131.3	pcf	Wet Unit Weight =	129.6	pcf	Wet Unit Weight =	121.3	pcf
Dry Unit Weight =	114.5	pcf	Dry Unit Weight =	116.2	pcf	Dry Unit Weight =	107.7	pcf
Void Ratio =	0.47		Void Ratio =	0.44		Void Ratio =	0.56	
Percent Saturation =	85%		Percent Saturation =	70%		Percent Saturation =	61%	

After Consolidation			After Consolidation			After Consolidation		
Length =	6.107	in	Length =	5.905	in	Length =	5.961	in
Diameter =	2.875	in	Diameter =	2.849	in	Diameter =	2.801	in
Area =	6.491	in^2 (Method B)	Area =	6.376	in^2 (Method B)	Area =	6.161	in^2 (Method B)
Volume =	39.641	in^3	Volume =	37.647	in^3	Volume =	36.723	in^3
Moisture Content =	17.4%		Moisture Content =	15.7%		Moisture Content =	17.0%	
Wet Unit Weight =	134.2	pcf	Wet Unit Weight =	136.4	pcf	Wet Unit Weight =	134.6	pcf
Dry Unit Weight =	114.3	pcf	Dry Unit Weight =	117.8	pcf	Dry Unit Weight =	115.0	pcf
Void Ratio =	0.47		Void Ratio =	0.42		Void Ratio =	0.46	
Percent Saturation =	100%		Percent Saturation =	100%		Percent Saturation =	100%	

B Parameter =	0.99		B Parameter =	0.95		B Parameter =	0.96	
Shear Rate =	0.089%	/min.	Shear Rate =	0.088%	/min.	Shear Rate =	0.091%	/min.
t_{50} =	1.30	min.	t_{50} =	0.17	min.	t_{50} =	0.18	min.
Strain at Failure =	14.9%		Strain at Failure =	3.2%		Strain at Failure =	4.6%	

Cell Pressure =	83.5	psi	Cell Pressure =	87.0	psi	Cell Pressure =	94.0	psi
Back Pressure =	80.0	psi	Back Pressure =	80.0	psi	Back Pressure =	80.0	psi
Confining Pressure =	3.5	psi	Confining Pressure =	7.0	psi	Confining Pressure =	14.0	psi

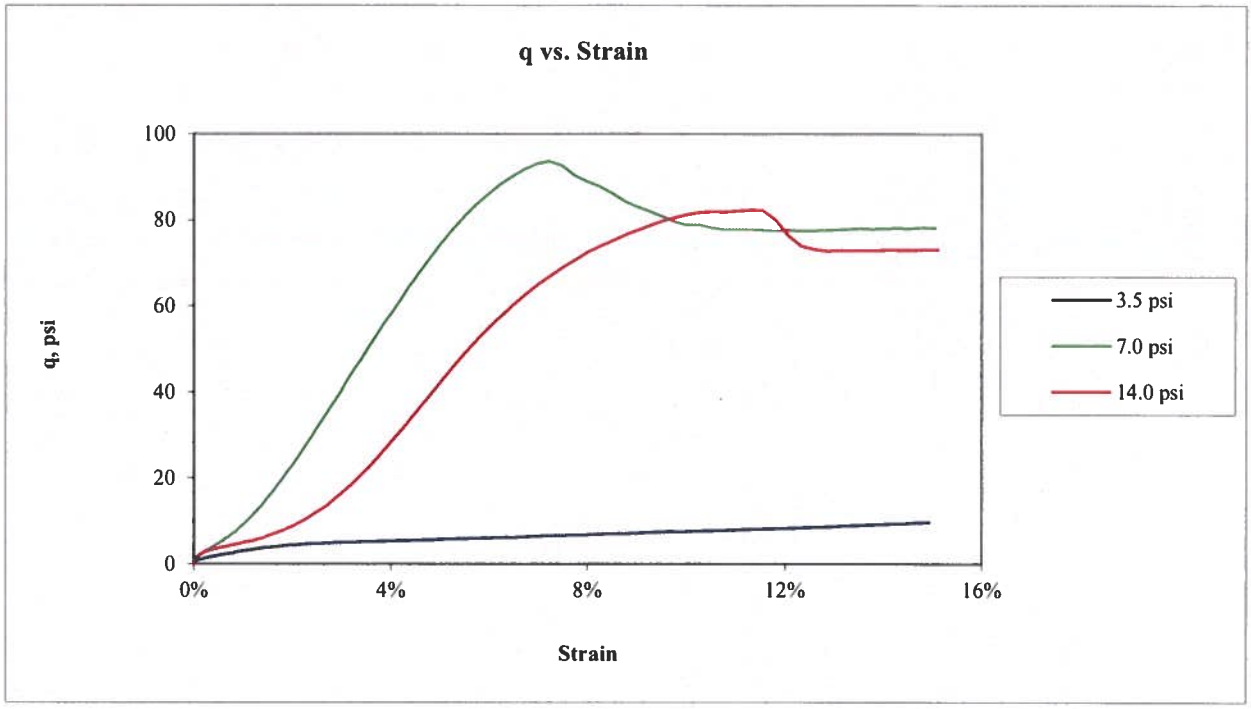
Notes: Sample description: SM - fine SAND and SILT; brown.

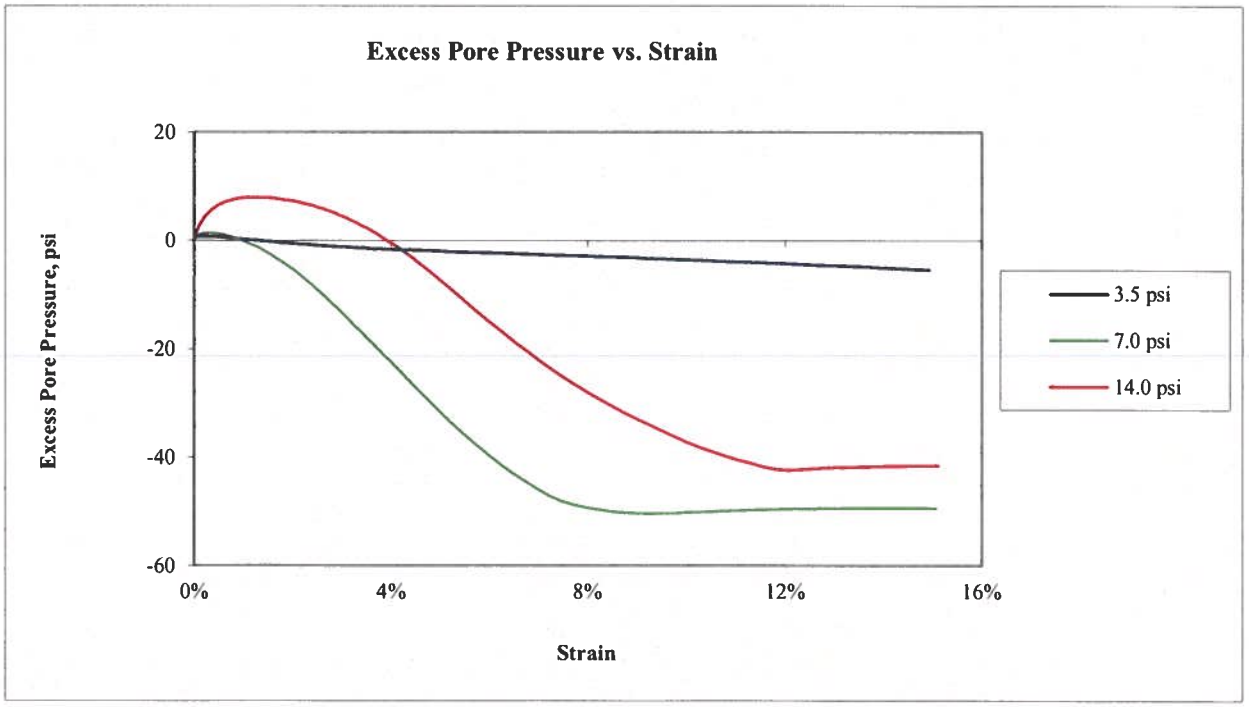
Atterberg limits: LL = NP PL = NP PI = NP (ASTM D4318)

Percent finer: 3/4 in. = 100% No. 4 = 100% No. 200 = 36% (ASTM D422, refer to separate report for gradation curve)

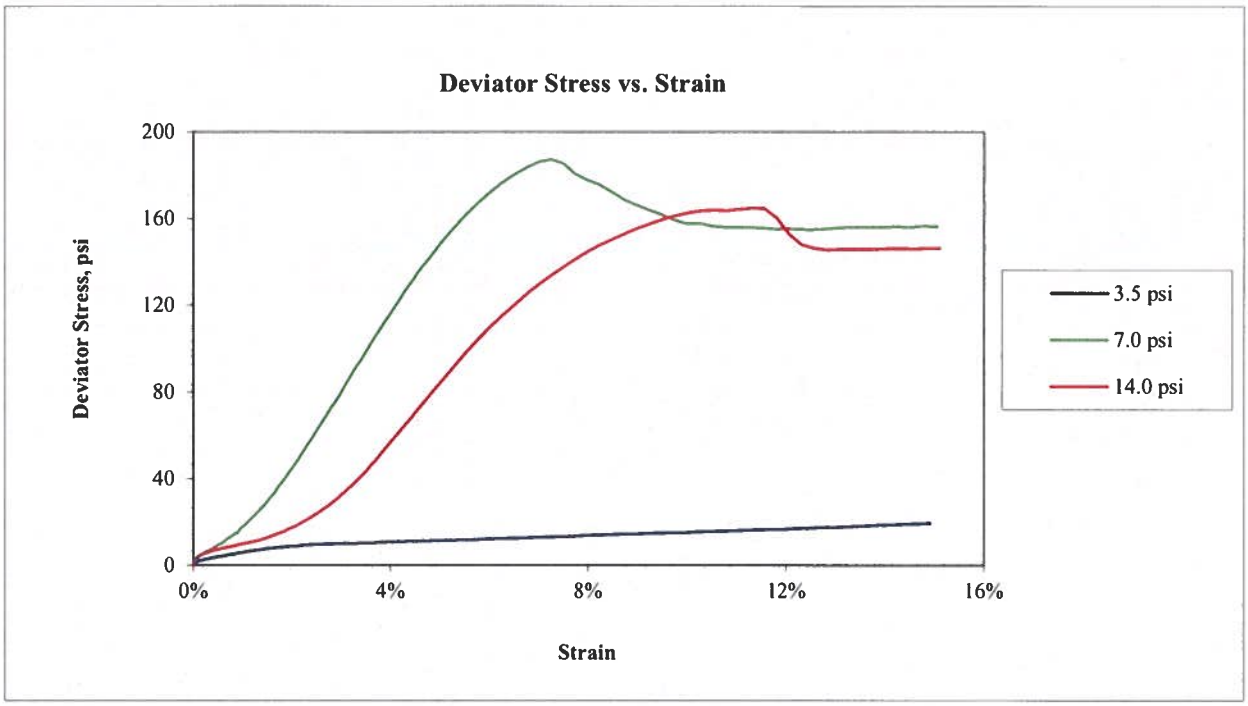
Specimen type:	X	Intact		Reconstituted
Moisture from:		Cuttings	X	Entire specimen
Saturation method:	X	Wet		Dry
Failure criterion:	X	$(\sigma'_1/\sigma'_3)_{max}$		$(\sigma'_1-\sigma'_3)_{max}$ ____ % strain
Membrane effect:	X	Corrected		Not Corrected

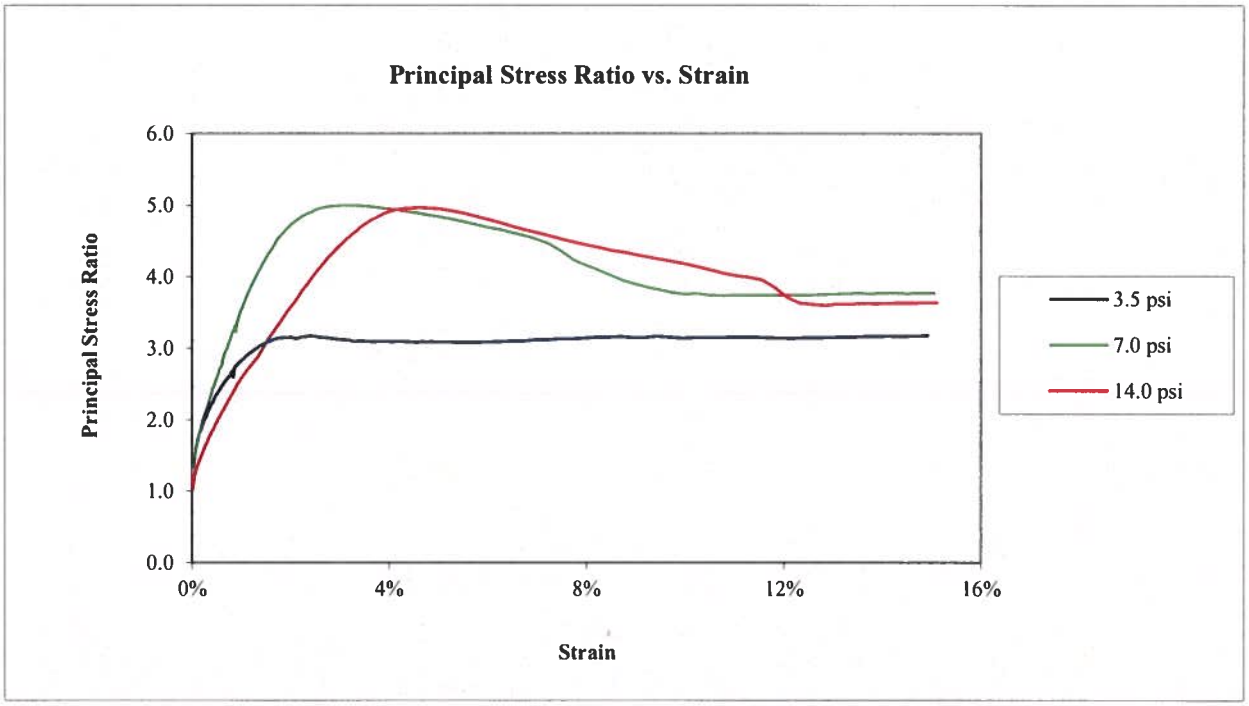
WSP USA **Norcross, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **SAMPLE AND TEST DATA**				
Job Short Title: **AEP/KANAWHA RIVER/WV**					
Sample: **MW-2505D, 10.0-12.0'**	**Technician:** FT **Check:** DA	**Reviewed:** **Approved:**	**Start Date:** 11/12/2025	**Job Number:** US-0041868.3860	**Figure:** 1





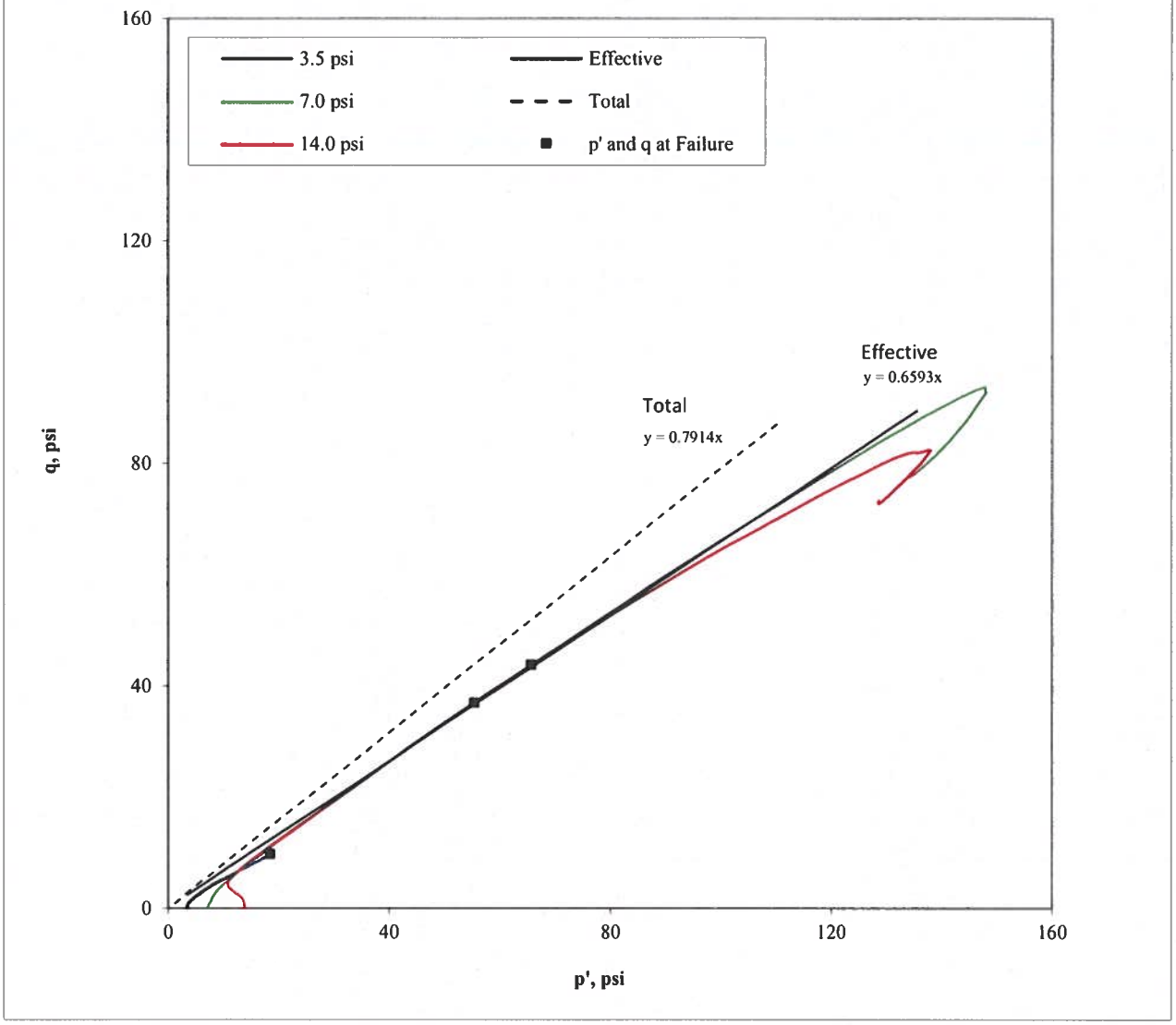
WSP USA **Norcross, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **q AND EXCESS PORE PRESSURE PLOTS**				
Job Short Title: **AEP/KANAWHA RIVER/WV**					
Sample: **MW-2505D, 10.0-12.0'**	**Technician:** **FT** **Check:** DA	**Reviewed:** **Approved:**	**Start Date:** **11/12/2025**	**Job Number:** **US-0041868.3860**	**Figure:** **2**





WSP USA **Norcross, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **DEVIATOR STRESS AND PRINCIPAL STRESS RATIO PLOT**				
Job Short Title: **AEP/KANAWHA RIVER/WV**					
Sample: **MW-2505D, 10.0-12.0'**	**Technician:** **FT** **Check: DA**	**Reviewed:** **TT** **Approved:**	**Start Date:** **11/12/2025**	**Job Number:** **US-0041868.3860**	**Figure:** **3**

Stress Path (p'-q) Plot



Confining Pressure (psi)	p at failure (psi)	p' at failure (psi)	q at failure (psi)
3.5	13.2	18.6	9.7
7.0	50.7	65.6	43.7
14.0	50.9	55.5	36.9

Effective

α ' =	33.4	degree
a' =	0.0	psi

Total

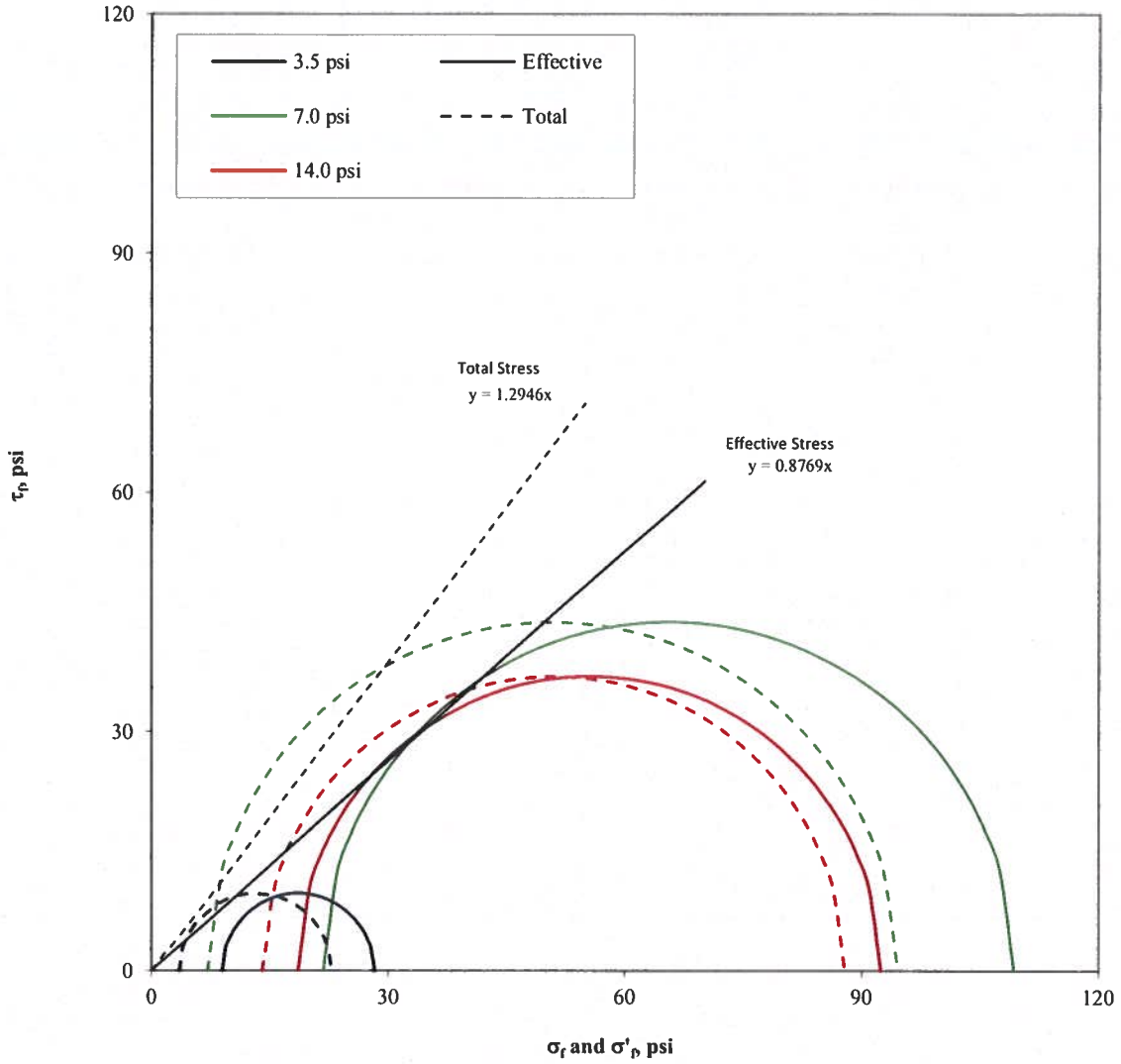
α =	38.4	degree
a =	0.0	psi

Note: The laboratory testing relates only to the sample tested. WSP USA neither accepts responsibility for nor makes claims to the final use and purpose of the material.

WSP USA **Norcross, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **STRESS PATH PLOT**
Job Short Title: **AEP/KANAWHA RIVER/WV**	

Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
MW-2505D, 10.0-12.0'	FT Check: DA	Approved:	11/12/2025	US-0041868.3860	4

Mohr's Circle Diagram



Confining Pressure (psi)	σ'_1 at failure (psi)	σ'_3 at failure (psi)	σ_1 at failure (psi)	σ_3 at failure (psi)
3.5	28.3	8.9	22.9	3.5
7.0	109.4	21.9	94.5	7.0
14.0	92.5	18.6	87.8	14.0

Effective

ϕ' =	41.2	degree
c' =	0.0	psi

Total

ϕ =	52.3	degree
c =	0.0	psi

Note: The laboratory testing relates only to the sample tested. WSP USA neither accepts responsibility for nor makes claims to the final use and purpose of the material.

WSP USA **Norcross, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **MOHR'S CIRCLE DIAGRAM**				
Job Short Title: **AEP/KANAWHA RIVER/WV**					
Sample: **MW-2505D, 10.0-12.0'**	**Technician:** **FT** **Check:** DA	**Reviewed:** **Approved:**	**Start Date:** **11/12/2025**	**Job Number:** **US-0041868.3860**	**Figure:** **5**

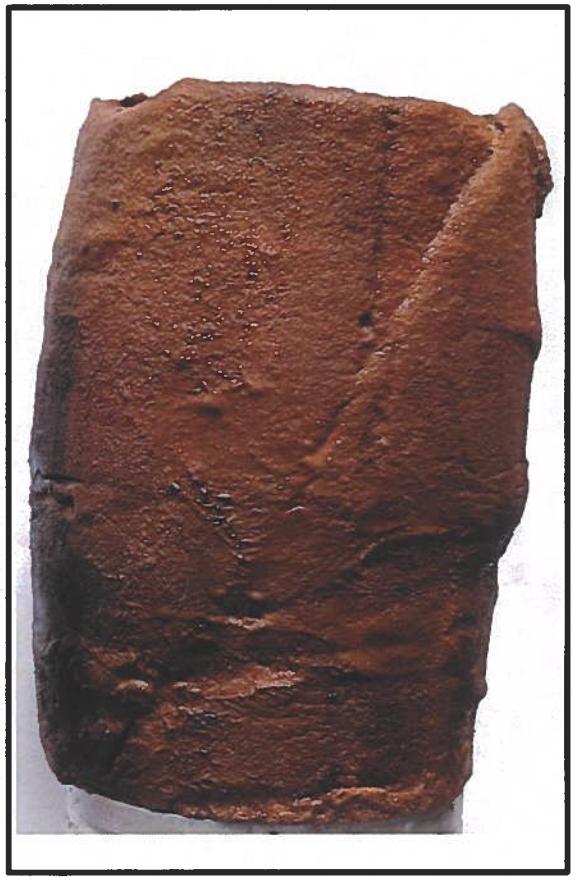
3.5 psi



7.0 psi



14.0 psi



WSP USA **Norcross, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **SPECIMENS PHOTOGRAPH - 3.5 | 7.0 | 14.0 psi**				
Job Short Title: **AEP/KANAWHA RIVER/WV**					
Sample: **MW-2505D, 10.0-12.0'**	**Technician:** **FT** **Check:** DA	**Reviewed:** **Approved:**	**Start Date:** **11/12/2025**	**Job Number:** **US-0041868.3860**	**Figure:** **6**

	Initial		Final		Notes							
Height =	1.000	in	0.980	in	Visual Description:	SM - fine SAND and SILT; brown.						
Diameter =	2.500	in	2.500	in	Atterberg Limits (ASTM D4318):	LL =	NP	PL =	NP	PI =	NP	
Area =	4.909	in^2	4.909	in^2	Percent Finer (ASTM D422):	3/4 in. =	100%	No. 4 =	100%	No. 200 =	36%	
Volume =	4.909	in^3	4.810	in^3	Specimen Type:	X	Intact		Reconstituted			
Water Content =	13.5%		14.8%		Remold Targets:							
Specific Gravity =	2.69	(ASTM D854)	2.69	(ASTM D854)	Water Content of Trimmings (ASTM D2216):	11.9%						
Height of Solids =	0.7061	in	0.7061	in	Trimming Procedure:	Trimming Ring						
Void Ratio =	0.416		0.388		Inundation:		Not inundated	X	Inundated at	0.10	ksf	
Degree of Saturation =	87.4%		102.6%		Test Method:		A	X	B			
Wet Mass =	0.382	lb	0.386	lb	Apparatus:	GeoTac automated consolidometer						
Dry Mass =	0.336	lb	0.336	lb	Final Water Content Specimen:	X	Entire		Partial			
Wet Unit Weight =	134.4	pcf	138.7	pcf	Final Differential Height:	0.0000	in					
Dry Unit Weight =	118.4	pcf	120.9	pcf	Estimated Preconsolidation Stress:		ksf					

			At End of Primary Consolidation				At End of Load Duration							
	Axial Stress (ksf)	Load Duration (min)	Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Time Deformation Method	Average Void Ratio	Coefficient of Consolidation (ft^2/day)	Time to 50% Consolidation (min)
Seating	0.10	240					0.0000	0.9999	0.00	0.416				
1	0.25	240					0.0048	0.9952	0.48	0.409				
2	0.5	240					0.0085	0.9915	0.85	0.404				
3	1.0	240					0.0095	0.9904	0.95	0.403				
4	1.5	240					0.0148	0.9851	1.48	0.395				
5	0.5	240					0.0132	0.9867	1.32	0.397				
6	0.1	240					0.0113	0.9886	1.13	0.400				
7	0.25	240					0.0123	0.9876	1.23	0.399				
8	0.5	240					0.0140	0.9860	1.40	0.396				
9	1.0	240					0.0157	0.9842	1.57	0.394				
10	2.0	240	0.0182	0.9817	1.82	0.390	0.0181	0.9818	1.81	0.390	2 (Root time)	0.392	2.731	0.23
11	4.0	240	0.0197	0.9802	1.97	0.388	0.0194	0.9805	1.94	0.389	2 (Root time)	0.389	0.100	3.06
12	8.0	240	0.0282	0.9717	2.82	0.376	0.0287	0.9712	2.87	0.375	2 (Root time)	0.381	0.466	0.75
13	16.0	240	0.0324	0.9675	3.24	0.370	0.0330	0.9669	3.30	0.369	2 (Root time)	0.371	0.124	3.72
14	4.0	60					0.0295	0.9705	2.95	0.374				
15	1.0	60					0.0261	0.9738	2.61	0.379				
16	0.25	60					0.0217	0.9783	2.17	0.385				
17	0.1	60					0.0200	0.9799	2.00	0.388				

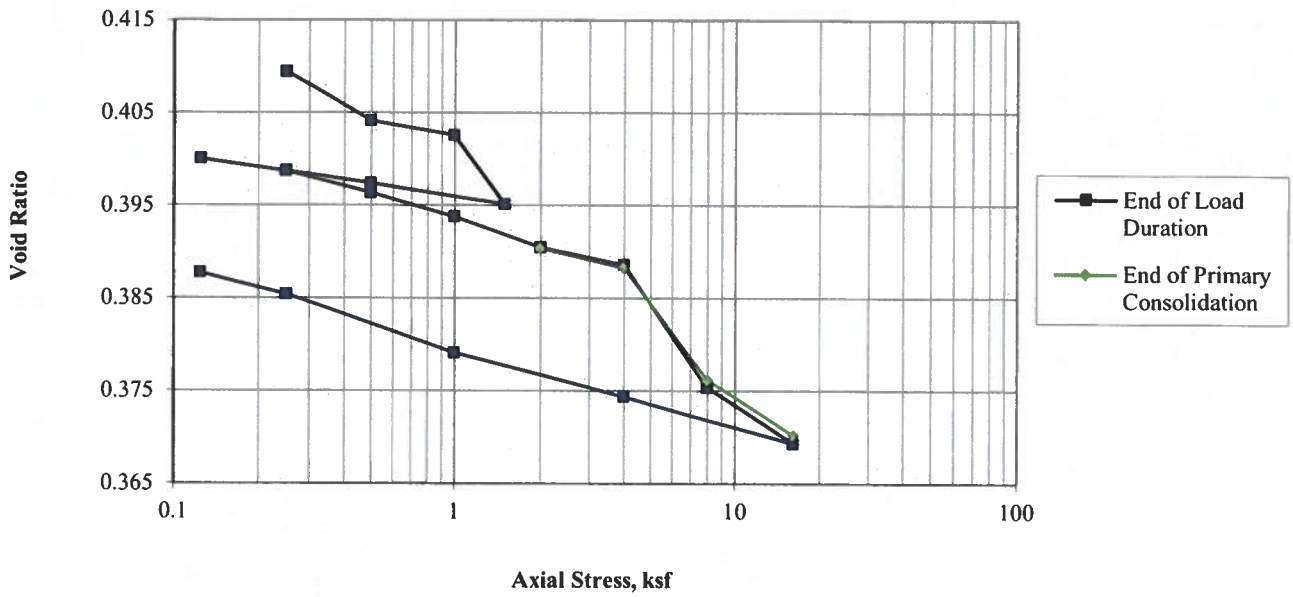
WSP USA
Norcross, Georgia

Job Short Title: AEP/EFA KANAWHA RIVER/WV

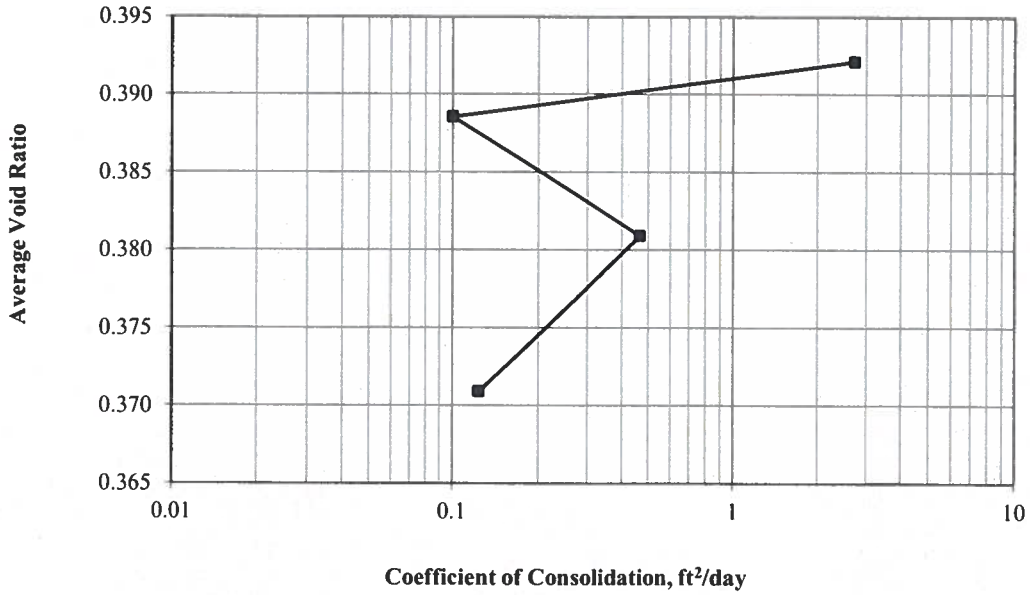
Title: ASTM D2435
ONE-DIMENSIONAL CONSOLIDATION TEST REPORT
SPECIMEN AND SUMMARY DATA

Sample:	Technician:	Checked:	Reviewed:	Approved:	Start Date:	Job Number:	Figure:
MW-2505D, 10.0-12.0'	CJ/DA	DA	11		11/7/2025	US-0041868.3860	1

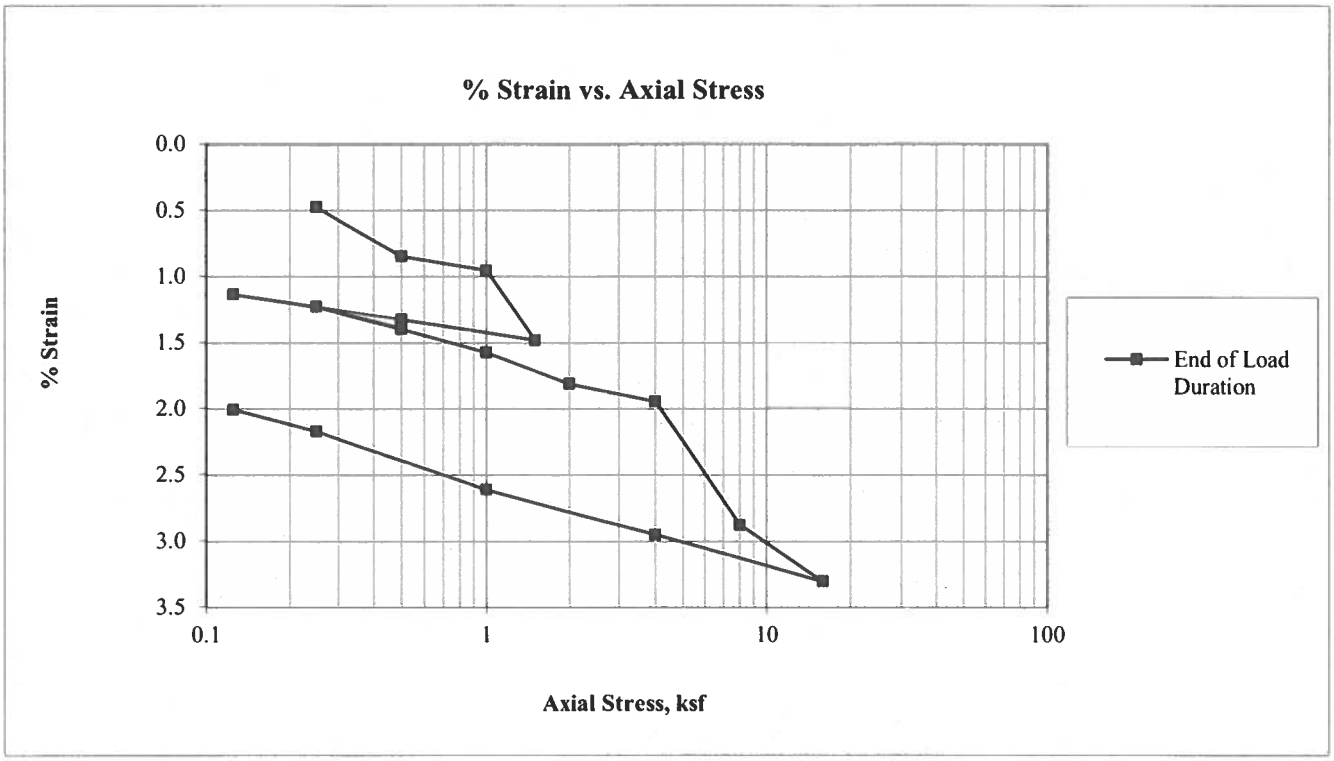
Void Ratio vs. Axial Stress

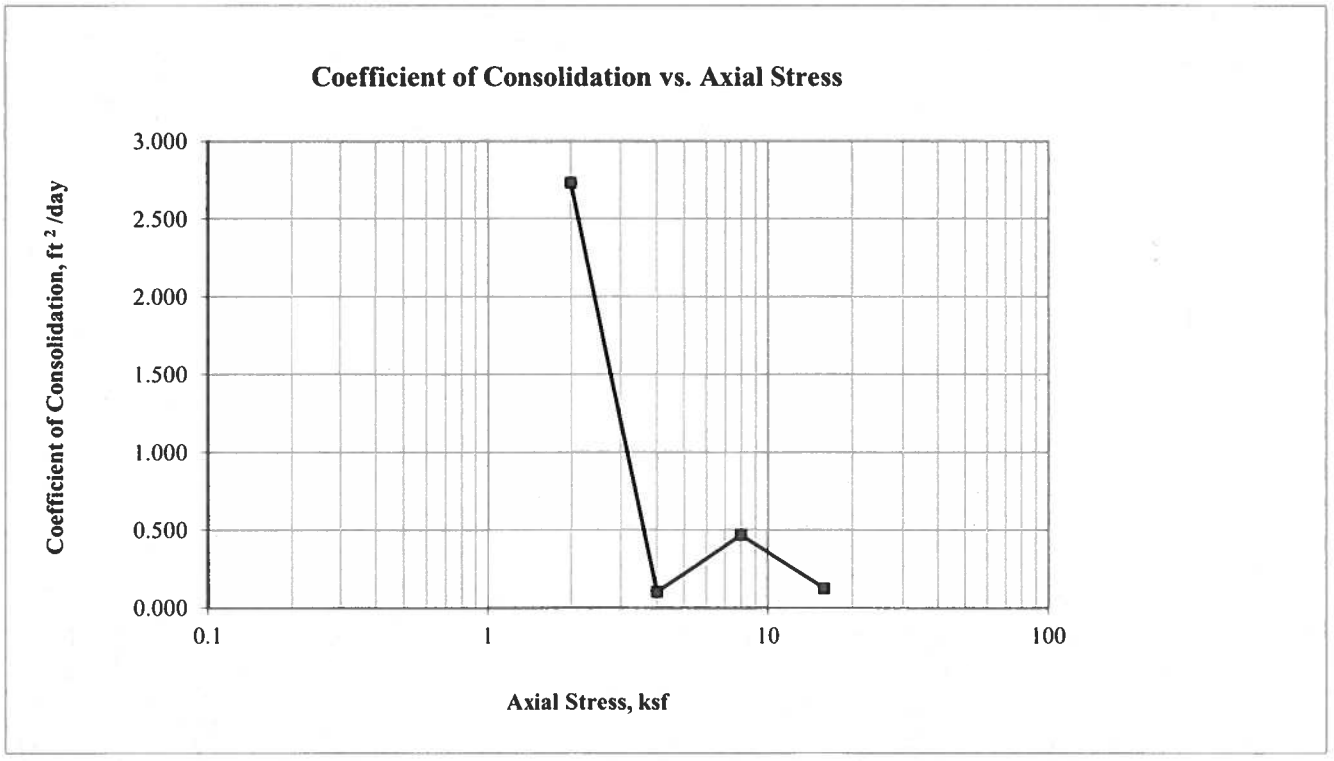


Average Void Ratio vs. Coefficient of Consolidation



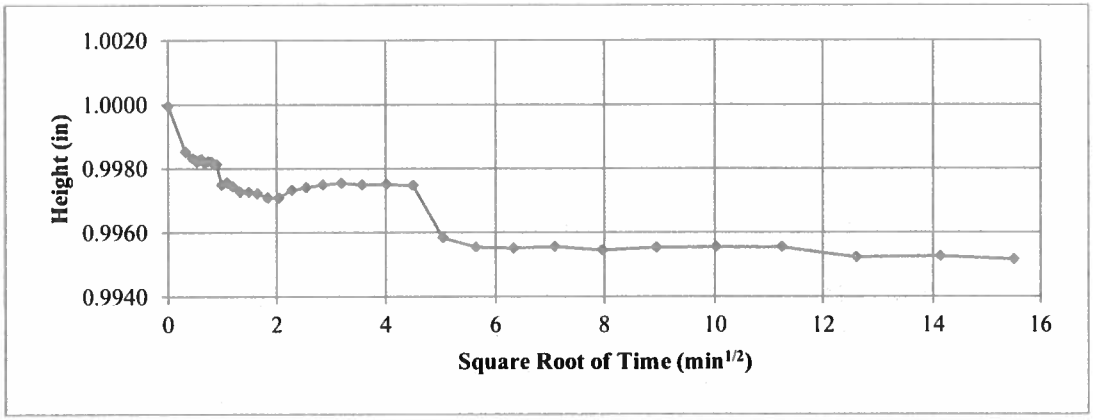
WSP USA **Norcross, Georgia**	**Title:** **ASTM D2435** **ONE-DIMENSIONAL CONSOLIDATION TEST REPORT** **CONSOLIDATION PLOTS**					
Job Short Title: **AEP/EFA KANAWHA RIVER/WV**						
Sample: **MW-2505D, 10.0-12.0'**	**Technician:** **CJ/DA**	**Reviewed:**	**Start Date:** **11/7/2025**	**Job Number:** **US-0041868.3860**	**Figure:** **2**	



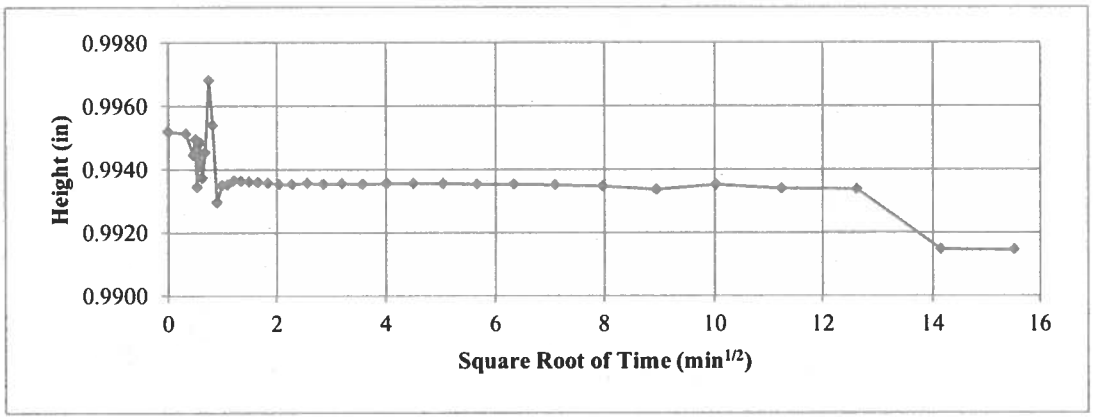


WSP USA **Norcross, Georgia**	**Title:** **ASTM D2435** **ONE-DIMENSIONAL CONSOLIDATION TEST REPORT** **CONSOLIDATION PLOTS**					
Job Short Title: **AEP/EFA KANAWHA RIVER/WV**						
Sample: **MW-2505D, 10.0-12.0'**	**Technician:** **CJ/DA**	**Reviewed:** JJ	**Start Date:** **11/7/2025**	**Job Number:** **US-0041868.3860**	**Figure:** **2A**	

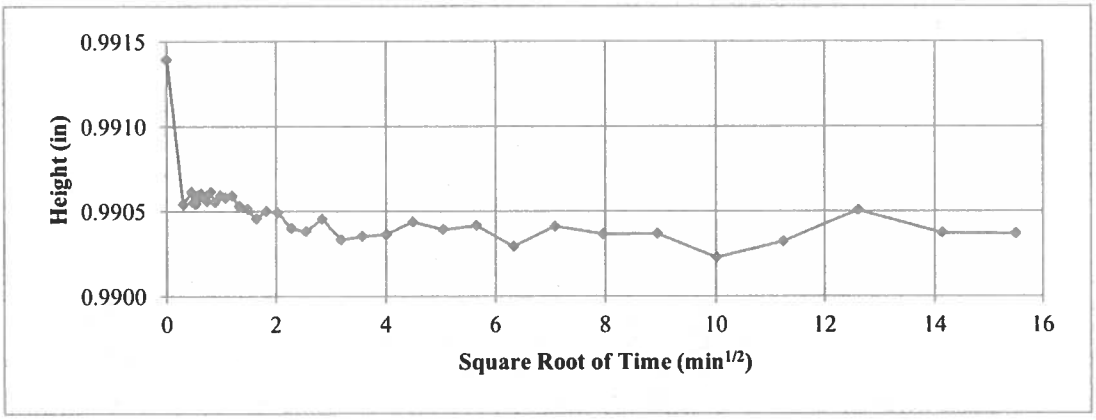
0.25 ksf



0.5 ksf

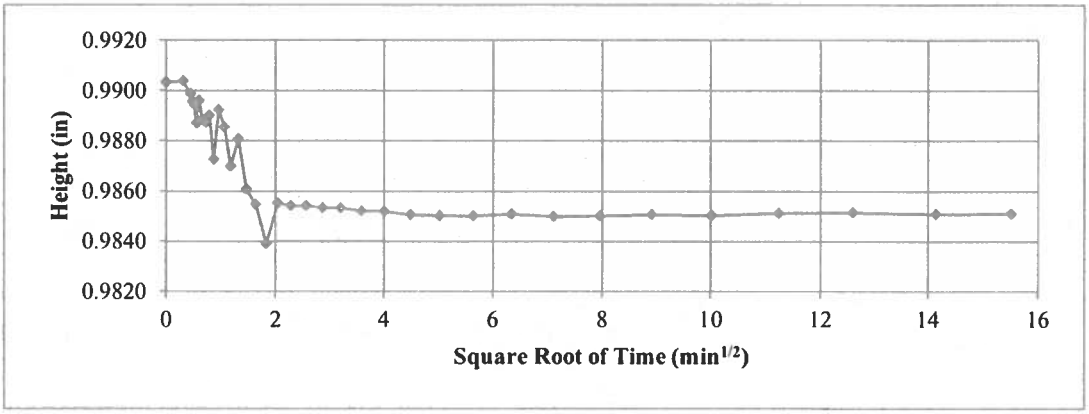


1.0 ksf

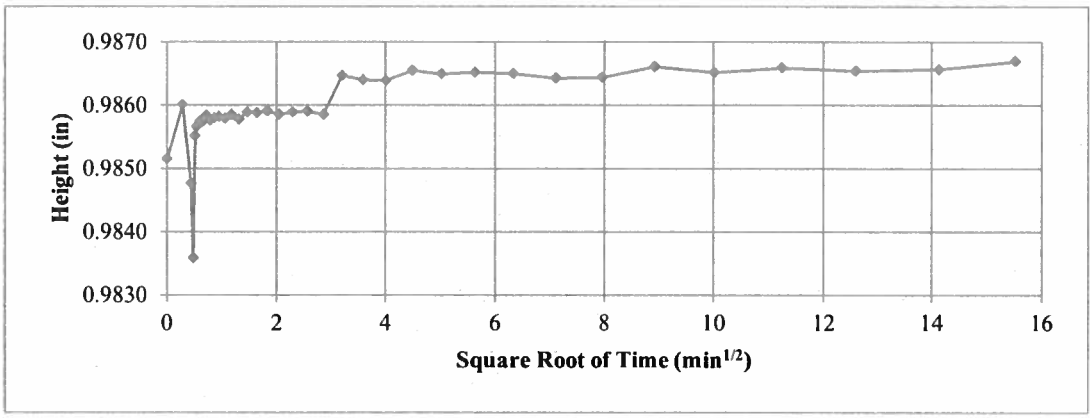


WSP USA **Norcross, Georgia**	**Title:** **ASTM D2435** **ONE-DIMENSIONAL CONSOLIDATION TEST REPORT** **TIME-DEFORMATION PLOTS (1)**				
Job Short Title: **AEP/EFA KANAWHA RIVER/WV**					
Sample: **MW-2505D, 10.0-12.0'**	**Technician:** **CJ/DA**	**Reviewed:** **JJ**	**Start Date:** **11/7/2025**	**Job Number:** **US-0041868.3860**	**Figure:** **3**

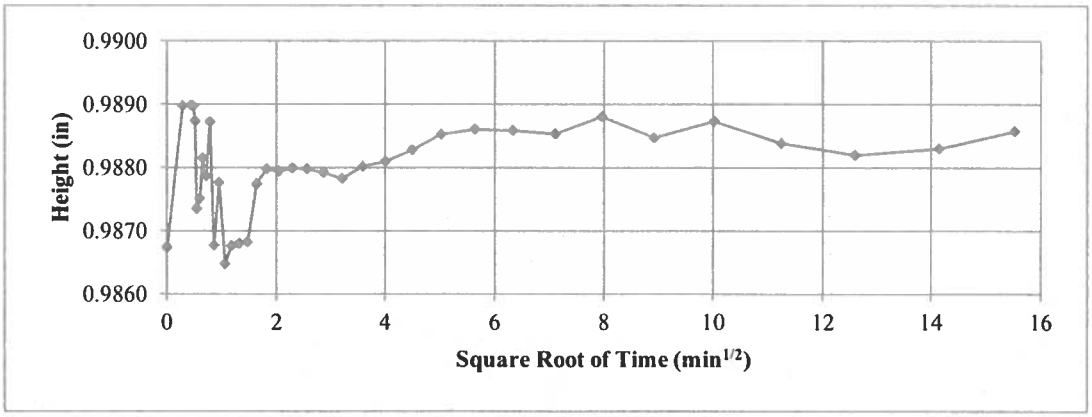
1.5 ksf



0.5 ksf

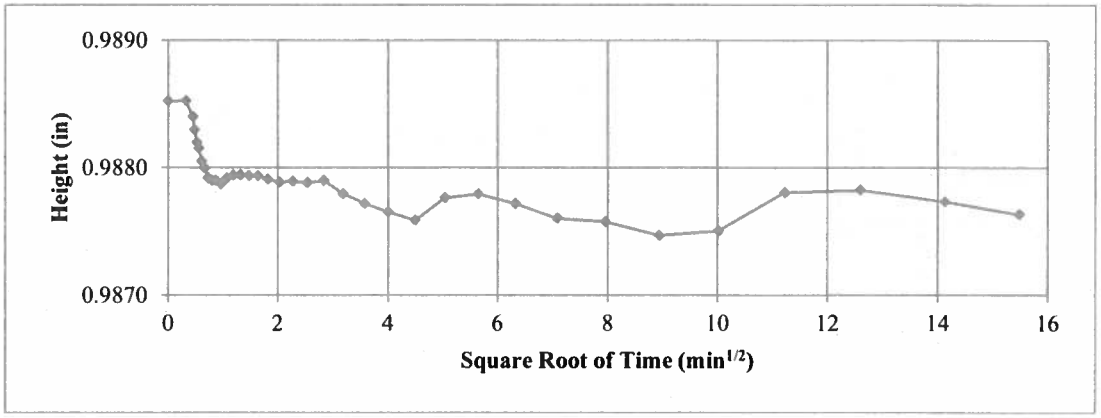


0.1 ksf

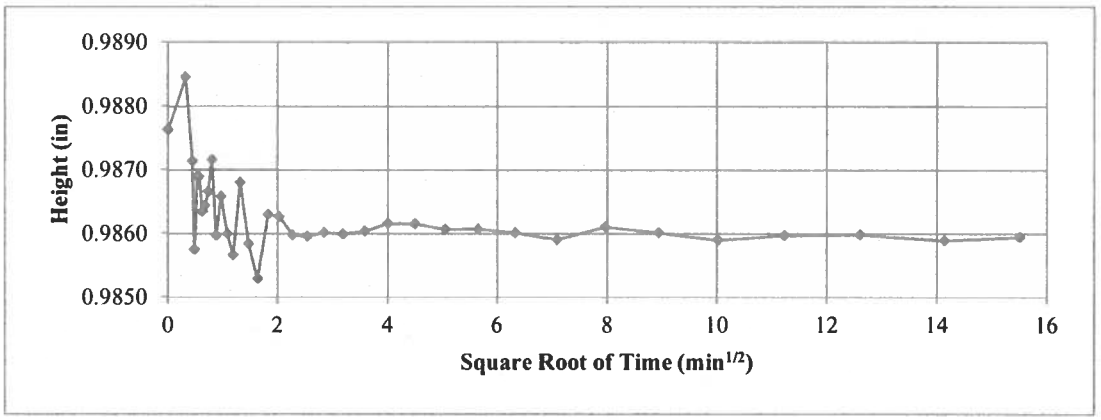


WSP USA Norcross, Georgia	Title: ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT TIME-DEFORMATION PLOTS (2)				
Job Short Title: AEP/EFA KANAWHA RIVER/WV					
Sample: MW-2505D, 10.0-12.0'	Technician: CJ/DA	Reviewed: JJ	Start Date: 11/7/2025	Job Number: US-0041868.3860	Figure: 4

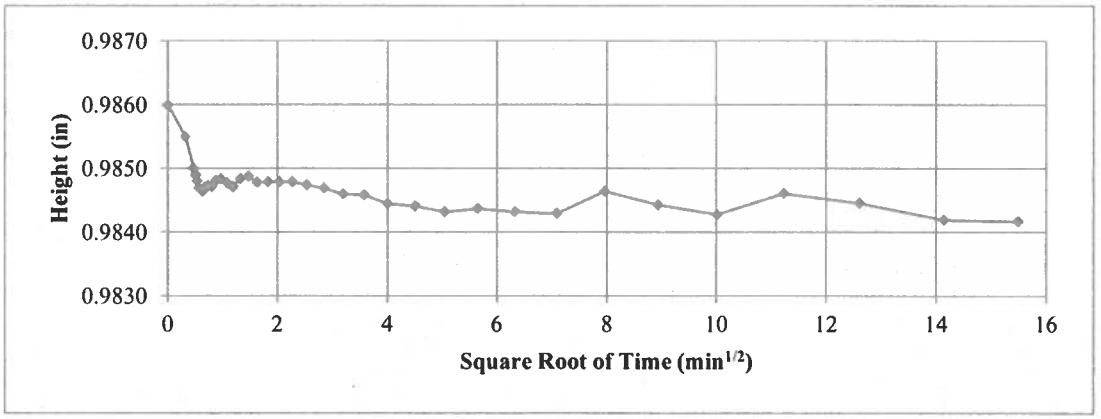
0.25 ksf



0.5 ksf

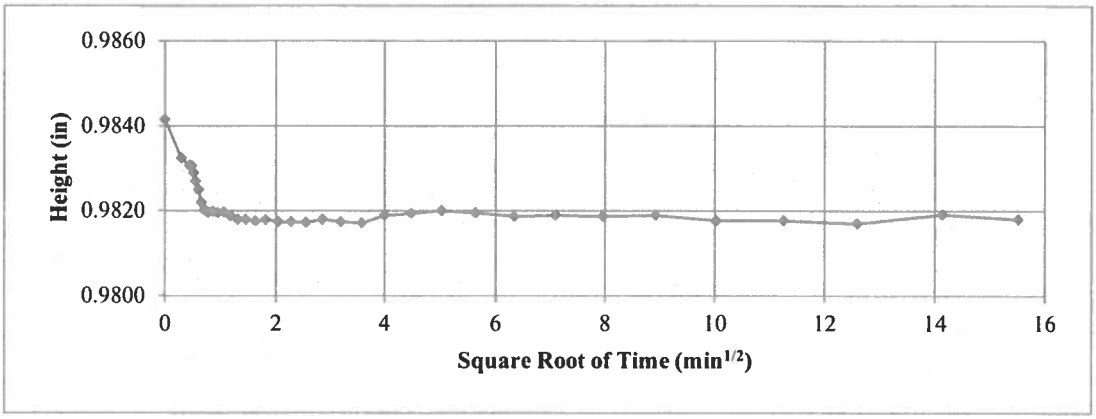


1.0 ksf

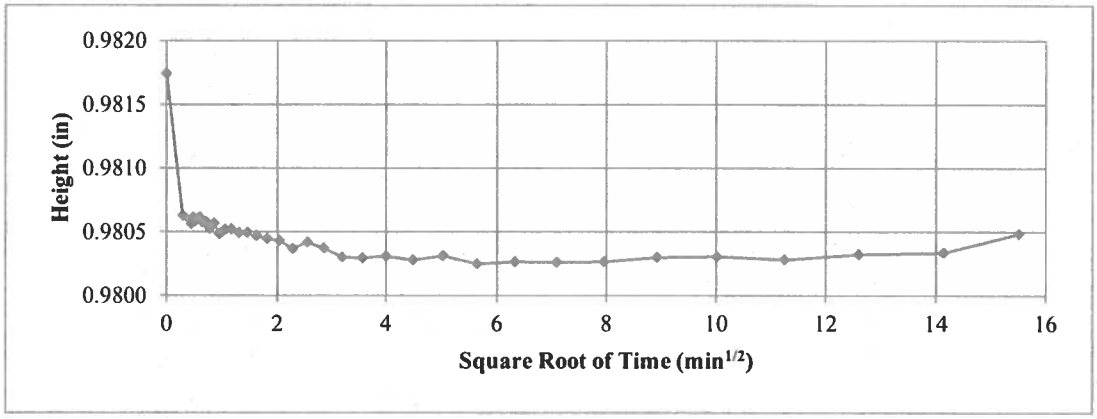


WSP USA Norcross, Georgia	Title: ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT TIME-DEFORMATION PLOTS (3)				
Job Short Title: AEP/EFA KANAWHA RIVER/WV					
Sample: MW-2505D, 10.0-12.0'	Technician: CJ/DA	Reviewed: JJ	Start Date: 11/7/2025	Job Number: US-0041868.3860	Figure: 5

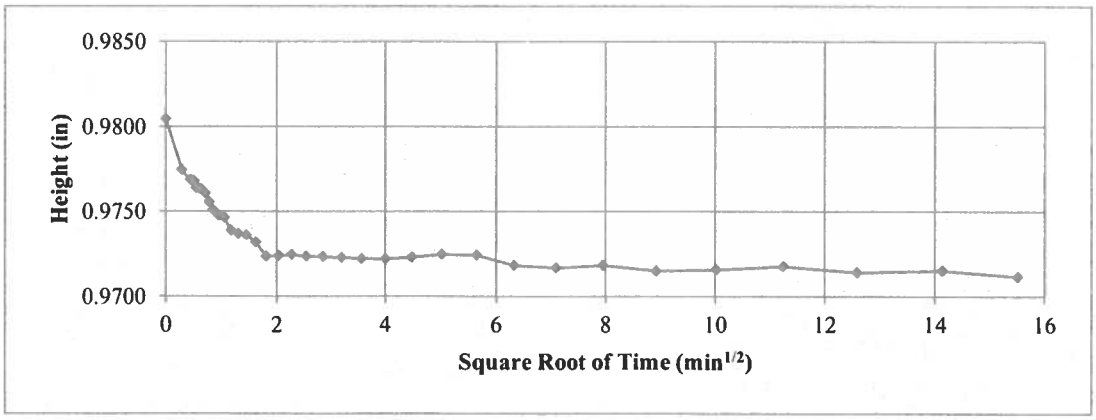
2.0 ksf



4.0 ksf

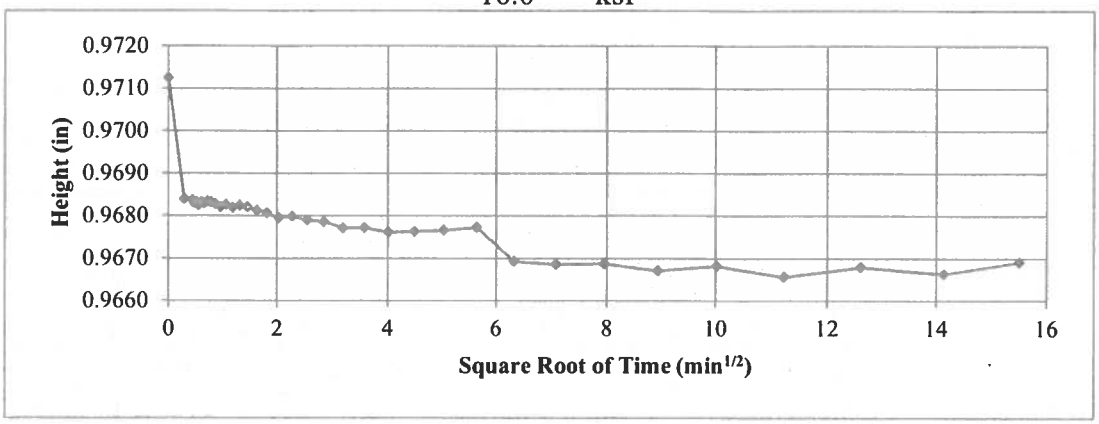


8.0 ksf

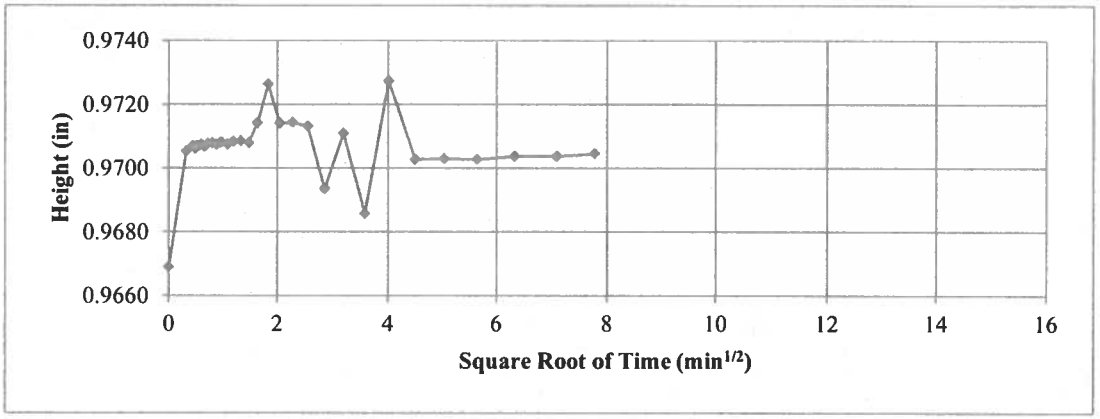


WSP USA **Norcross, Georgia**	**Title:** **ASTM D2435** **ONE-DIMENSIONAL CONSOLIDATION TEST REPORT** **TIME-DEFORMATION PLOTS (4)**				
Job Short Title: **AEP/EFA KANAWHA RIVER/WV**					
Sample: **MW-2505D, 10.0-12.0'**	**Technician:** **CJ/DA**	**Reviewed:** **JJ**	**Start Date:** **11/7/2025**	**Job Number:** **US-0041868.3860**	**Figure:** **6**

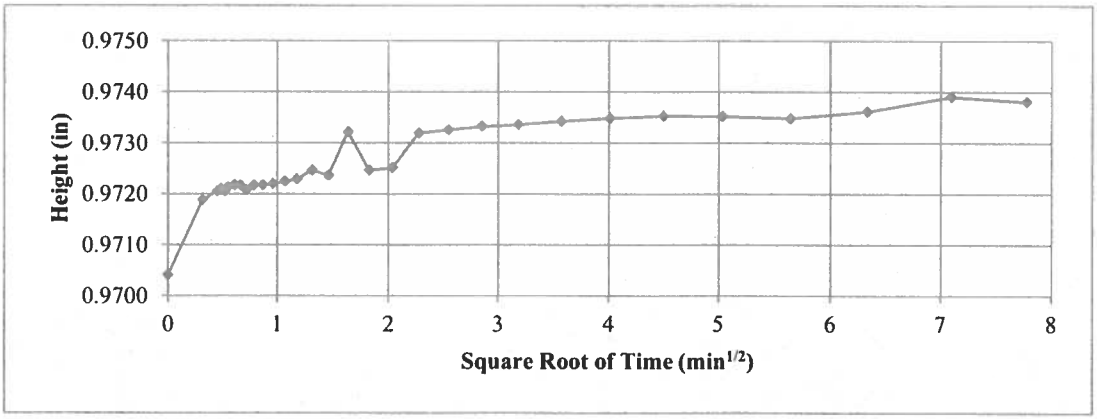
16.0 ksf



4.0 ksf

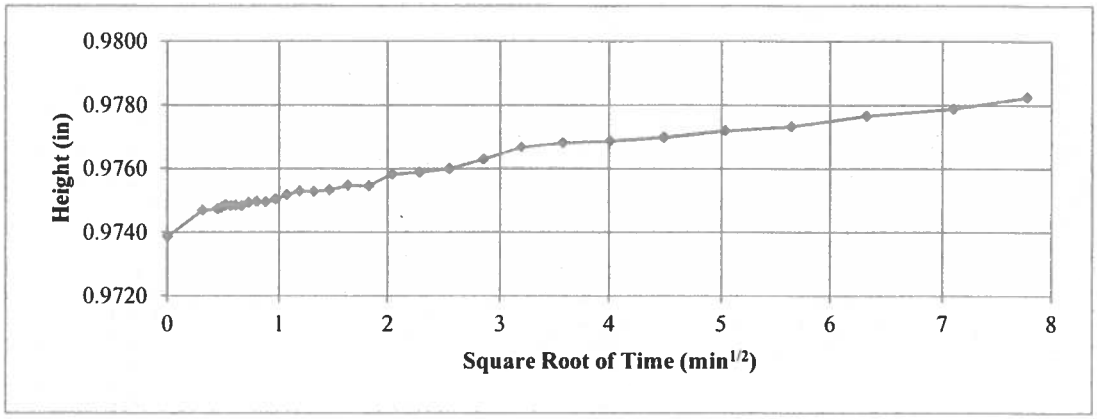


1.0 ksf

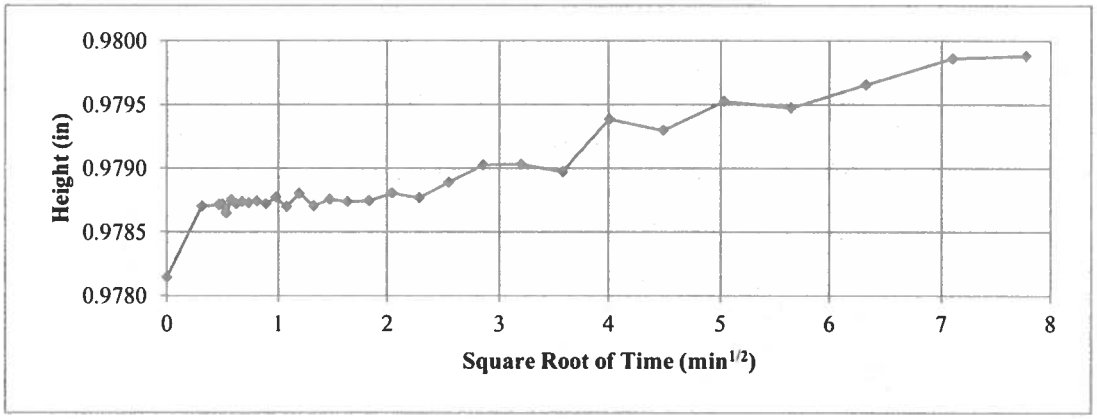


WSP USA **Norcross, Georgia**	**Title:** **ASTM D2435** **ONE-DIMENSIONAL CONSOLIDATION TEST REPORT** **TIME-DEFORMATION PLOTS (5)**				
Job Short Title: **AEP/EFA KANAWHA RIVER/WV**					
Sample: **MW-2505D, 10.0-12.0'**	**Technician:** **CJ/DA**	**Reviewed:** **JJ**	**Start Date:** **11/7/2025**	**Job Number:** **US-0041868.3860**	**Figure:** **7**

0.25 ksf



0.125 ksf



WSP USA **Norcross, Georgia**	**Title:** **ASTM D2435** **ONE-DIMENSIONAL CONSOLIDATION TEST REPORT** **TIME-DEFORMATION PLOTS (6)**					
Job Short Title: **AEP/EFA KANAWHA RIVER/WV**						
Sample: **MW-2505D, 10.0-12.0'**	**Technician:** **CJ/DA**	**Reviewed:** **JJ**	**Start Date:** **11/7/2025**	**Job Number:** **US-0041868.3860**	**Figure:** **8**	

NOVEMBER 2025

US-0041868.3860

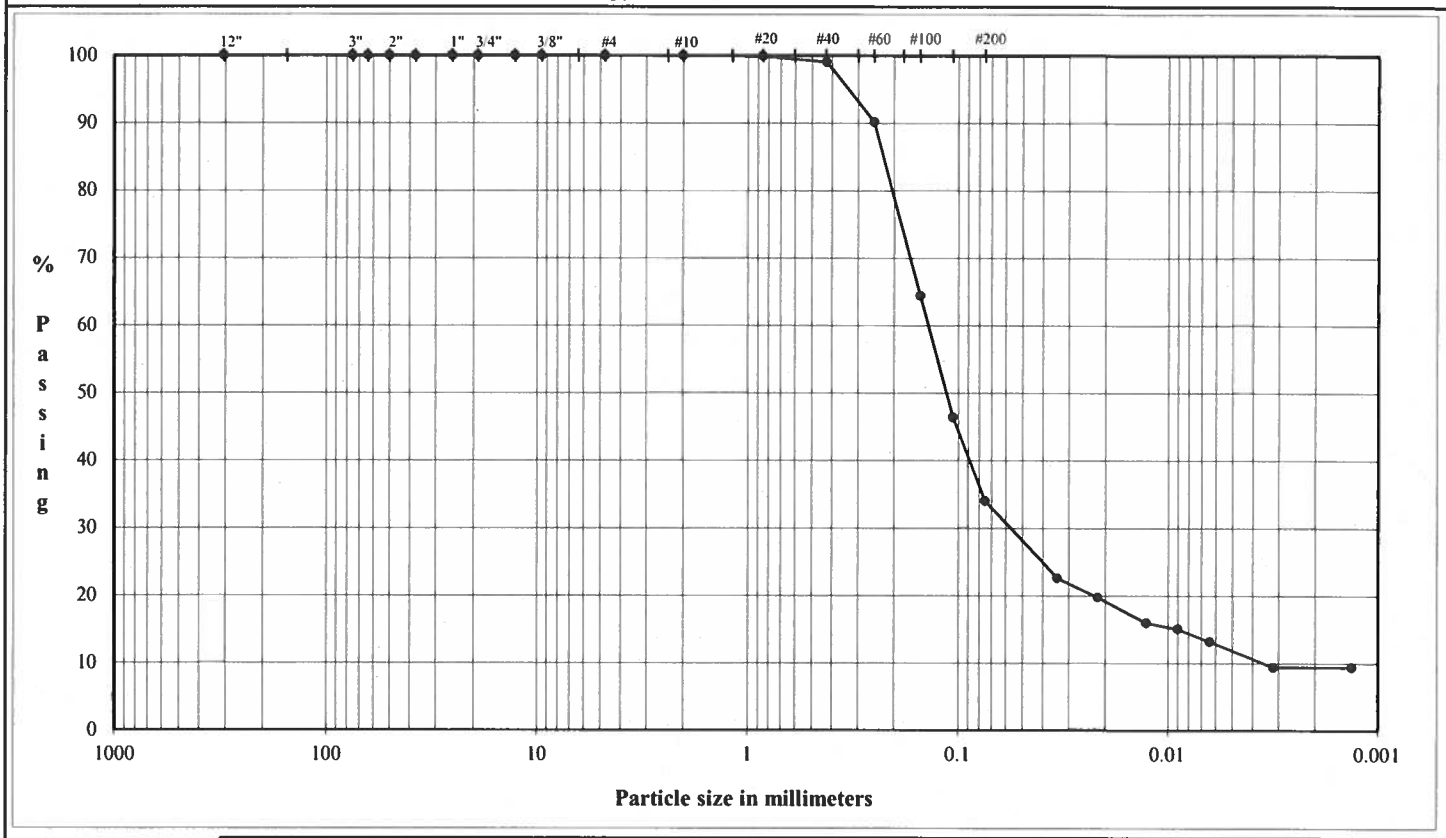
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: AEP/EFA KANAWHA RIVER/WV

SAMPLE ID: MW-2511 D Depth: 14.0-16.0'

TYPE: UD



COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Particle Size Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.0
0.50"	12.7	100.0		
0.375"	9.5	100.0		
#4	4.8	100.0	Fine Gravel	0.0
#10	2.00	100.0	Coarse Sand	0.0
#20	0.85	99.9		
#40	0.43	99.1	Medium Sand	0.9
#60	0.25	90.2		
#100	0.15	64.4		
#140	0.106	46.4		
#200	0.034	34.0	Fine Sand	65.1

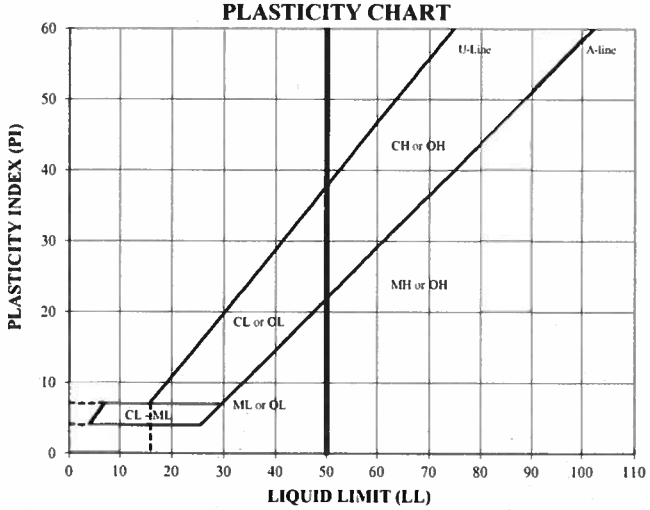
Hydrometer Analysis

(mm)	%Finer		
0.034	22.6		
0.022	19.8		
0.013	16.0	Fines	
0.0090	15.1	Silt or Clay	34.0
0.0064	13.2		
0.0032	9.4		
0.0013	9.4		

DESCRIPTION: fine SILTY SAND; brown.

USCS: SM

PLASTICITY CHART



ATTERBERG LIMITS

Method - B (Dry preparation)

M_c	LL	PL	PI	LI
11.7	NP	NP	NP	NP

LL (oven-dried) / < 0.75 = ORGANIC (OL OH)

TECH	CJ/JC/EK
DATE	11/12/25
CHECK	DP
REVIEW	JT
APPROVE	

SPECIFIC GRAVITY OF SOILS
ASTM D854
PYCNOMETER METHOD

PROJECT TITLE	AEP/EFA KANAWHA RIVER/WV		
PROJECT NUMBER	US-0041868.3860	**SAMPLE ID**	MW-2511D
		SAMPLE DEPTH	14.0-16.0'
TESTED FOR	Gs	**SAMPLE TYPE**	UD

HYGROSCOPIC MOISTURE CONTENT OF MATERIAL PASSING THE #4 SIEVE

Weight of Soil and Tare, Initial (g)	147.54
Weight of Soil and Tare, Final (g)	147.37
Weight of Tare (g)	62.54
Weight of Moisture (g)	0.17
Weight of Dry Soil (g)	84.83
Hygroscopic Moisture Content	0.2%

Test Method		Method - B
Pycnometer Number		7
Weight of Pycnometer (g)		186.95
Volume of Pycnometer (mL)		499.39
Weight of Pycnometer and Water (g)		685.28
Mass of Pycnometer and Water at the Test Temperture	(A)	685.14
Observed Temperature (Tb), for (Mb) (°C)		22.8
Weight of Soil, Water & Pycnometer (g)	(B)	733.06
Temperature (°C)		22.8
Density of Water @ Tested Temperature (g/mL)		0.9976
Tare Number		-
Weight of Dry Soil Slurry plus Tare (g)		260.29
Weight of Tare (g)		184.33
Weight of Dry Soil (g)	(C)	75.96
Temperature Coefficient		0.9979
SPECIFIC GRAVITY (G)		2.704

G @ 20 °C = [C/(A-(B - C))]*(K)

METHOD - A WET METHOD
METHOD - B OVEN-DRIED METHOD

METHOD OF AIR REMOVAL: VACUUM

Maximum Particle Size of Reduced Sample	Specimen Dry Mass (g) when using 500 mL Pycnometer (Minimum)	(Maximum)
No. 100	30	75
No. 40	40	100
No. 10	50	125
No. 4	75	200
3/8 in.	165	300

TECH	CJ
DATE	11/14/25
CHECK	DA
REVIEW	JY
APPROVE	

Boring or Test Pit:	MW-2511D		Boring or Test Pit:	MW-2511D		Boring or Test Pit:	MW-2511D	
Sample:	-		Sample:	-		Sample:	-	
Depth:	14.0-16.0 ft		Depth:	14.0-16.0 ft		Depth:	14.0-16.0 ft	
Point No.:	1		Point No.:	2		Point No.:	3	
Initial			**Initial**			**Initial**		
Length =	6.022	in	Length =	6.004	in	Length =	5.991	in
Diameter =	2.861	in	Diameter =	2.867	in	Diameter =	2.858	in
Wet Mass =	2.790	lb	Wet Mass =	2.820	lb	Wet Mass =	2.841	lb
Area =	6.429	in^2	Area =	6.456	in^2	Area =	6.415	in^2
Volume =	38.714	in^3	Volume =	38.760	in^3	Volume =	38.434	in^3
Specific Gravity =	2.70	(ASTM D854)	Specific Gravity =	2.70	(ASTM D854)	Specific Gravity =	2.70	(ASTM D854)
Dry Mass of Solids =	2.464	lb	Dry Mass of Solids =	2.515	lb	Dry Mass of Solids =	2.508	lb
Moisture Content =	13.2%		Moisture Content =	12.1%		Moisture Content =	13.3%	
Wet Unit Weight =	124.5	pcf	Wet Unit Weight =	125.7	pcf	Wet Unit Weight =	127.7	pcf
Dry Unit Weight =	110.0	pcf	Dry Unit Weight =	112.1	pcf	Dry Unit Weight =	112.8	pcf
Void Ratio =	0.53		Void Ratio =	0.50		Void Ratio =	0.49	
Percent Saturation =	67%		Percent Saturation =	65%		Percent Saturation =	73%	
After Consolidation			**After Consolidation**			**After Consolidation**		
Length =	5.970	in	Length =	5.964	in	Length =	5.948	in
Diameter =	2.823	in	Diameter =	2.846	in	Diameter =	2.824	in
Area =	6.260	in^2 (Method B)	Area =	6.361	in^2 (Method B)	Area =	6.265	in^2 (Method B)
Volume =	37.373	in^3	Volume =	37.940	in^3	Volume =	37.264	in^3
Moisture Content =	17.7%		Moisture Content =	17.4%		Moisture Content =	16.6%	
Wet Unit Weight =	134.1	pcf	Wet Unit Weight =	134.5	pcf	Wet Unit Weight =	135.6	pcf
Dry Unit Weight =	113.9	pcf	Dry Unit Weight =	114.6	pcf	Dry Unit Weight =	116.3	pcf
Void Ratio =	0.48		Void Ratio =	0.47		Void Ratio =	0.45	
Percent Saturation =	100%		Percent Saturation =	100%		Percent Saturation =	100%	
B Parameter =	0.95		B Parameter =	0.96		B Parameter =	0.97	
Shear Rate =	0.091%	/min.	Shear Rate =	0.090%	/min.	Shear Rate =	0.090%	/min.
t_{50} =	0.36	min.	t_{50} =	0.15	min.	t_{50} =	0.32	min.
Strain at Failure =	15.1%		Strain at Failure =	9.5%		Strain at Failure =	6.5%	
Cell Pressure =	85.0	psi	Cell Pressure =	90.0	psi	Cell Pressure =	100.0	psi
Back Pressure =	80.0	psi	Back Pressure =	80.0	psi	Back Pressure =	80.0	psi
Confining Pressure =	5.0	psi	Confining Pressure =	10.0	psi	Confining Pressure =	20.0	psi

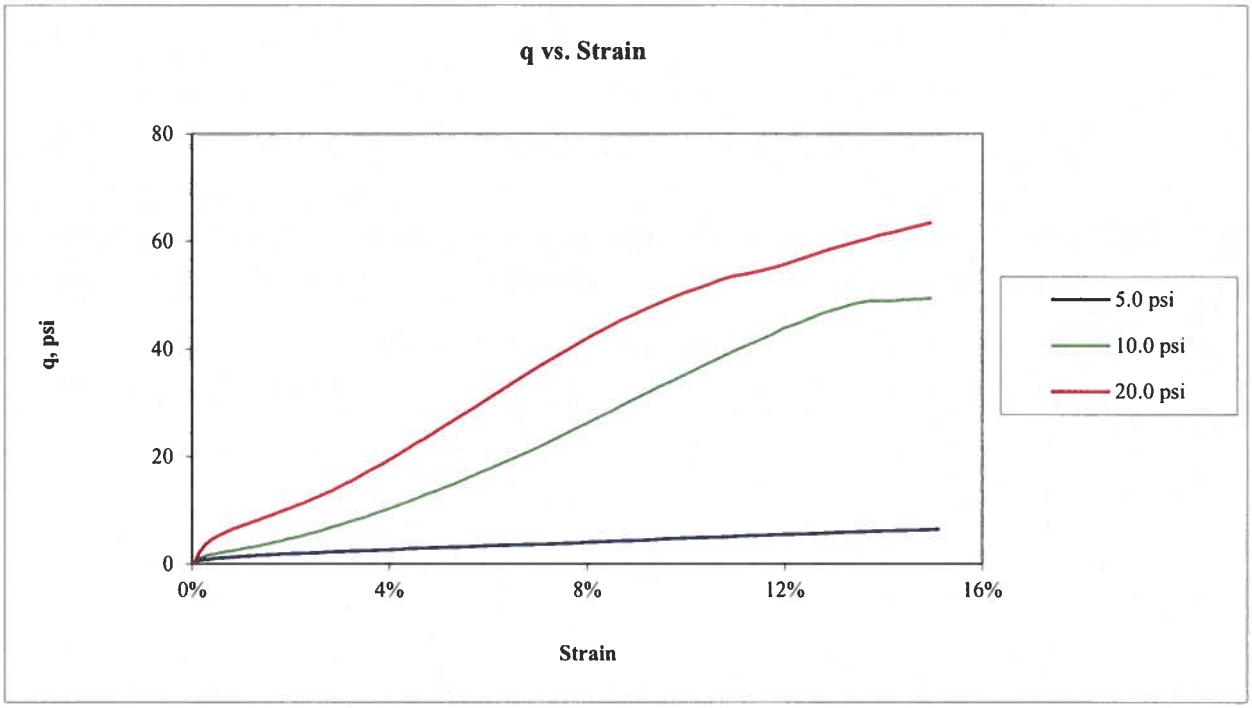
Notes: Sample description: SM - fine SILTY SAND; brown.

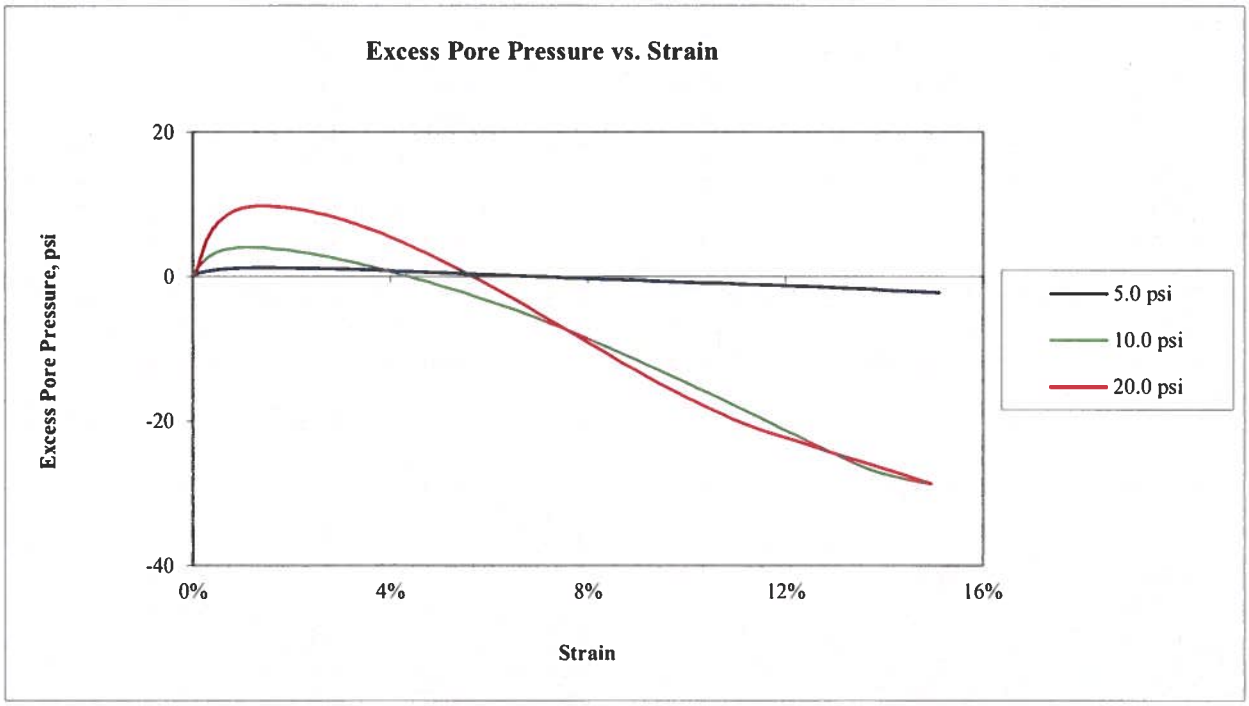
Atterberg limits: LL = NP PL = NP PI = NP (ASTM D4318)

Percent finer: 3/4 in. = 100% No. 4 = 100% No. 200 = 34% (ASTM D422, refer to separate report for gradation curve)

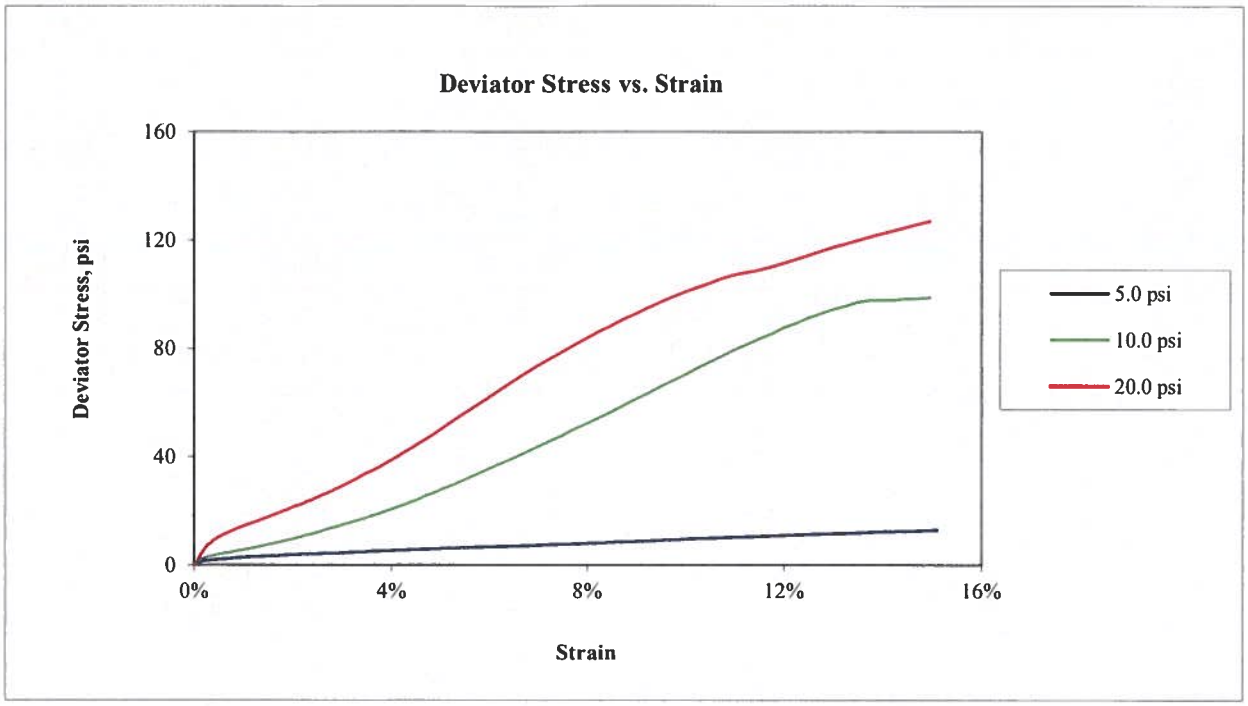
Specimen type:	X	Intact		Reconstituted
Moisture from:		Cuttings	X	Entire specimen
Saturation method:	X	Wet		Dry
Failure criterion:	X	$(\sigma'_1/\sigma'_3)_{max}$		$(\sigma'_1-\sigma'_3)_{max}$ ____ % strain
Membrane effect:	X	Corrected		Not Corrected

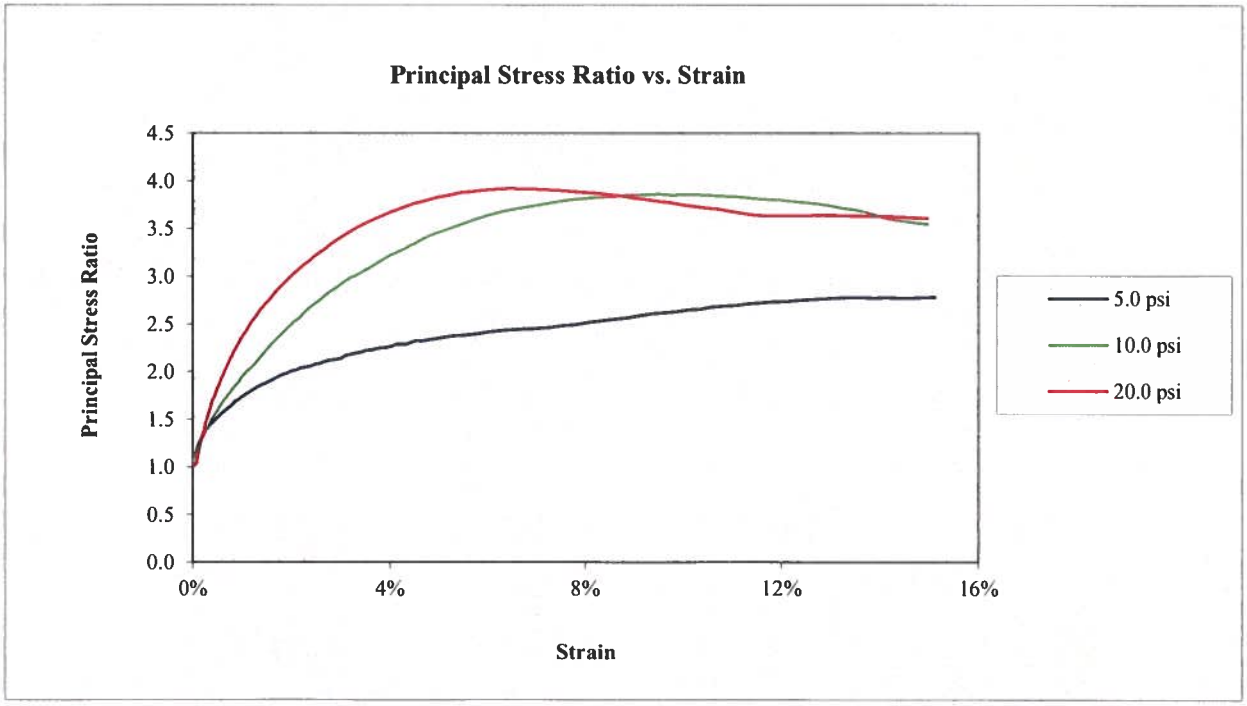
WSP USA **Norcross, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **SAMPLE AND TEST DATA**				
Job Short Title: **AEP/EFA KANAWHA RIVER/WV**					
Sample: **MW-2511D, 14.0-16.0'**	**Technician:** CJ **Check:** DA	**Reviewed:** M **Approved:**	**Start Date:** 11/18/2025	**Job Number:** US-0041868.3860	**Figure:** 1





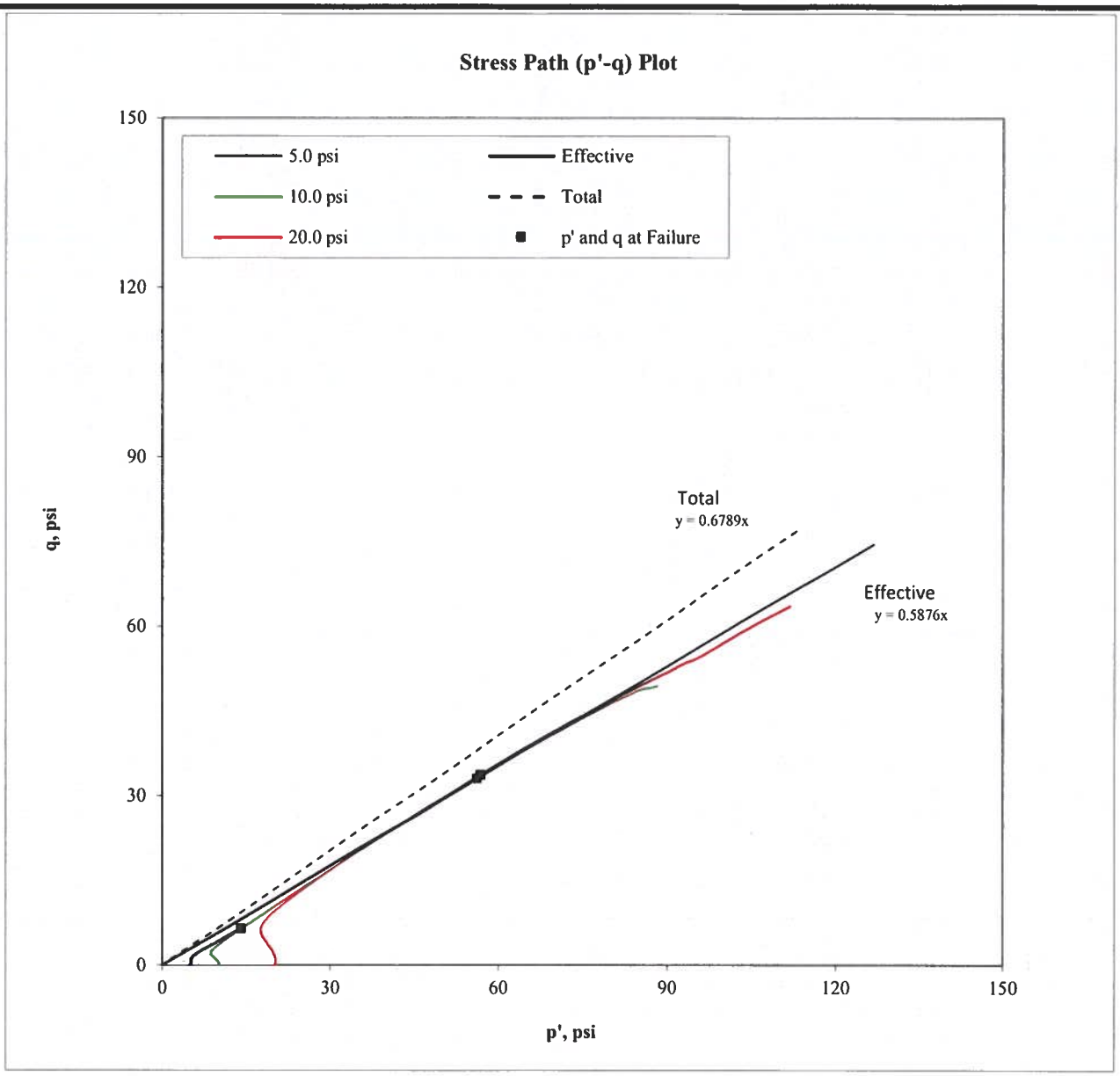
WSP USA **Norcross, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **q AND EXCESS PORE PRESSURE PLOTS**				
Job Short Title: **AEP/EFA KANAWHA RIVER/WV**					
Sample: **MW-2511D, 14.0-16.0'**	**Technician:** **CJ** **Check:** DM	**Reviewed:** M **Approved:**	**Start Date:** **11/18/2025**	**Job Number:** **US-0041868.3860**	**Figure:** **2**





WSP USA **Norcross, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **DEVIATOR STRESS AND PRINCIPAL STRESS RATIO PLOT**				
Job Short Title: **AEP/EFA KANAWHA RIVER/WV**					
Sample: **MW-2511D, 14.0-16.0'**	**Technician:** **CJ** **Check:** DM	**Reviewed:** **Approved:**	**Start Date:** **11/18/2025**	**Job Number:** **US-0041868.3860**	**Figure:** **3**

Stress Path (p'-q) Plot



Confining Pressure (psi)	p at failure (psi)	p' at failure (psi)	q at failure (psi)
5.0	11.5	13.8	6.5
10.0	43.0	56.1	33.0
20.0	53.7	56.7	33.7

Effective

α ' =	30.4	degree
a' =	0.0	psi

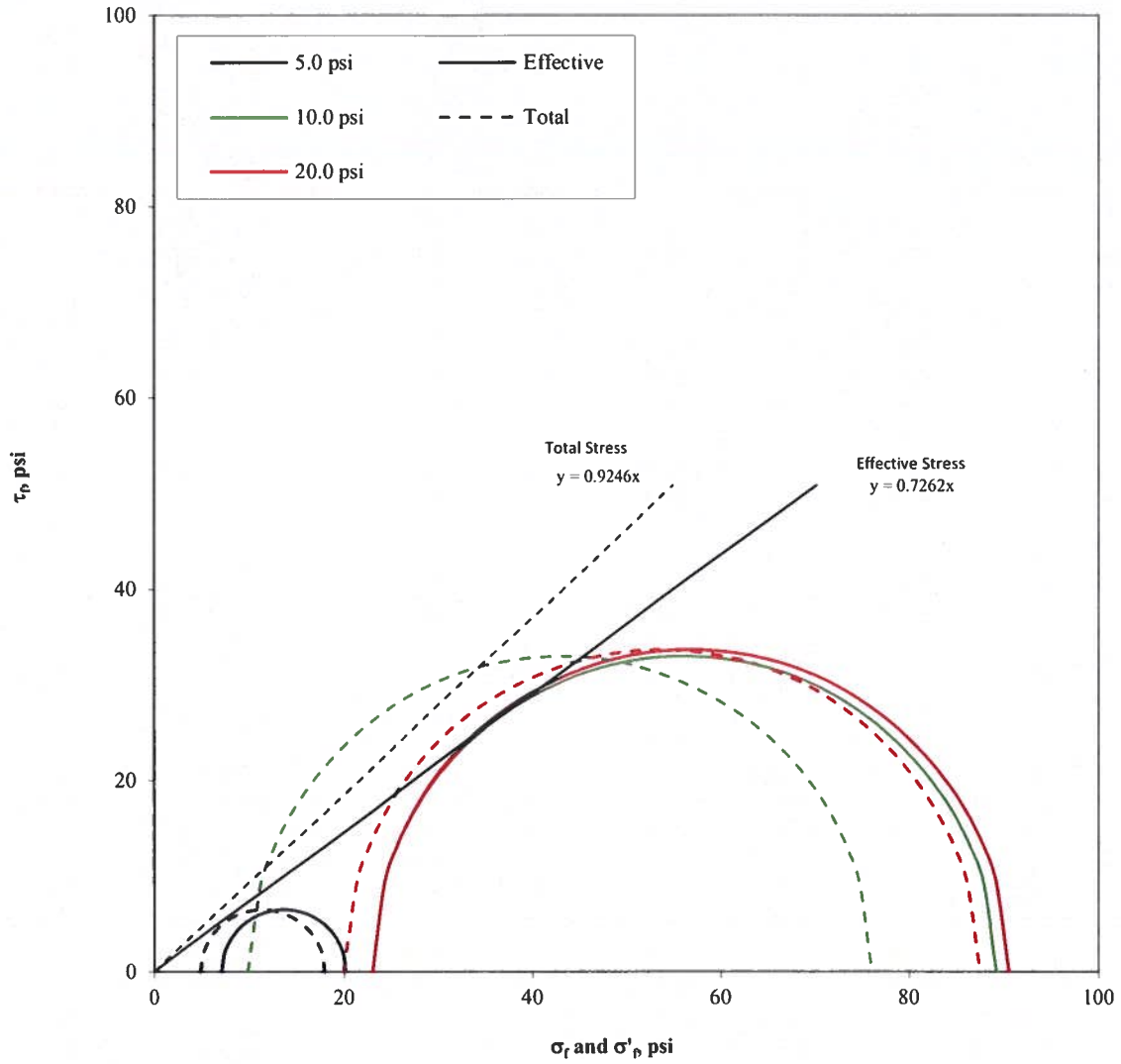
Total

α =	34.2	degree
a =	0.0	psi

Note: The laboratory testing relates only to the sample tested. WSP USA neither accepts responsibility for nor makes claims to the final use and purpose of the material.

WSP USA **Norcross, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **STRESS PATH PLOT**				
Job Short Title: **AEP/EFA KANAWHA RIVER/WV**					
Sample: **MW-2511D, 14.0-16.0'**	**Technician:** **CJ** **Check: DA**	**Reviewed:** **Approved:**	**Start Date:** **11/18/2025**	**Job Number:** **US-0041868.3860**	**Figure:** **4**

Mohr's Circle Diagram



Confining Pressure (psi)	σ'_1 at failure (psi)	σ'_3 at failure (psi)	σ_1 at failure (psi)	σ_3 at failure (psi)
5.0	20.2	7.3	18.0	5.0
10.0	89.1	23.1	76.0	10.0
20.0	90.4	23.1	87.3	20.0

Effective

ϕ' =	36.0	degree
c' =	0.0	psi

Total

ϕ =	42.8	degree
c =	0.0	psi

Note: The laboratory testing relates only to the sample tested. WSP USA neither accepts responsibility for nor makes claims to the final use and purpose of the material.

WSP USA **Norcross, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **MOHR'S CIRCLE DIAGRAM**				
Job Short Title: **AEP/EFA KANAWHA RIVER/WV**					
Sample: **MW-2511D, 14.0-16.0'**	**Technician:** **CJ** **Check:** DL	**Reviewed:** **Approved:**	**Start Date:** **11/18/2025**	**Job Number:** **US-0041868.3860**	**Figure:** **5**

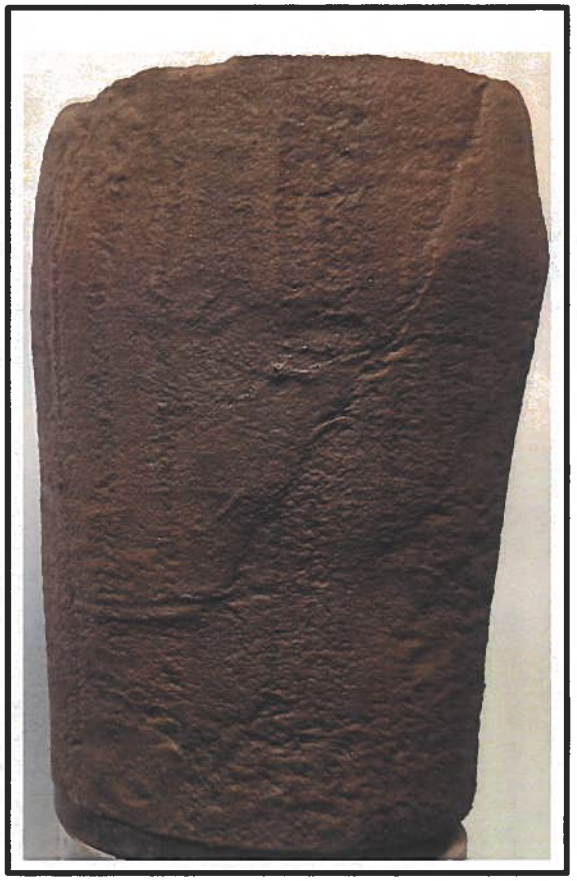
5.0 psi



10.0 psi



20.0 psi



WSP USA **Norcross, Georgia**	**Title:** ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT SPECIMENS PHOTOGRAPH - 5.0 | 10.0 | 20.0 psi				
Job Short Title: AEP/EFA KANAWHA RIVER/WV					
Sample: MW-2511D, 14.0-16.0'	**Technician:** CJ **Check:** DA	**Reviewed:** **Approved:**	**Start Date:** 11/18/2025	**Job Number:** US-0041868.3860	**Figure:** 6

SPECIFIC GRAVITY OF SOILS
ASTM D854
PYCNOMETER METHOD

PROJECT TITLE	AEP/EFA KANAWHA RIVER/WV		
PROJECT NUMBER	US-0041868.3860	**SAMPLE ID**	MW-2511D
		SAMPLE DEPTH	26.0-28.0'
TESTED FOR	Gs	**SAMPLE TYPE**	UD

HYGROSCOPIC MOISTURE CONTENT OF MATERIAL PASSING THE #4 SIEVE

Weight of Soil and Tare, Initial (g)	116.23
Weight of Soil and Tare, Final (g)	115.96
Weight of Tare (g)	52.10
Weight of Moisture (g)	0.27
Weight of Dry Soil (g)	63.86
Hygroscopic Moisture Content	0.4%

Test Method		Method - B
Pycnometer Number		7
Weight of Pycnometer (g)		186.95
Volume of Pycnometer (mL)		499.39
Weight of Pycnometer and Water (g)		685.28
Mass of Pycnometer and Water at the Test Temperture	(A)	684.88
Observed Temperature (Tb), for (Mb) (°C)		24.9
Weight of Soil, Water & Pycnometer (g)	(B)	717.11
Temperature (°C)		24.9
Density of Water @ Tested Temperature (g/mL)		0.9971
Tare Number		-
Weight of Dry Soil Slurry plus Tare (g)		50.99
Weight of Tare (g)		0.00
Weight of Dry Soil (g)	(C)	50.99
Temperature Coefficient		0.9979

SPECIFIC GRAVITY (G) 2.713

G @ 20 °C = [C/(A-(B - C))]*(K)

METHOD - A WET METHOD

METHOD - B OVEN-DRIED METHOD

METHOD OF AIR REMOVAL: VACUUM

Maximum Particle Size of Reduced Sample	Specimen Dry Mass (g) when using 500 mL Pycnometer (Minimum)	(Maximum)
No. 100	30	75
No. 40	40	100
No. 10	50	125
No. 4	75	200
3/8 in.	165	300

TECH	CJ
DATE	11/20/25
CHECK	DA
REVIEW	AA
APPROVE	

AEP/EFA KANAWHA RIVER/WV
SUMMARY OF SOIL DATA

Sample Identification	Sample Depth	Sample Type	Soil Classi-fication	As-R'cvd Moisture Content	Atterberg Limits				Grain Size Distribution			Compaction		Gs	Unit Weight		Permeability	Additional Tests Conducted
									% Finer	% Finer	% Finer	Max. Dry	Optimum		Dry	Moisture		
				%	LL	PL	PI	LI	No. 4 Sieve	No. 200 Sieve	0.002 mm	Density (pcf)	Moisture %		Density (pcf)	Content %	(cm/sec)	(See Notes)
MW-2505 D	5.5-7.5'	UD	CL	14.4	22	13	9	0.11	97.9	56.9	20.0	-	-	2.72	119.9	12.7	-	T
MW-2505 D	10.0-12.0'	UD	SM	11.9	NP	NP	NP	NP	100.0	36.2	8.4	-	-	2.69	112.8	13.0	-	T
MW-2505 D	10.0-12.0'	UD	-	-	-	-	-	-	-	-	-	-	-	-	118.4	13.5	-	C
MW-2505 D	34.0-36.0'	UD	SM	15.0	NP	NP	NP	NP	100.0	28.0	6.8	-	-	2.66	102.2	15.0	-	DS
MW-2511 D	14.0-16.0'	UD	SM	11.7	NP	NP	NP	NP	100.0	34.0	9.4	-	-	2.70	111.6	12.9	-	T
MW-2511 D	26.0-28.0'	UD	ML	18.2	NP	NP	NP	NP	98.5	53.1	12.5	-	-	2.71	104.8	18.2	-	T

ABBREVIATIONS: LIQUID LIMIT (LL)
PLASTIC LIMIT (PL)
PLASTICITY INDEX (PI)
LIQUIDITY INDEX (LI)
SPECIFIC GRAVITY (Gs)

NOTES: T = TRIAXIAL TEST
U = UNCONFINED COMPRESSION TEST
C = CONSOLIDATION TEST
DS = DIRECT SHEAR TEST

Boring or Test Pit:	MW-2505D		Boring or Test Pit:			Boring or Test Pit:		
Sample:	-		Sample:			Sample:		
Depth:	5.5-7.5	ft	Depth:			Depth:		
Point No.:	1		Point No.:			Point No.:		
	Initial							
Length =	5.925	in	Length =	5.909		Length =	5.895	
Diameter =	2.845	in	Diameter =	2.843		Diameter =	2.846	
Wet Mass =	2.945	lb	Wet Mass =			Wet Mass =		
Area =	6.357	in^2	Area =			Area =		
Volume =	37.665	in^3	Volume =			Volume =		
Specific Gravity =	2.72	(ASTM D854)	Specific Gravity =			Specific Gravity =		
Dry Mass of Solids =	2.613	lb	Dry Mass of Solids =			Dry Mass of Solids =		
Moisture Content =	12.7%		Moisture Content =			Moisture Content =		
Wet Unit Weight =	135.1	pcf	Wet Unit Weight =			Wet Unit Weight =		
Dry Unit Weight =	119.9	pcf	Dry Unit Weight =			Dry Unit Weight =		
Void Ratio =	0.41		Void Ratio =			Void Ratio =		
Percent Saturation =	84%		Percent Saturation =			Percent Saturation =		
	After Consolidation			**After Consolidation**			**After Consolidation**	
Length =	5.909	in	Length =	5.895	in	Length =	5.876	in
Diameter =	2.843	in	Diameter =	2.846	in	Diameter =	2.850	in
Area =	6.346		Area =	6.361		Area =	6.381	in^2 (Method B)
Volume =	37.498		Volume =	37.498		Volume =	37.498	in^3
Moisture Content =			Moisture Content =			Moisture Content =	15.0%	
Wet Unit Weight =			Wet Unit Weight =			Wet Unit Weight =	138.5	pcf
Dry Unit Weight =			Dry Unit Weight =			Dry Unit Weight =	120.4	pcf
Void Ratio =			Void Ratio =			Void Ratio =	0.41	
Percent Saturation =			Percent Saturation =			Percent Saturation =	100%	
B Parameter =	0.95		B Parameter =	--		B Parameter =	--	
Shear Rate =	0.086%	/min.	Shear Rate =	0.088%	/min.	Shear Rate =	0.090%	/min.
t_{50} =	1.57	min.	t_{50} =	0.74	min.	t_{50} =	1.22	min.
Strain at Failure =	0.2%		Strain at Failure =	0.5%		Strain at Failure =	2.3%	
Cell Pressure =	82.0	psi	Cell Pressure =	84.5	psi	Cell Pressure =	88.5	psi
Back Pressure =	80.0	psi	Back Pressure =	80.0	psi	Back Pressure =	80.0	psi
Confining Pressure =	2.0	psi	Confining Pressure =	4.5	psi	Confining Pressure =	8.5	psi

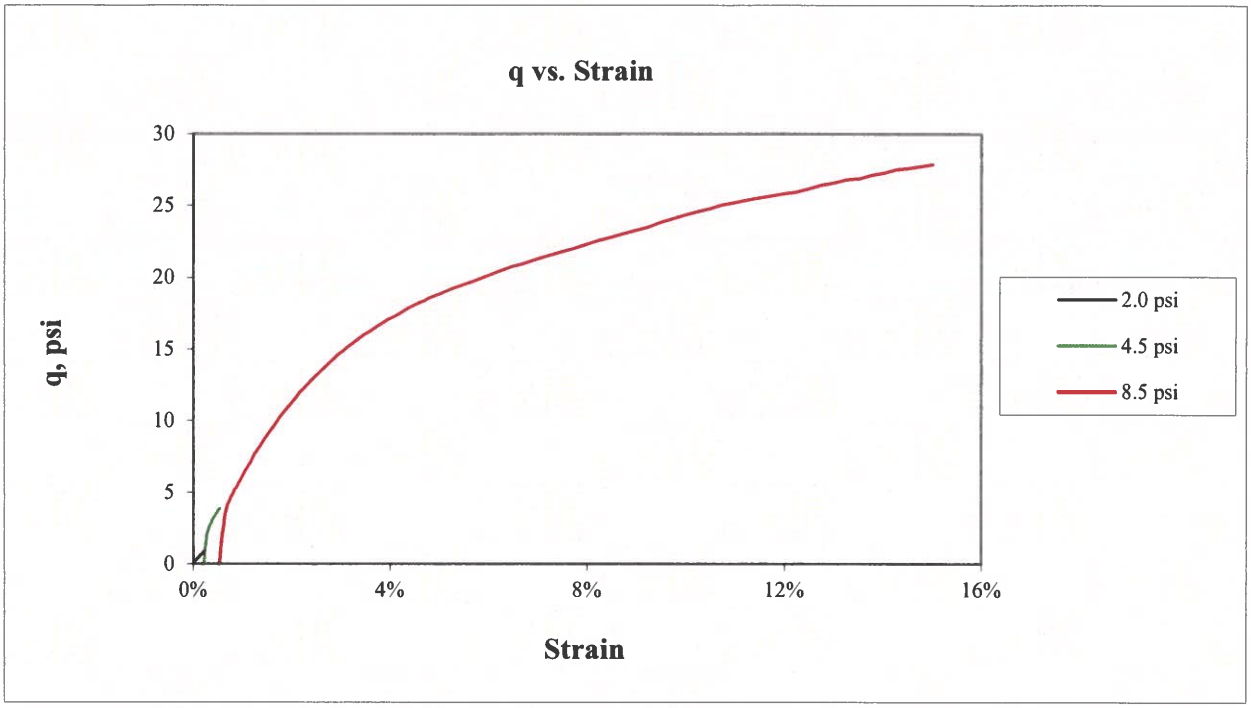
Notes: Sample description: CL - SILTY CLAY and SAND, fine to coarse, trace fine gravel; brown.

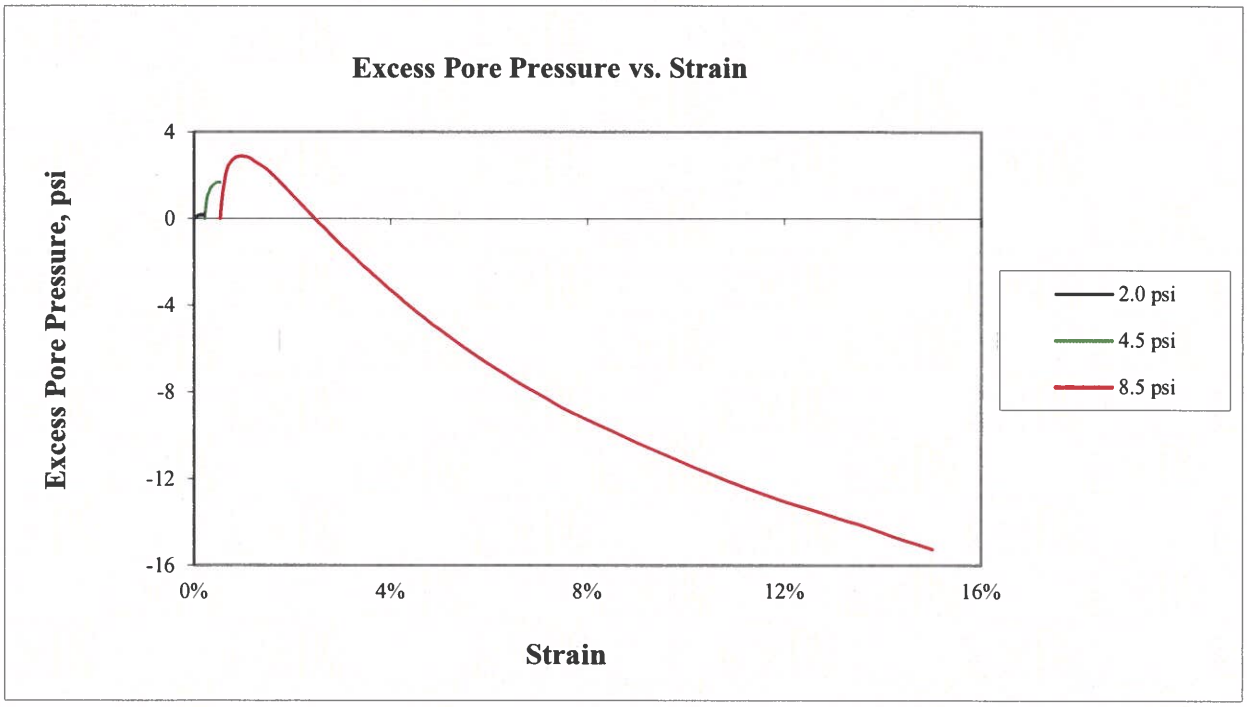
Atterberg limits: LL = 22 PL = 13 PI = 9 (ASTM D4318)

Percent finer: 3/4 in. = 100% No. 4 = 98% No. 200 = 57% (ASTM D422, refer to separate report for gradation curve)

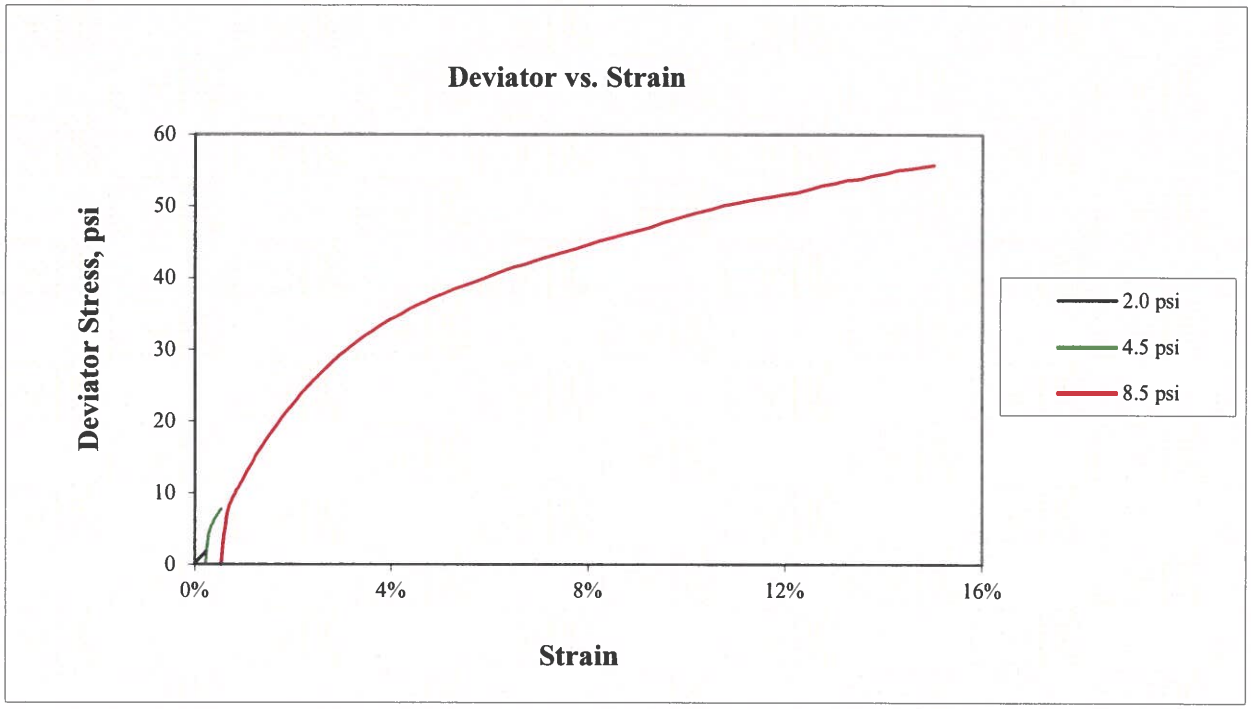
Specimen type:	X	Intact		Reconstituted
Moisture from:		Cuttings	X	Entire specimen
Saturation method:	X	Wet		Dry
Failure criterion:	X	$(\sigma'_1/\sigma'_3)_{max}$		$(\sigma'_1-\sigma'_3)_{max}$ ____ % strain
Membrane effect:	X	Corrected		Not Corrected

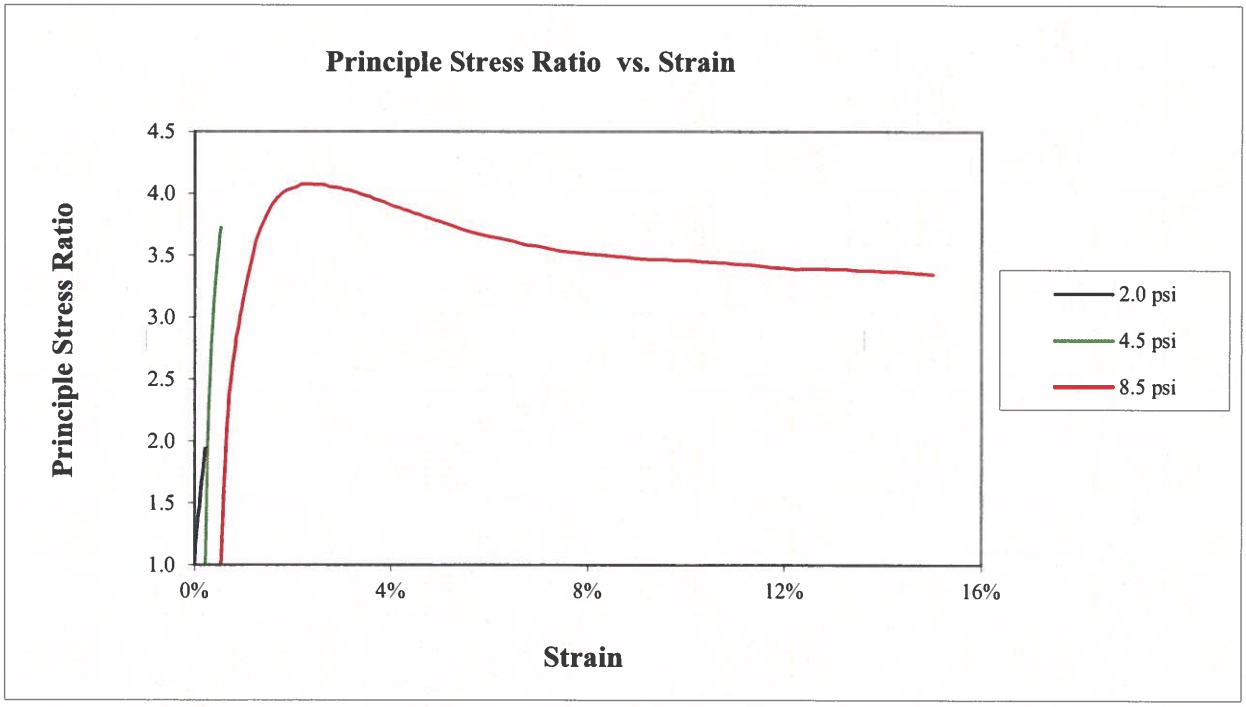
WSP USA **Norcross, Georgia**	**Title:** **MODIFIED (Multi-Stage) - ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **SAMPLE AND TEST DATA**				
Job Short Title: **AEP/EFA KANAWHA RIVER/WV**					
Sample: **MW-2505D, 5.5-7.5'**	**Technician:** FT **Check:**	**Reviewed:** JA **Approved:**	**Start Date:** 11/28/2025	**Job Number:** US-0041868.3860	**Figure:** 1





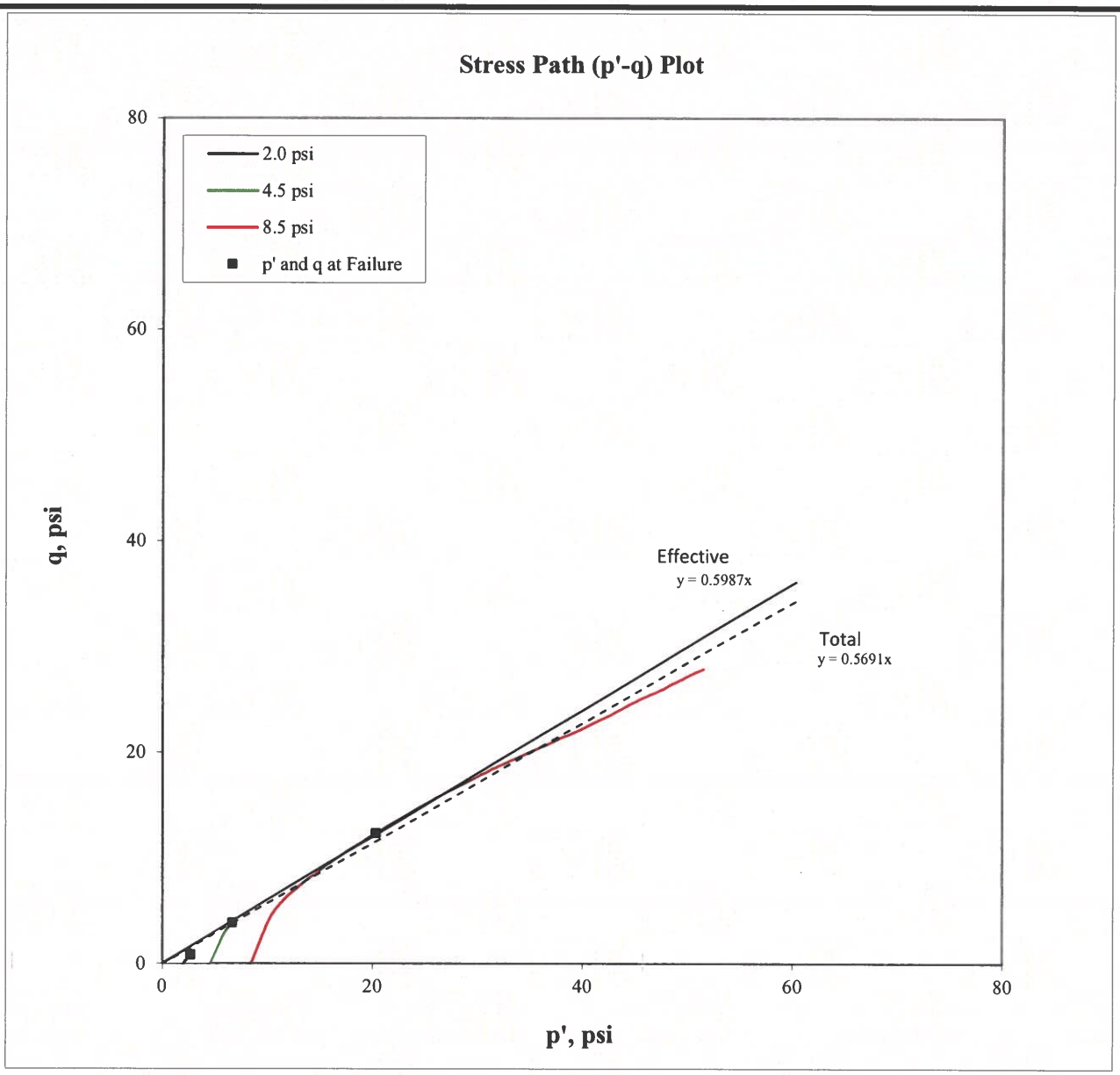
WSP USA **Norcross, Georgia**	**Title:** **MODIFIED (Multi-Stage) - ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **q AND EXCESS PORE PRESSURE PLOTS**				
Job Short Title: **AEP/EFA KANAWHA RIVER/WV**					
Sample:	**Technician:** **FT**	**Reviewed:** JA	**Start Date:**	**Job Number:**	**Figure:**
MW-2505D, 5.5-7.5'	**Check:** CO	**Approved:**	**11/28/2025**	**US-0041868.3860**	**2**





WSP USA **Norcross, Georgia**	**Title:** **MODIFIED (Multi-Stage) - ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **q AND EXCESS PORE PRESSURE PLOTS**				
Job Short Title: **AEP/EFA KANAWHA RIVER/WV**					
Sample: **MW-2505D, 5.5-7.5'**	**Technician:** **FT** **Check:** CO	**Reviewed:** DA **Approved:**	**Start Date:** **11/28/2025**	**Job Number:** **US-0041868.3860**	**Figure:** **3**

Stress Path (p'-q) Plot



Confining Pressure (psi)	p at failure (psi)	p' at failure (psi)	q at failure (psi)
2.0	2.9	2.7	0.9
4.5	8.4	6.7	3.9
8.5	20.8	20.3	12.3

Effective

α ' =	30.9	degree
a' =	0.0	psi

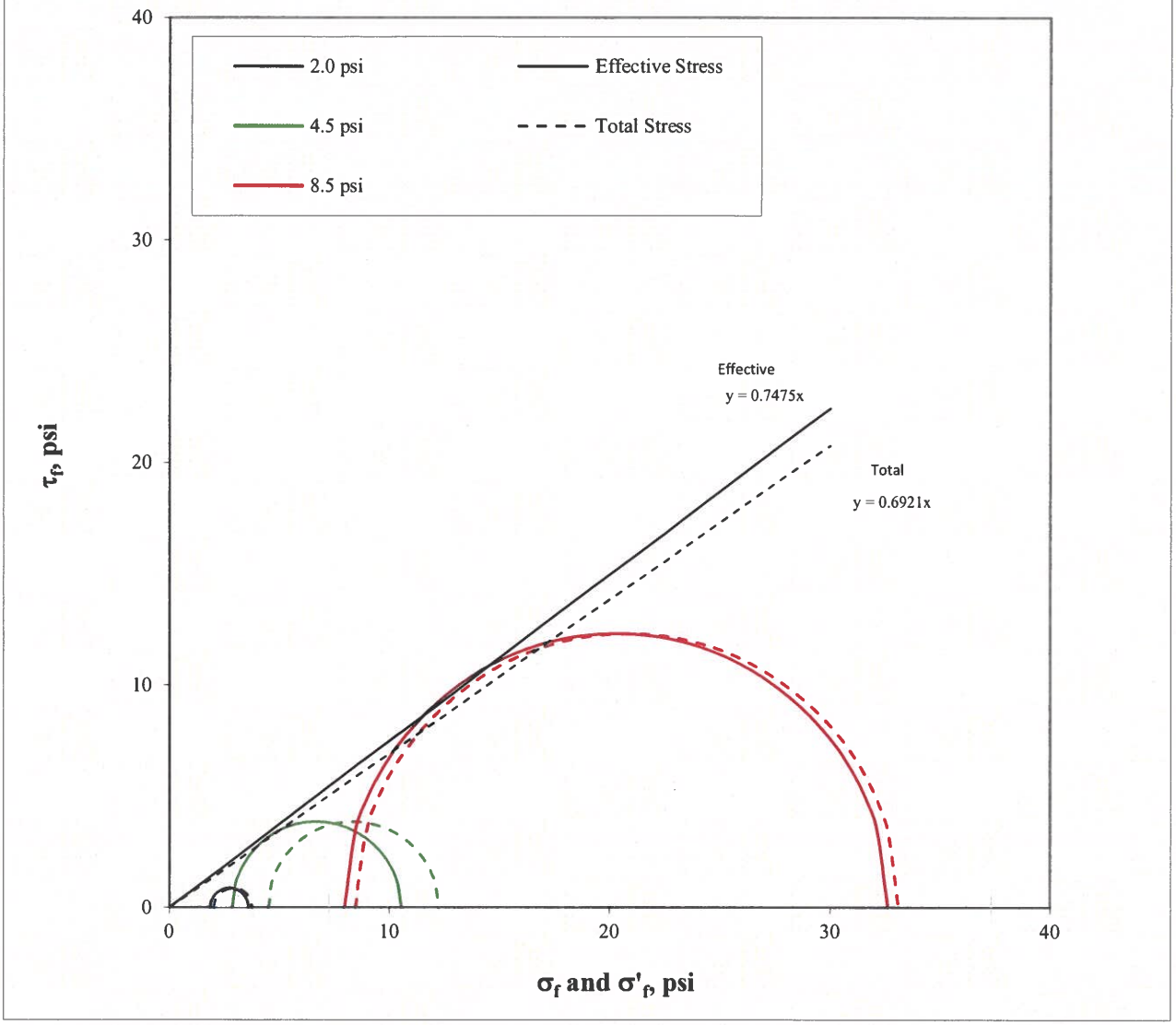
Total

α =	29.6	degree
a =	0.0	psi

Note: The laboratory testing relates only to the sample tested. WSP USA neither accepts responsibility for nor makes claims to the final use and purpose of the material.

WSP USA **Norcross, Georgia**	**Title:** **MODIFIED (Multi-Stage) - ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **STRESS PATH PLOT**				
Job Short Title: **AEP/EFA KANAWHA RIVER/WV**					
Sample: **MW-2505D, 5.5-7.5'**	**Technician:** **FT** **Check:** CO	**Reviewed:** JM **Approved:**	**Start Date:** **11/28/2025**	**Job Number:** **US-0041868.3860**	**Figure:** **4**

Mohr's Circle Diagram



Confining Pressure (psi)	σ'_1 at failure (psi)	σ'_3 at failure (psi)	σ_1 at failure (psi)	σ_3 at failure (psi)
2.0	3.6	1.8	3.7	2.0
4.5	10.5	2.8	12.2	4.5
8.5	32.6	8.0	33.1	8.5

Effective

ϕ' =	36.8	degree
c' =	0.0	psi

Total

ϕ =	34.7	degree
c =	0.0	psi

Note: The laboratory testing relates only to the sample tested. WSP USA neither accepts responsibility for nor makes claims to the final use and purpose of the material.

WSP USA **Norcross, Georgia**	**Title:** **MODIFIED (Multi-Stage) - ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **MOHR'S CIRCLE DIAGRAM**				
Job Short Title: **AEP/EFA KANAWHA RIVER/WV**					
Sample: **MW-2505D, 5.5-7.5'**	**Technician:** **FT** **Check:** CO	**Reviewed:** JA **Approved:**	**Start Date:** **11/28/2025**	**Job Number:** **US-0041868.3860**	**Figure:** **5**



WSP USA Norcross, Georgia	Title: MODIFIED (Multi-Stage) - ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT SPECIMEN PHOTOGRAPH - Single Specimen, 3 Confining Pressures				
Job Short Title: AEP/EFA KANAWHA RIVER/WV					
Sample: MW-2505D, 5.5-7.5'	Technician: FT Check: CG	Reviewed: DA Approved:	Start Date: 11/28/2025	Job Number: US-0041868.3860	Figure: 6

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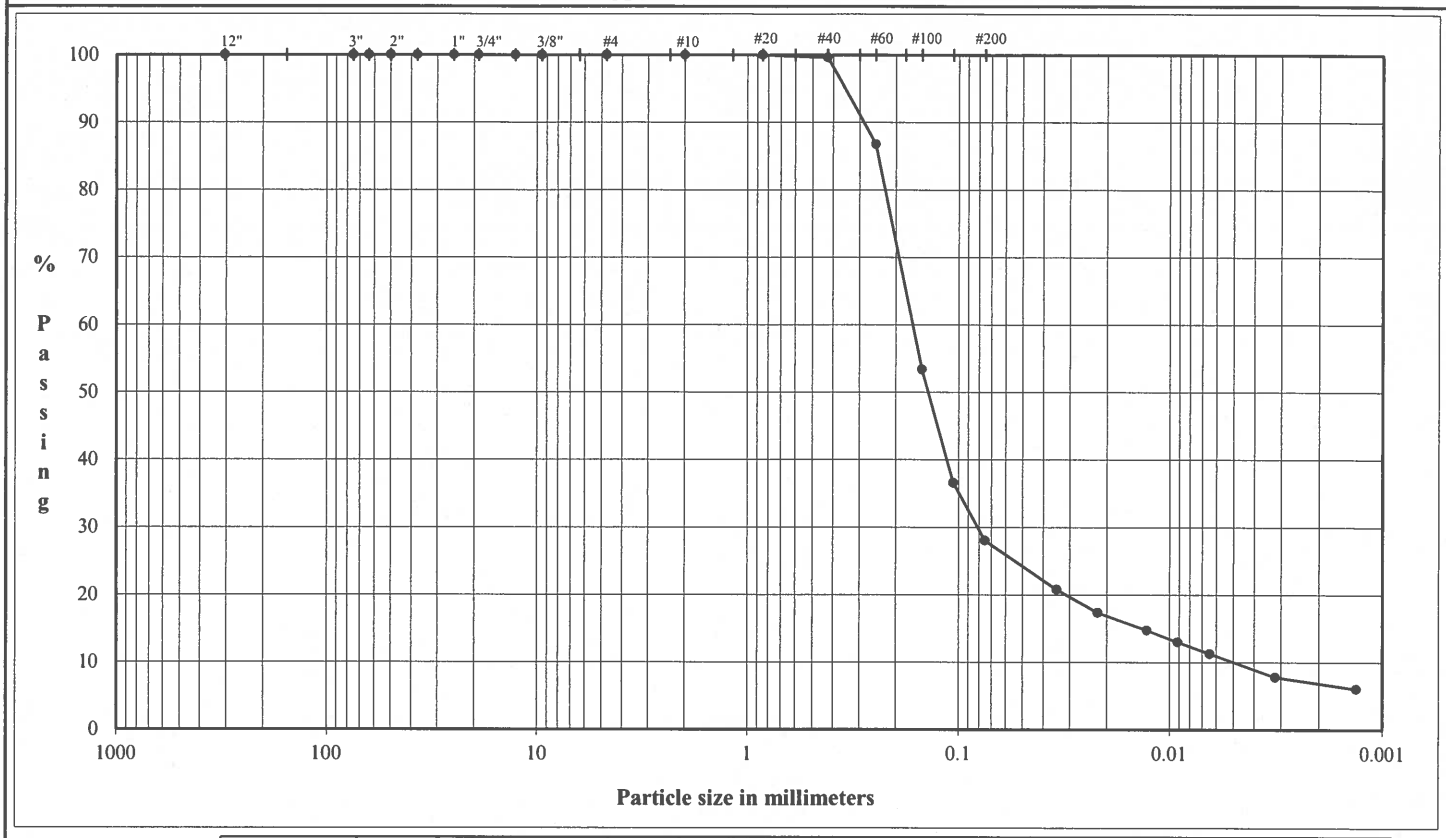
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **AEP/EFA KANAWHA RIVER/WV**

SAMPLE ID: **MW-2505D** Depth: **34.0-36.0'**

TYPE: **UD**



COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

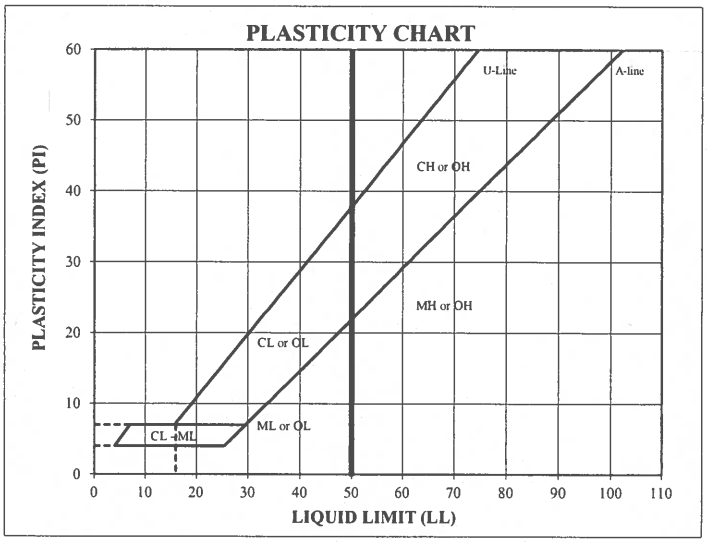
	Particle Size (mm)	% Passing	Particle Size Classification	Particle Size Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.0
0.50"	12.7	100.0		
0.375"	9.5	100.0		
#4	4.8	100.0	Fine Gravel	0.0
#10	2.00	100.0	Coarse Sand	0.0
#20	0.85	100.0		
#40	0.43	99.6	Medium Sand	0.4
#60	0.25	86.7		
#100	0.15	53.4		
#140	0.106	36.6		
#200	0.035	28.0	Fine Sand	71.6

Hydrometer Analysis

(mm)	%Finer		
0.035	20.8		
0.022	17.3		
0.013	14.7	Fines	
0.0092	13.0	Silt or Clay	28.0
0.0064	11.3		
0.0032	7.8		
0.0013	6.1		

DESCRIPTION: fine SILTY SAND; brown.

USCS: SM



ATTERBERG LIMITS

Method - B (Dry preparation)

M_c	LL	PL	PI	LI
15.0	NP	NP	NP	NP

LL (oven-dried) / < 0.75 = ORGANIC (OL OH)

TECH	CJ/EK
DATE	12/1/25
CHECK	
REVIEW	
APPROVE	

SPECIFIC GRAVITY OF SOILS
ASTM D854
PYCNOMETER METHOD

PROJECT TITLE	**AEP/EFA KANAWHA RIVER/WV**		
PROJECT NUMBER	**US-0041868.3860**	**SAMPLE ID**	**MW-2505D**
		SAMPLE DEPTH	**34.0-36.0'**
TESTED FOR	**Gs**	**SAMPLE TYPE**	**UD**

HYGROSCOPIC MOISTURE CONTENT OF MATERIAL PASSING THE #4 SIEVE

Weight of Soil and Tare, Initial (g)	**153.30**
Weight of Soil and Tare, Final (g)	**153.01**
Weight of Tare (g)	**50.89**
Weight of Moisture (g)	**0.29**
Weight of Dry Soil (g)	**102.12**
Hygroscopic Moisture Content	**0.3%**

Test Method		**Method - B**
Pycnometer Number		**22**
Weight of Pycnometer (g)		165.59
Volume of Pycnometer (mL)		499.43
Weight of Pycnometer and Water (g)		663.99
Mass of Pycnometer and Water at the Test Temperture	(A)	663.72
Observed Temperature (Tb), for (Mb) (°C)		23.6
Weight of Soil, Water & Pycnometer (g)	(B)	**711.23**
Temperature (°C)		**23.6**
Density of Water @ Tested Temperature (g/mL)		0.9974
Tare Number		-
Weight of Dry Soil Slurry plus Tare (g)		**206.88**
Weight of Tare (g)		**130.92**
Weight of Dry Soil (g)	(C)	75.96
Temperature Coefficient		0.9979

SPECIFIC GRAVITY (G) **2.664**

G @ 20 °C = [C/(A-(B - C))]*(K)

METHOD - A WET METHOD
METHOD - B OVEN-DRIED METHOD

METHOD OF AIR REMOVAL: VACUUM

Maximum Particle Size of Reduced Sample	Specimen Dry Mass (g) when using 500 mL Pycnometer (Minimum)	(Maximum)
No. 100	30	75
No. 40	40	100
No. 10	50	125
No. 4	75	200
3/8 in.	165	300

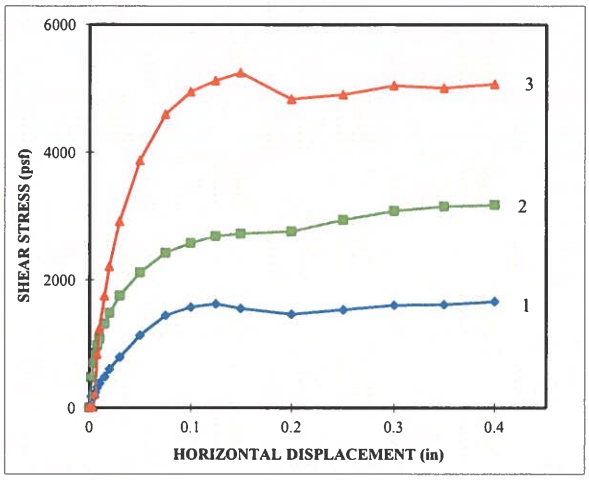
TECH	CJ
DATE	12/2/25
CHECK	CO
REVIEW	DA
APPROVE	

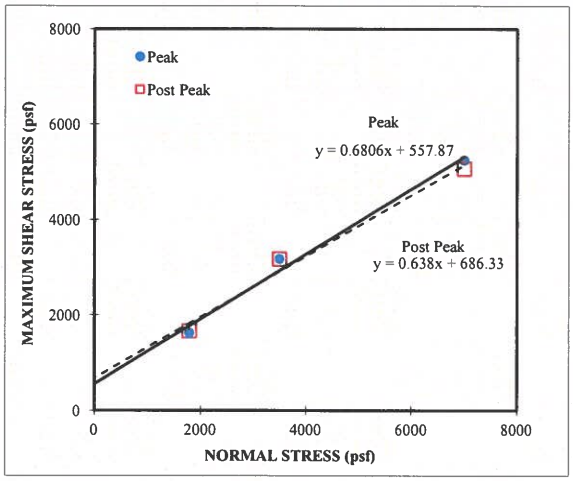
DECEMBER 2025 US-0041868.3860

DIRECT SHEAR

ASTM D3080

PROJECT NAME: AEP/EFA KANAWHA RIVER/WV
PROJECT NUMBER: US-0041868.3860
SAMPLE ID: MW-2505D **DEPTH: 34.0-36.0'**





Peak		
f =	34.2	°
C=	558	psf

Post Peak		
f =	32.5	°
C=	686	psf

SPECIMEN 1	
Normal Stress (psf)	1800
t_{50} (min)	0.65
Speed (in/min)	0.005
Sample Diameter (in)	2.50
Moisture Content (%)	15.0
Wet Density (pcf)	120.0
Dry Density (pcf)	104.4
Void Ratio	0.59
Saturation (%)	67.2

Horizontal Displacement (in)	Shear Stress (psf)
0.000	0
0.002	176
0.004	161
0.006	241
0.008	320
0.010	381
0.015	484
0.020	604
0.030	792
0.050	1132
0.075	1443
0.100	1575
0.125	1625
0.150	1555
0.200	1461
0.250	1534
0.300	1602
0.350	1613
0.400	1663

1625
Max Shear Stress

SPECIMEN 2	
Normal Stress (psf)	3500
t_{50} (min)	0.65
Speed (in/min)	0.005
Sample Diameter (in)	2.50
Moisture Content (%)	15.0
Wet Density (pcf)	118.9
Dry Density (pcf)	103.4
Void Ratio	0.61
Saturation (%)	65.5

Horizontal Displacement (in)	Shear Stress (psf)
0.000	0
0.002	475
0.004	692
0.006	848
0.008	971
0.010	1077
0.015	1311
0.020	1481
0.030	1754
0.050	2118
0.075	2420
0.100	2576
0.125	2681
0.150	2722
0.200	2758
0.250	2939
0.300	3080
0.350	3151
0.400	3174

3174
Max Shear Stress

SPECIMEN 3	
Normal Stress (psf)	7000
t_{50} (min)	0.65
Speed (in/min)	0.005
Sample Diameter (in)	2.50
Moisture Content (%)	15.0
Wet Density (pcf)	113.6
Dry Density (pcf)	98.8
Void Ratio	0.68
Saturation (%)	58.4

Horizontal Displacement (in)	Shear Stress (psf)
0.000	0
0.002	12
0.004	12
0.006	217
0.008	836
0.010	1226
0.015	1748
0.020	2212
0.030	2916
0.050	3869
0.075	4594
0.100	4949
0.125	5119
0.150	5245
0.200	4834
0.250	4902
0.300	5046
0.350	5010
0.400	5069

5245
Max Shear Stress

REMARKS

DESCRIPTION fine SILTY SAND; brown.

USCS SM

TECH	CJ
DATE	12/2/25
CHECK	CJ
REVIEW	DA
APROVE	

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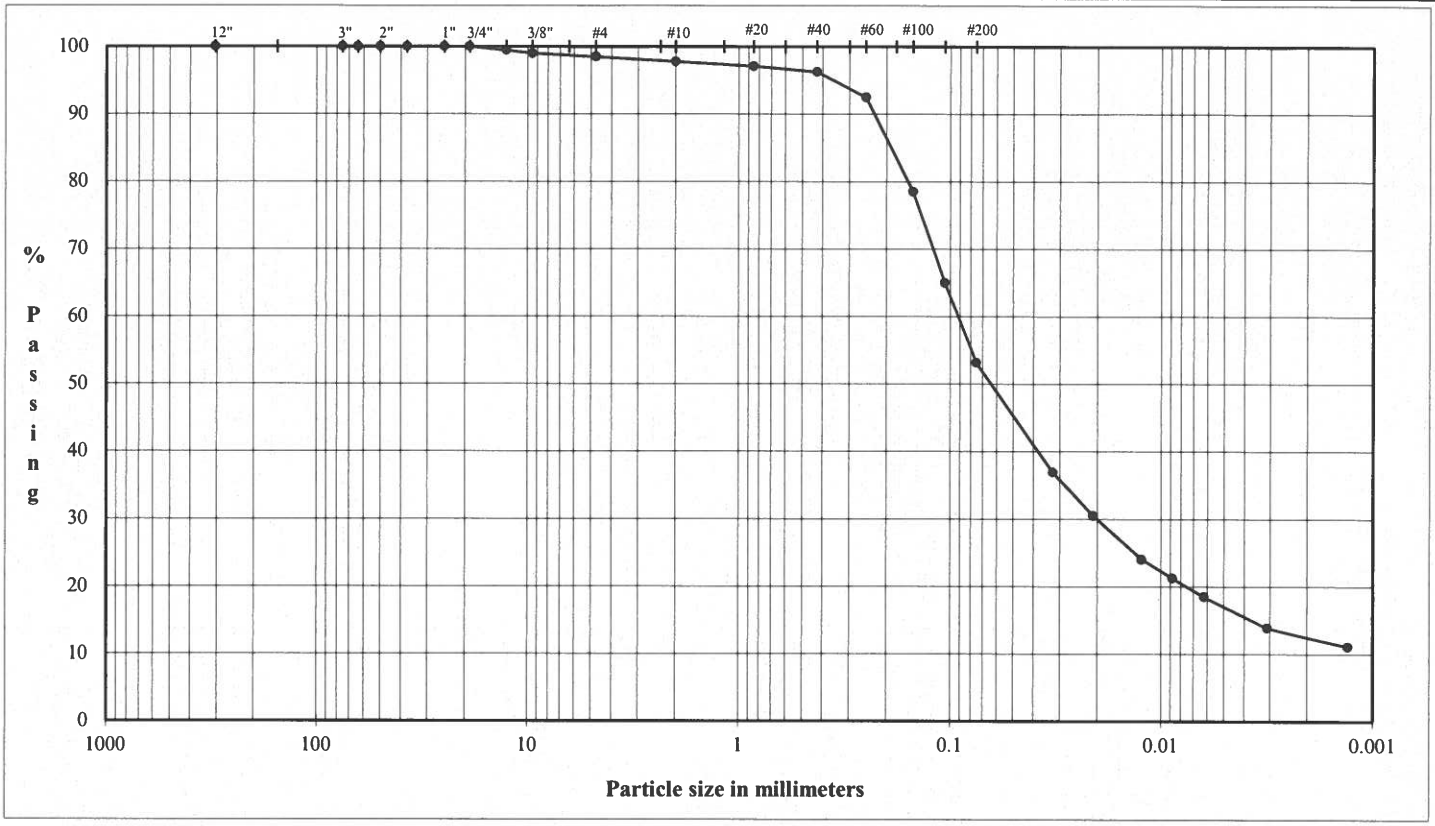
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: AEP/EFA KANAWHA RIVER/WV

SAMPLE ID: MW-2511 D Depth: 26.0-28.0'

TYPE: UD



	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Particle Size Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.0
0.50"	12.7	99.4		
0.375"	9.5	99.0		
#4	4.8	98.5	Fine Gravel	1.5
#10	2.00	97.7	Coarse Sand	0.7
#20	0.85	97.1		
#40	0.43	96.2	Medium Sand	1.5
#60	0.25	92.4		
#100	0.15	78.5		
#140	0.106	65.0		
#200	0.032	53.1	Fine Sand	43.1

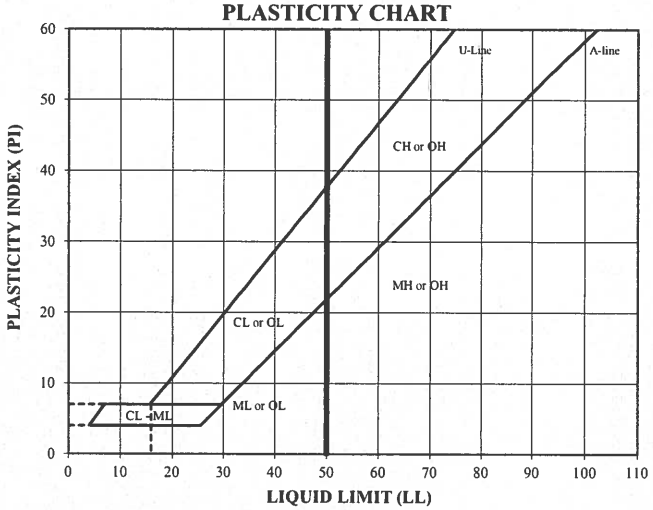
Hydrometer Analysis

(mm)	%Finer		
0.032	36.9		
0.021	30.5		
0.012	24.0	Fines	
0.0088	21.2	Silt or Clay	53.1
0.0062	18.5		
0.0031	13.9		
0.0013	11.1		

DESCRIPTION: SILT and fine SAND; brown.

USCS: ML

PLASTICITY CHART



ATTERBERG LIMITS

Method - B (Dry preparation)

M_c	LL	PL	PI	LI
18.2	NP	NP	NP	NP

LL (oven-dried) / < 0.75 = ORGANIC (OL OH)

TECH	CJ/EK
DATE	12/3/25
CHECK	CO
REVIEW	DK
APPROVE	

Boring or Test Pit:	MW-2511D		Boring or Test Pit:	MW-2511D		Boring or Test Pit:	MW-2511D	
Sample:	1		Sample:	1		Sample:	1	
Depth:	26.0-28.0 ft		Depth:	26.0-28.0 ft		Depth:	26.0-28.0 ft	
Point No.:	1		Point No.:	2		Point No.:	3	
Initial			**Initial**			**Initial**		
Length =	5.683	in	Length =	5.993	in	Length =	6.029	in
Diameter =	2.824	in	Diameter =	2.843	in	Diameter =	2.847	in
Wet Mass =	2.463	lb	Wet Mass =	2.722	lb	Wet Mass =	2.853	lb
Area =	6.264	in^2	Area =	6.348	in^2	Area =	6.366	in^2
Volume =	35.596	in^3	Volume =	38.044	in^3	Volume =	38.380	in^3
Specific Gravity =	2.71	(ASTM D854)	Specific Gravity =	2.71	(ASTM D854)	Specific Gravity =	2.71	(ASTM D854)
Dry Mass of Solids =	2.110	lb	Dry Mass of Solids =	2.272	lb	Dry Mass of Solids =	2.419	lb
Moisture Content =	16.7%		Moisture Content =	19.8%		Moisture Content =	18.0%	
Wet Unit Weight =	119.6	pcf	Wet Unit Weight =	123.6	pcf	Wet Unit Weight =	128.5	pcf
Dry Unit Weight =	102.4	pcf	Dry Unit Weight =	103.2	pcf	Dry Unit Weight =	108.9	pcf
Void Ratio =	0.65		Void Ratio =	0.64		Void Ratio =	0.55	
Percent Saturation =	70%		Percent Saturation =	84%		Percent Saturation =	88%	
After Consolidation			**After Consolidation**			**After Consolidation**		
Length =	5.560	in	Length =	5.962	in	Length =	6.002	in
Diameter =	2.713	in	Diameter =	2.782	in	Diameter =	2.779	in
Area =	5.780	in^2 (Method B)	Area =	6.079	in^2 (Method B)	Area =	6.066	in^2 (Method B)
Volume =	32.136	in^3	Volume =	36.243	in^3	Volume =	36.407	in^3
Moisture Content =	18.0%		Moisture Content =	20.6%		Moisture Content =	17.4%	
Wet Unit Weight =	133.9	pcf	Wet Unit Weight =	130.7	pcf	Wet Unit Weight =	134.8	pcf
Dry Unit Weight =	113.5	pcf	Dry Unit Weight =	108.3	pcf	Dry Unit Weight =	114.8	pcf
Void Ratio =	0.49		Void Ratio =	0.56		Void Ratio =	0.47	
Percent Saturation =	100%		Percent Saturation =	100%		Percent Saturation =	100%	
B Parameter =	0.98		B Parameter =	0.98		B Parameter =	0.98	
Shear Rate =	0.090%	/min.	Shear Rate =	0.089%	/min.	Shear Rate =	0.090%	/min.
t_{50} =	2.09	min.	t_{50} =	3.03	min.	t_{50} =	2.80	min.
Strain at Failure =	15.0%		Strain at Failure =	5.9%		Strain at Failure =	5.2%	
Cell Pressure =	80.0	psi	Cell Pressure =	89.0	psi	Cell Pressure =	108.0	psi
Back Pressure =	70.0	psi	Back Pressure =	70.0	psi	Back Pressure =	70.0	psi
Confining Pressure =	10.0	psi	Confining Pressure =	19.0	psi	Confining Pressure =	38.0	psi

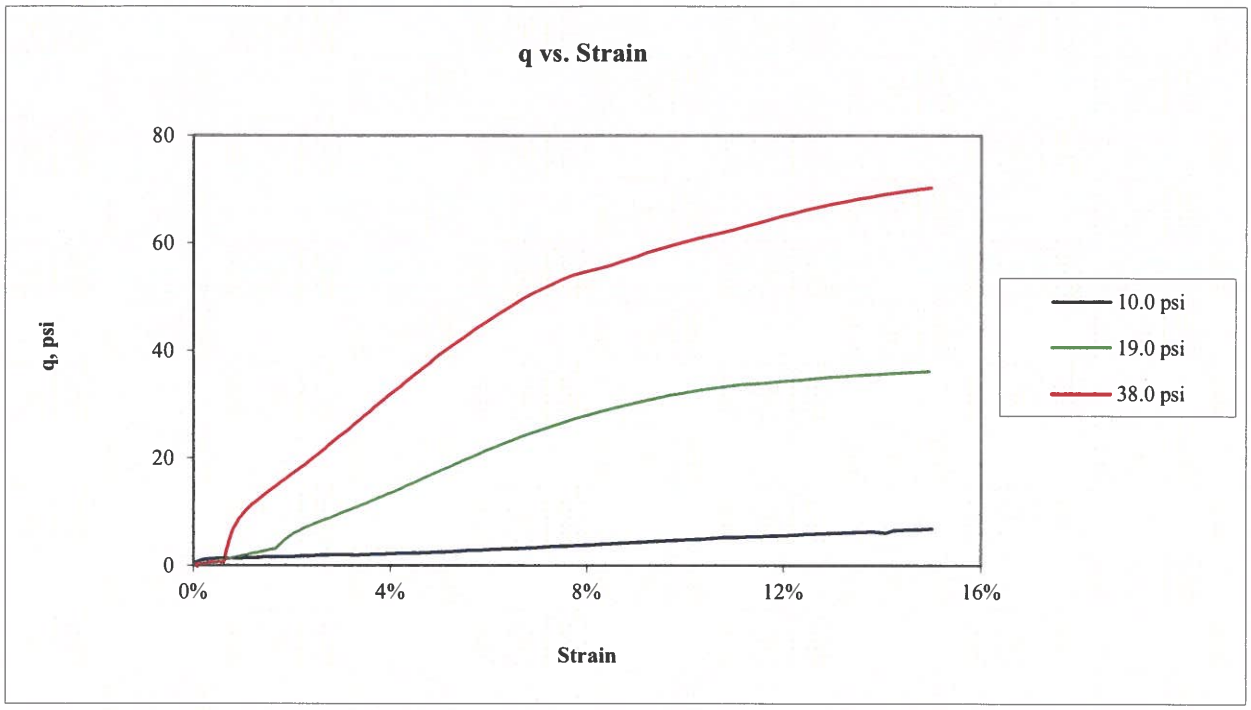
Notes: Sample description: ML - SILT and fine SAND; brown.

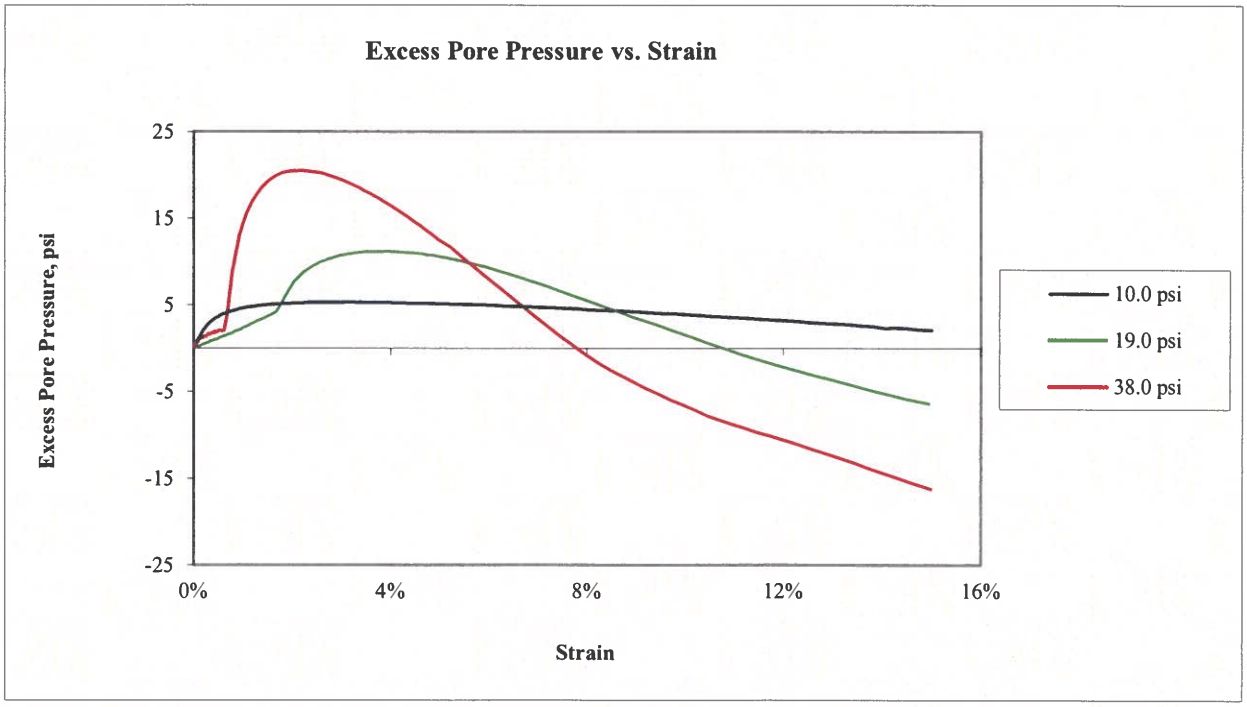
Atterberg limits: LL = NP PL = NP PI = NP (ASTM D4318)

Percent finer: 3/4 in. = 100% No. 4 = 99% No. 200 = 53% (ASTM D422, refer to separate report for gradation curve)

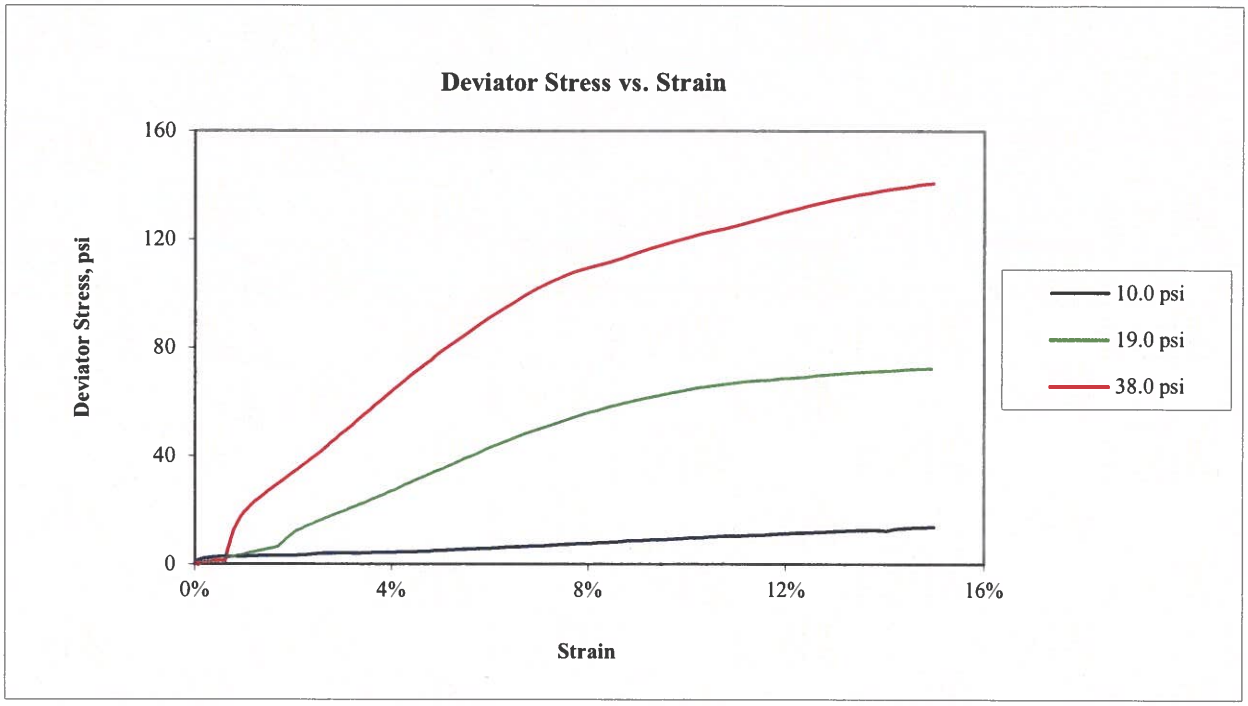
Specimen type:	X	Intact		Reconstituted
Moisture from:		Cuttings	X	Entire specimen
Saturation method:	X	Wet		Dry
Failure criterion:	X	$(\sigma'_1/\sigma'_3)_{max}$		$(\sigma'_1-\sigma'_3)_{max}$ ____ % strain
Membrane effect:	X	Corrected		Not Corrected

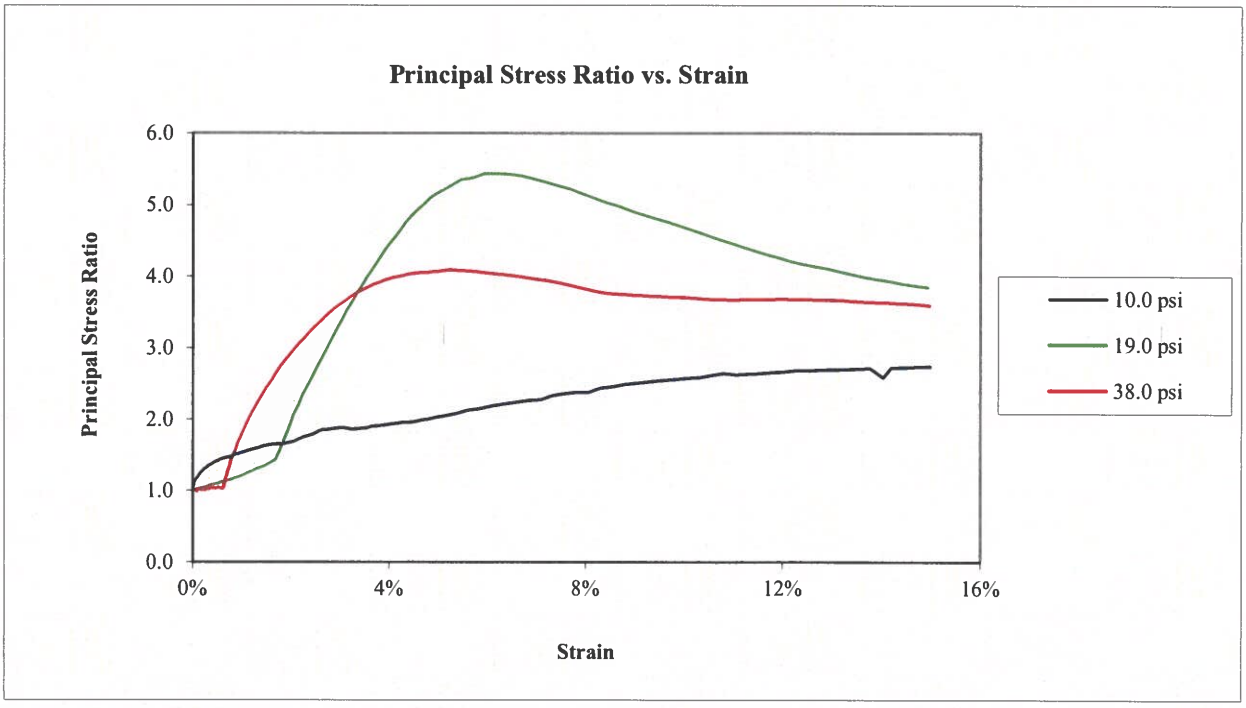
WSP USA **Norcross, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **SAMPLE AND TEST DATA**				
Job Short Title: **AEP/EFA KANAWHA RIVER/WV**					
Sample: **MW-2511D, 26.0-28.0'**	**Technician:** **CJ/FT** **Check:**	**Reviewed:** **Approved:**	**Start Date:** **11/24/2025**	**Job Number:** **US-0041868.3860**	**Figure:** **1**





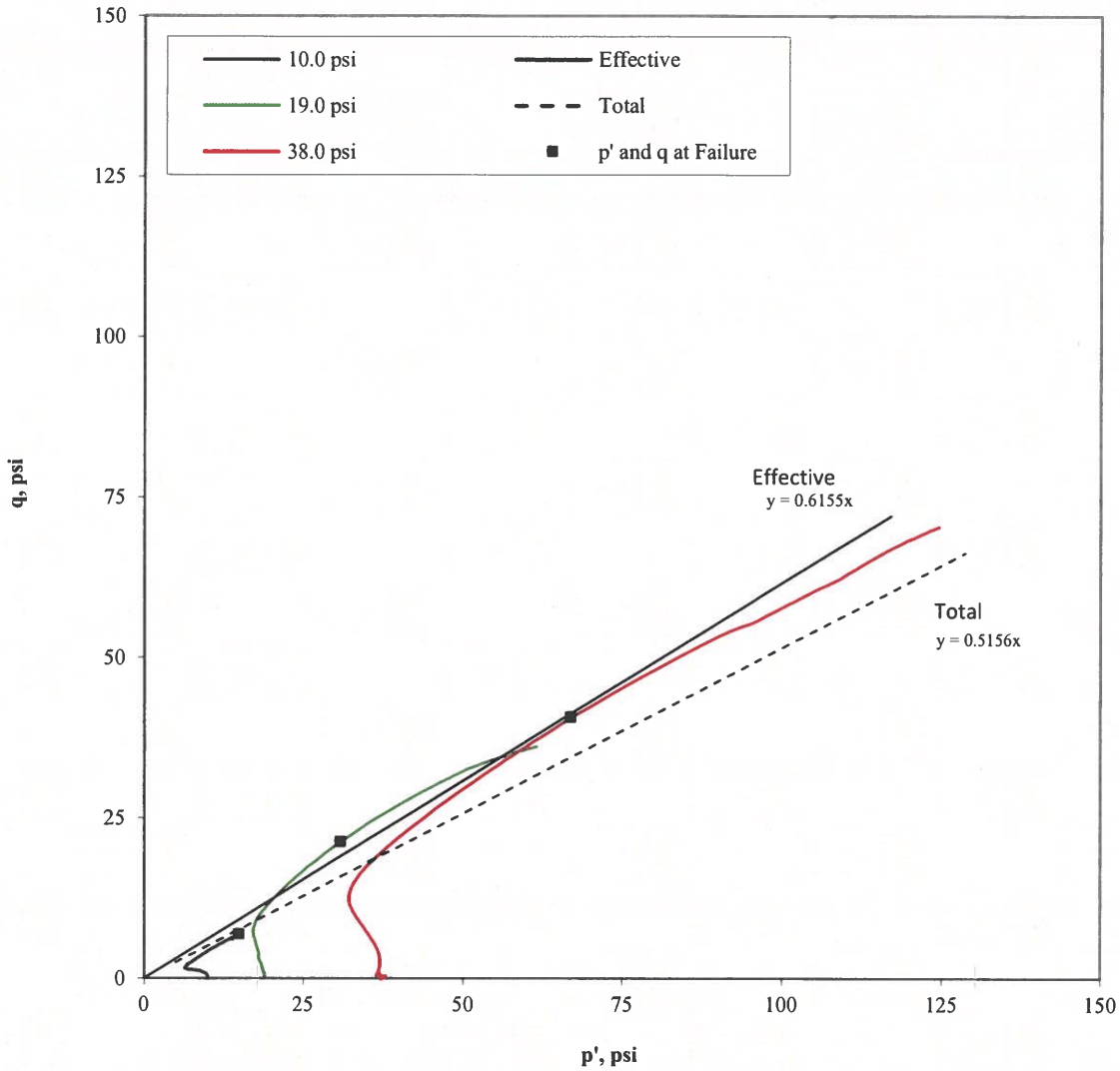
WSP USA **Norcross, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **q AND EXCESS PORE PRESSURE PLOTS**				
Job Short Title: **AEP/EFA KANAWHA RIVER/WV**					
Sample: **MW-2511D, 26.0-28.0'**	**Technician:** **CJ/FT** **Check:** CO	**Reviewed:** JA **Approved:**	**Start Date:** **11/24/2025**	**Job Number:** **US-0041868.3860**	**Figure:** **2**





WSP USA **Norcross, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **DEVIATOR STRESS AND PRINCIPAL STRESS RATIO PLOT**				
Job Short Title: **AEP/EFA KANAWHA RIVER/WV**					
Sample: **MW-2511D, 26.0-28.0'**	**Technician:** **CJ/FT** **Check:** CO	**Reviewed:** DM **Approved:**	**Start Date:** **11/24/2025**	**Job Number:** **US-0041868.3860**	**Figure:** **3**

Stress Path (p'-q) Plot



Confining Pressure (psi)	p at failure (psi)	p' at failure (psi)	q at failure (psi)
10.0	16.9	14.8	6.9
19.0	40.3	30.9	21.3
38.0	78.7	67.0	40.7

Effective

α ' =	31.7	degree
a' =	0.0	psi

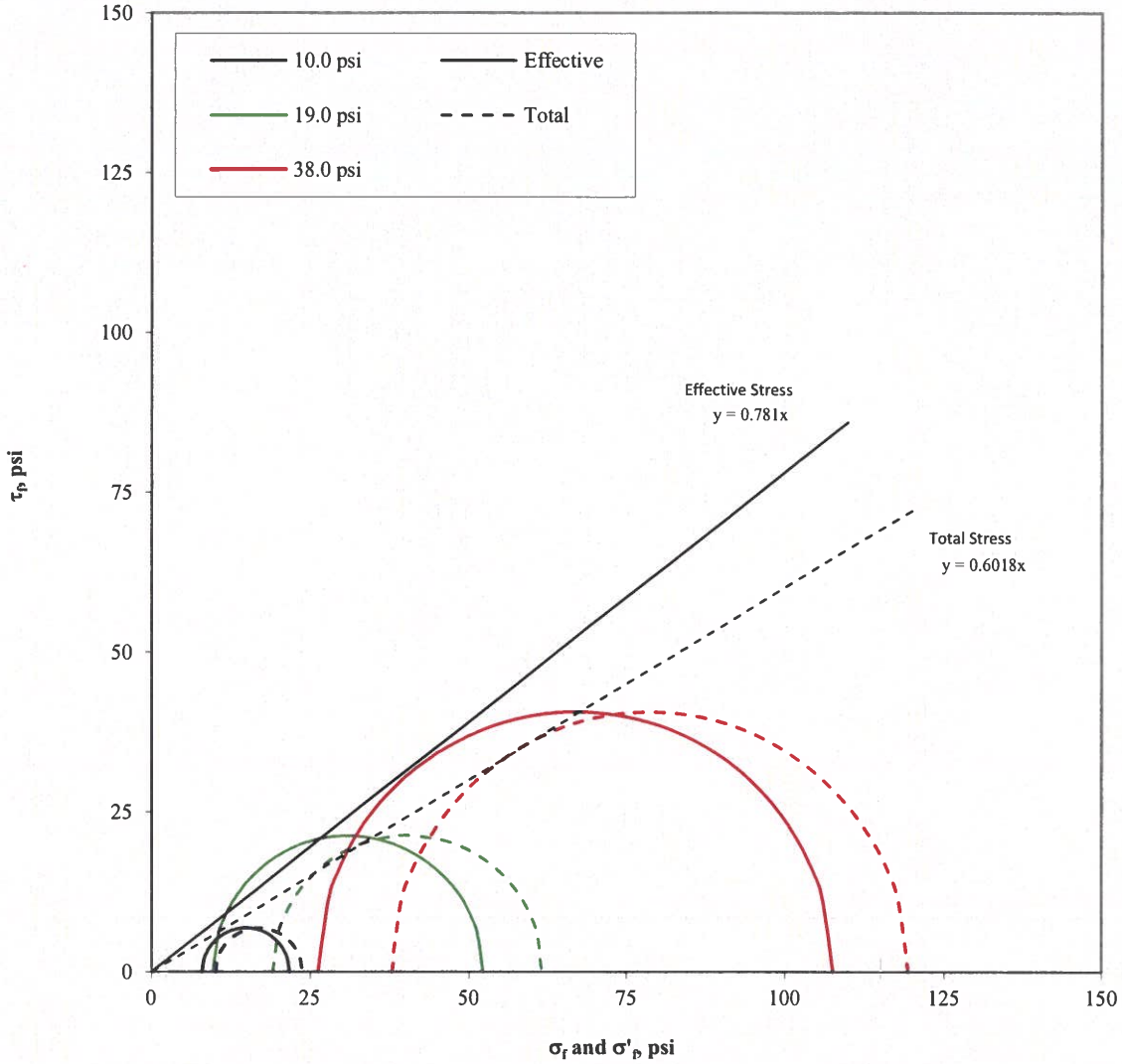
Total

α =	27.4	degree
a =	0.0	psi

Note: The laboratory testing relates only to the sample tested. WSP USA neither accepts responsibility for nor makes claims to the final use and purpose of the material.

WSP USA **Norcross, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **STRESS PATH PLOT**				
Job Short Title: **AEP/EFA KANAWHA RIVER/WV**					
Sample: **MW-2511D, 26.0-28.0'**	**Technician:** **CJ/FT** **Check:** CO	**Reviewed:** DA **Approved:**	**Start Date:** **11/24/2025**	**Job Number:** **US-0041868.3860**	**Figure:** **4**

Mohr's Circle Diagram



Confining Pressure (psi)	σ'_1 at failure (psi)	σ'_3 at failure (psi)	σ_1 at failure (psi)	σ_3 at failure (psi)
10.0	21.7	7.9	23.8	10.0
19.0	52.2	9.6	61.6	19.0
38.0	107.7	26.3	119.4	38.0

Effective

ϕ' =	38.0	degree
c' =	0.0	psi

Total

ϕ =	31.0	degree
c =	0.0	psi

Note: The laboratory testing relates only to the sample tested. WSP USA neither accepts responsibility for nor makes claims to the final use and purpose of the material.

WSP USA **Norcross, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **MOHR'S CIRCLE DIAGRAM**				
Job Short Title: **AEP/EFA KANAWHA RIVER/WV**					
Sample: **MW-2511D, 26.0-28.0'**	**Technician:** **CJ/FT** **Check:** CO	**Reviewed:** DA **Approved:**	**Start Date:** **11/24/2025**	**Job Number:** **US-0041868.3860**	**Figure:** **5**

10.0 psi



19.0 psi



38.0 psi



WSP USA **Norcross, Georgia**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **SPECIMENS PHOTOGRAPH - 10.0 19.0 38.0 psi**				
Job Short Title: **AEP/EFA KANAWHA RIVER/WV**					
Sample: **MW-2511D, 26.0-28.0'**	**Technician:** **CJ/FT** **Check:**	**Reviewed:** **Approved:**	**Start Date:** **11/24/2025**	**Job Number:** **US-0041868.3860**	**Figure:** **6**



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ATTACHMENT C

Design Drawings

DR. No. S-1344-3001

ASH AREA

COAL STORAGE AREA

Initial Coal Storage 60,000 Tons
Pile 45' High, Bottom of Pile El 623.0

U.S. 60

N.Y.C.R.R.

Note 1

Note 2

Note 3

Note 4

Note 5

Note 6

Note 7

Note 8

Note 9

Note 10

Note 11

Note 12

Note 13

Note 14

Note 15

Note 16

Note 17

Note 18

Note 19

Note 20

Note

DR. NO. 3344-3007

TYPICAL PLAN OF MANHOLE #5

Section d-d

Section n-n

Section b-b
DRAIN SHAFT MH-5

MANHOLE-SHAFT No 1
EAST FACE

SEE REV. 2&3. DWG 3358

MANHOLES
ONE MH-5
ONE MH-6

7 RUNGS EACH
MK 3306-63

SECTION F-F & F-F'S
SCALE 1"=20'-0"

FOR DETAILS SEE DRG S-3346-3358

UNGRADE OF DRAIN PIPE
W. REF. NO.

SECTION A-A

SECTION B-B

SECT C-C

SECTION M-M

SECTION L-L TYPICAL

SECTION D-D
TYPICAL THRU RIVER

SECTION E-E

SECTION K-K

Section Thru Headwall #2

FINISHED GRADE EL 623

Note Top Soil:
Topsoil to be removed from areas above El 623, ash area and plant excavation area. Part of Mhole 3 & headwall 3 contains after drainpipe has been installed. The best or right hand curves to be saved for landscaping.

CINDER DISPOSAL AREA EL 593
CAPACITY TO EL 623 - 726,000 CU YD

EXCAVATION

CINDER AREA	162,000 cu yd
CUT AREAS TO EL 623	66,000
CUT RIVER BANK FOR COAL DOCK	9,000
PLANT EXCAVATION 1ST STEP	157,000
PLANT EXCAVATION 2ND STEP	63,000
TOTAL CUT	437,000 cu yd

FILL

FILL AREA TO EL 623 GRADE	285,000 (Earthfill varies entire)
FILL AREA TO EL 625 SAND	187,000
PLANT BACK FILL (TO EL 625)	115,000
TOTAL FILL	539,000 cu yd

NOTE
The above quantities are for the area West of Matchline. Quantities of Earthwork East of Matchline are shown on Drawing S-3356-3356 which shows cuts & fill work for the flyash yard.
The amount of cut will balance the amount of fill ex pending the quantities shown on this drawing and drawing S-3346-3356

Additional Material required to Grade this area to EL 625 from Flyash Yard Excavation Shown on Dwg S-3360-3356

Earth work and Drains by Boso & Ritchie Inc.

DRAIN SHAFT MH-5 (NEW) Dwg S-3346-3357
PLANT EXCAVATION - FIRST STEP SEE Dwg S-3346-3005
BORING DATA Dwg S-3346-3003
BORING LOCATION PLAN S-3346-3004

Rev.		
4/8/51	10	Headwall 3 Revised Grading to El 625 added JJ GR
5/22/51	11	Quantities of Earth handling revised Earth slope in coal area, section MM added Slope of cut slopes changed to 2:1 & 2½:1 JJ GR
9/7/51	12	Cut of River bank W. of Plant El. Coal Wash) located Sections K, L & M added GR
12/12/51	13	Opening in MH-1 added for Grinder drainage JJ GR
2/14/52	14	MH-1 Altered as per Dwg 3358-C GR
4/18/52	1	revised Dra
10/17/52	2	Plant North Cross-Sec
		Dimensions of Drainage for Precast Wedge & Slope Sections, Catch Basins for Manholes & Pipe Connections added JJW
11/25/53	3	Dimensions Changed
12/17/53	4	Headwall 3 & Slope Protection Dimensions and Elevations added JJW
1/26/54	5	Dimensions Changed
3/9/54	6	Extended to Old Ash Area & Elevation
10/18/54	7	Plant moved 5' to West JJW
4/6/55	8	Dim. 300'0 added
4/15/55	9	Added Field Information JJW
DATE	NO.	DESCRIPTION APPD.

REVISIONS

AMERICAN GAS & ELECTRIC SERVICE CORPORATION
30 CHURCH STREET NEW YORK

EXCAVATION & GRADING PLAN

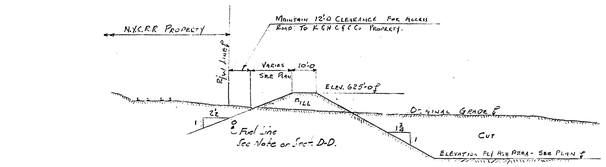
APPALACHIAN ELECTRIC POWER CO.
KANAWHA RIVER PLANT
GLASGOW, WEST VIRGINIA

SCALE 1"=100'	DATE 8/8/50
DES. BY	APPROVED
DR. BY JJW	
TR. BY	
CH. BY	
ARCH. CH.	
ELEC. CH.	
MECH. CH.	
STRUC. CH.	

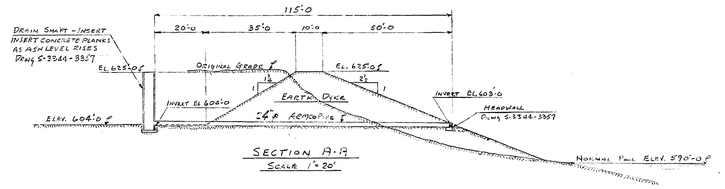
DR. NO. 3344-3007

AEP Confidential - Moderate Risk - Approved - S-3344-3007 - 03/06/1951 - tiff - 1_req_s-3344-3007_0.tif

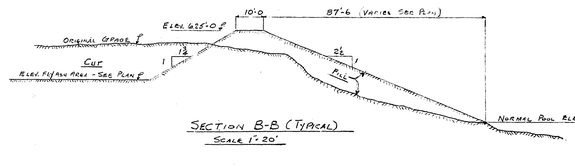
DR. NO. S-3344-3356



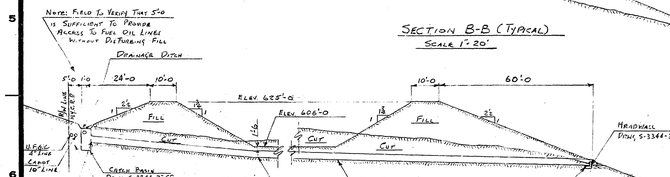
SECTION C-C (TYPICAL)
SCALE 1" = 20'



SECTION A-A
SCALE 1" = 20'



SECTION B-B (TYPICAL)
SCALE 1" = 20'



SECTION D-D (AS SHOWN)
SECTION D'-D' (SIMILIAR)
SCALE 1" = 20'-0

General Notes

This Dwng. Not To Be Scaled

Quantities:

Excavation: 410 cu. c.y.
Fill (Including 15% Compaction): 308 cu. c.y.

Note:
The Above Quantities Are For The Area East Of The Main Line. Quantities Of Earthwork, West Of The Main Line, Are Shown On Drawing S-3344-3007. The Amount Of Cut Will Balance The Amount Of Fill By Adding The Quantities Shown On This Dwng. & Dwng. S-3344-3007.

Earthwork & Drainage By Bosa & Ritenz

Materials:

125 L.F. 28'ø Armco Pipe By: Field
1200 L.F. 30'ø Armco Pipe By: Field

Reference Drawings

S-3344-3007 Excavation & Grading Plan
3001 Plot Plan
3357 Ash Yard - Misc. Structures

DATE	No.	DESCRIPTION	APV'D.
9/11/64	1	Released For Construct.	G.R.

REVISIONS

AMERICAN GAS & ELECTRIC SERVICE CORPORATION
30 CHURCH STREET NEW YORK

FLY ASH YARD
PLAN AND SECTIONS

APPALACHIAN ELECTRIC P...
KANAWHA RIVER PLANT
GLASGOW, WEST VIRGINIA

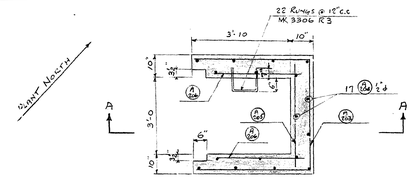
SCALE 1"=100' DATE 9/9/64

9112-A

ARCH. CH.	DR. BY M.E.	APPROVED	
ELEC. CH.	TR. BY		
MECH. CH.	CH. BY		
STRUCT. CH.	DR. No. S-3344-3356-1		

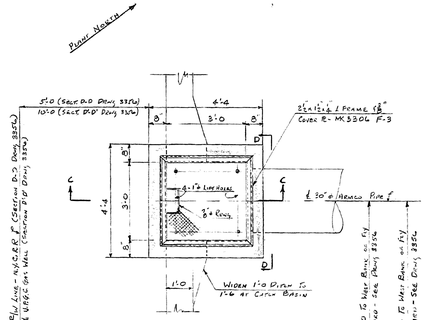
AEP Confidential - Moderate Risk - Approved - S3344-3356 - 06151951 - vp, 12, dwg, s3344-3356_1.tif

DR. NO. S-3344-3357

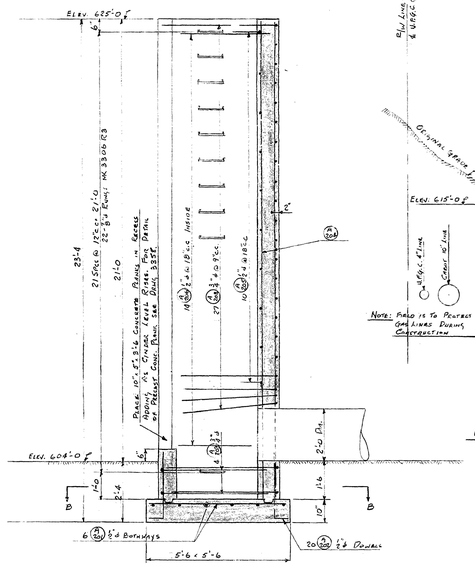


PLAN AT TOP

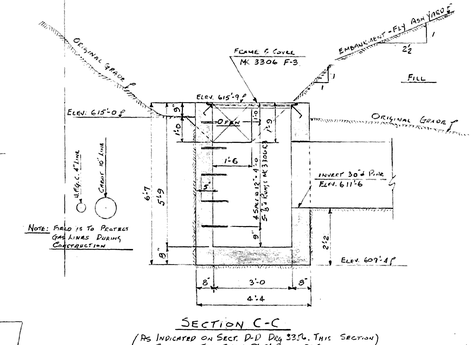
Mark 1423
Interpolated casing top ℄ El 635.0' on ℄ Pipe



PLAN MANHOLE "A"
2 REQ'D DRWG 3324
SCALE ½" = 1'-0

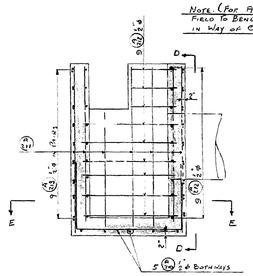


ELEVATION DRAIN SHAFT - SECT A-A
SCALE ½" = 1'-0

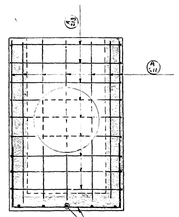


SECTION C-C
(AS INDICATED ON SECT. D-D DRG. 3324. THIS SECTION IS SIMILAR FOR SECT. D-D' DRWG. 3324)

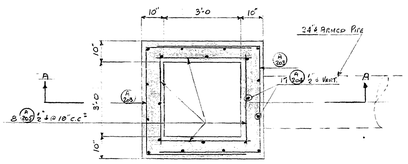
NOTE (FOR ALL STRUCTURES)
FIELD TO BEND TOE (UP) BARS IN WAY OF OPENINGS



SECTION C-C

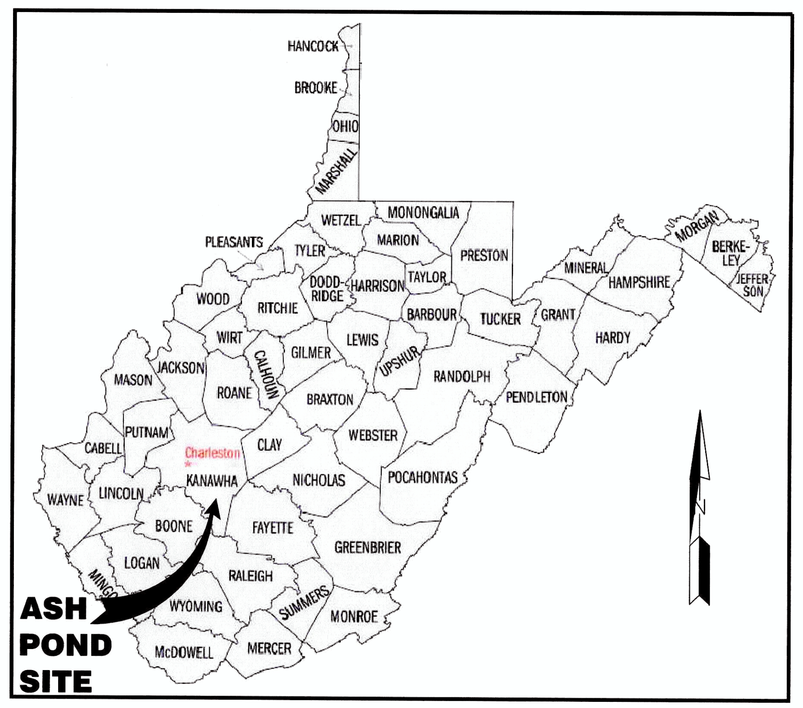


SECTION D-D

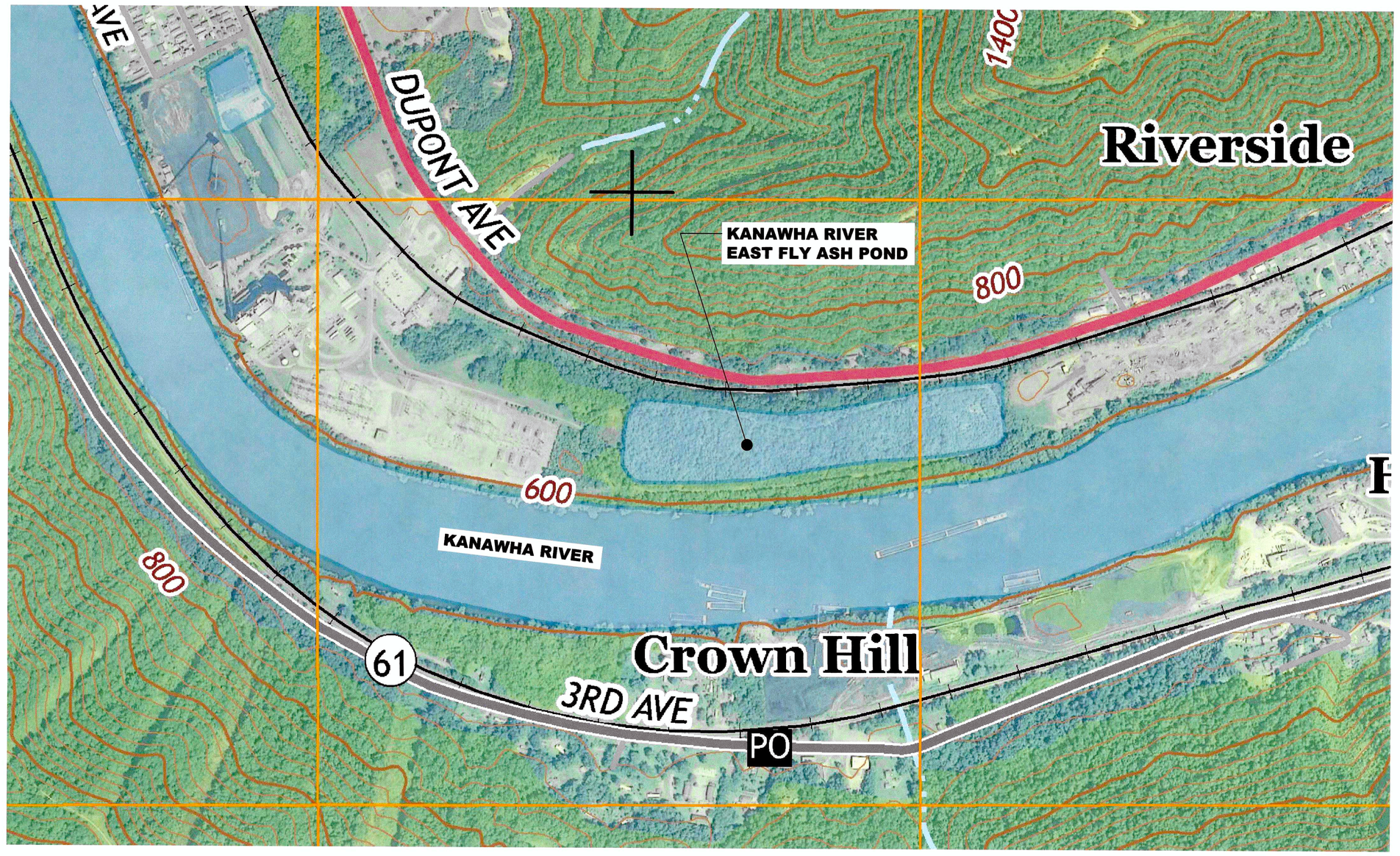

10"
3'-0
10"
24" ø RCP
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(2b)
(2c)
(2d)
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APPALACHIAN POWER COMPANY

STORM WATER DIVERSION CONSTRUCTION DRAWINGS



LOCATION MAP
(NOT TO SCALE)



SITE LOCATION MAP DEVELOPED FROM THE CEDAR GROVE WEST VIRGINIA 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP, DATED 2014

SITE LOCATION MAP

INDEX TO DRAWINGS

12-30000-1	COVER SHEET
12-30001-1	EXISTING CONDITIONS
12-30002-1	PROPOSED STORM WATER PLAN
12-30003-1	PROPOSED STORM WATER DIVERSION DETAILS 1
12-30004-1	PROPOSED STORM WATER DIVERSION DETAILS 2
12-30005-1	PROPOSED STORM WATER DIVERSION DETAILS 3
12-30006-1	EROSION AND SEDIMENT CONTROL PLAN AND DETAILS

OWNER/OPERATOR: APPALACHIAN POWER COMPANY
KANAWHA RIVER PLANT
US ROUTE 60
GLASGOW, WV 25086

PREPARED BY: ARCADIS U.S., INC.
4665 CORNELL ROAD
SUITE 350
CINCINNATI, OHIO 45241

06-24	1	REVISED STORMWATER PIPE INSTALLATION
06-01	0	ISSUED FOR CONSTRUCTION
DATE	NO.	DESCRIPTION APPD.

REVISIONS

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APPALACHIAN POWER COMPANY
KANAWHA RIVER PLANT
GLASGOW WEST VIRGINIA

STORM WATER DIVERSION CONSTRUCTION DRAWINGS
COVER SHEET

DWG. NO. 12-30000-1

SCALE:
DR:
CH:
ENGR.
PROJ. ENGR.
DATE:
AS GRAPHED

CIVIL ENGINEERING DIVISION

AEP AMERICAN ELECTRIC POWER
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

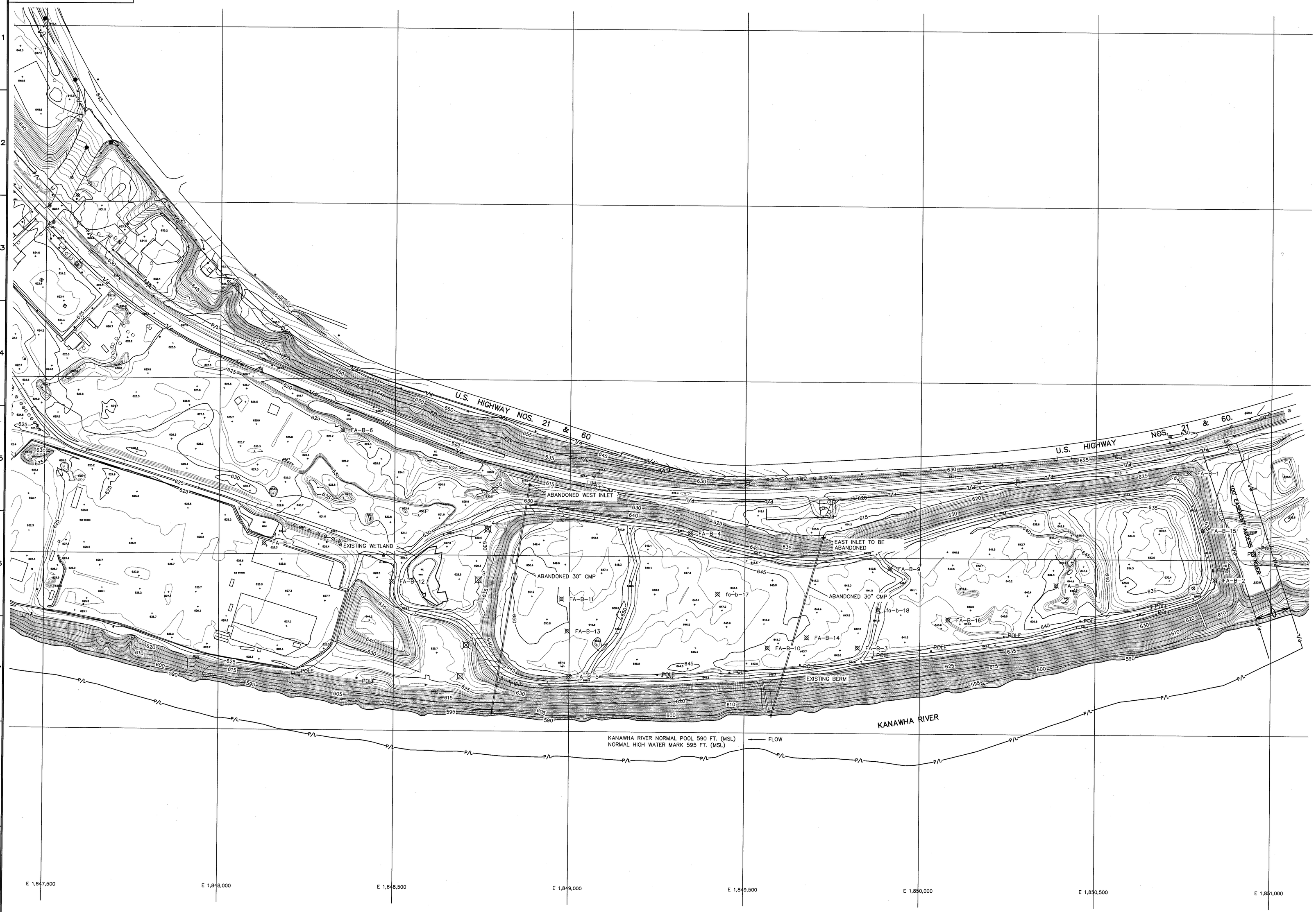
ARCADIS Project No. HA100250.0000.00000	Professional Engineer's Name JOHN HOLM		
Date 06-24/2015	Professional Engineer's No.		
ARCADIS 4665 CORNELL ROAD SUITE 350 CINCINNATI, OHIO 45241 TEL. 513.860.8700	State	Date Signed	Project Mgr. RJK
	Designed by	Drawn by JLF	Checked by JWH

JOHN W. HOLM REGISTERED 17419 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

ARCADIS
ARCADIS U.S., INC.

IGS1092

DWG. NO. 12-30001-1



N

100' 0' 100' 200'
SCALE: 1"=100' CONTOUR INTERVAL: 2'

LEGEND

- EXISTING CONTOUR (720)
- EXISTING SPOT ELEVATION (690.9)
- EXISTING TREES
- EXISTING STREAM OR POND EDGE
- EXISTING OCCUPIED STRUCTURE
- EXISTING FENCE
- EXISTING UTILITY POLE
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING PROPERTY LINE
- EXISTING SOIL BORINGS
- NEW SOIL BORING

NOTES:
1. FIELD SURVEY BASEMAP INFORMATION BASED ON DATA COLLECTED BY HENDERSON AERIAL SURVEYS INC. DATED MARCH 31, 2014

VERTICAL DATUM: NAVD88
HORIZONTAL DATUM: NAD83 WVA SOUTH

DATE	NO.	DESCRIPTION	APPD.
06-24	1	REVISED STORMWATER PIPE INSTALLATION	
05-01	0	ISSUED FOR CONSTRUCTION	

REVISIONS

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APPALACHIAN POWER COMPANY

KANAWHA RIVER PLANT

GLASGOW WEST VIRGINIA

STORM WATER DIVERSION
CONSTRUCTION DRAWINGS
EXISTING CONDITIONS

DWG. NO. 12-30001-1

SCALE:

DR: LNC

CH:

ENGR.

PROJ. ENGR.

DATE:

APPROVED BY

CIVIL ENGINEERING DIVISION

AEP AMERICAN ELECTRIC POWER

1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

ARCADIS Project No.
HA100250.0000.00000

Date
06-24-2015

ARCADIS
4665 CORNELL ROAD
SUITE 350
CINCINNATI, OH/O 45241
TEL. 513.860.8700

Professional Engineer's Name
JOHN HOLM

Professional Engineer's No.

State	Date Signed	Project Mgr.
		RJK
Designed by	Drawn by	Checked by
	LNC	JWH

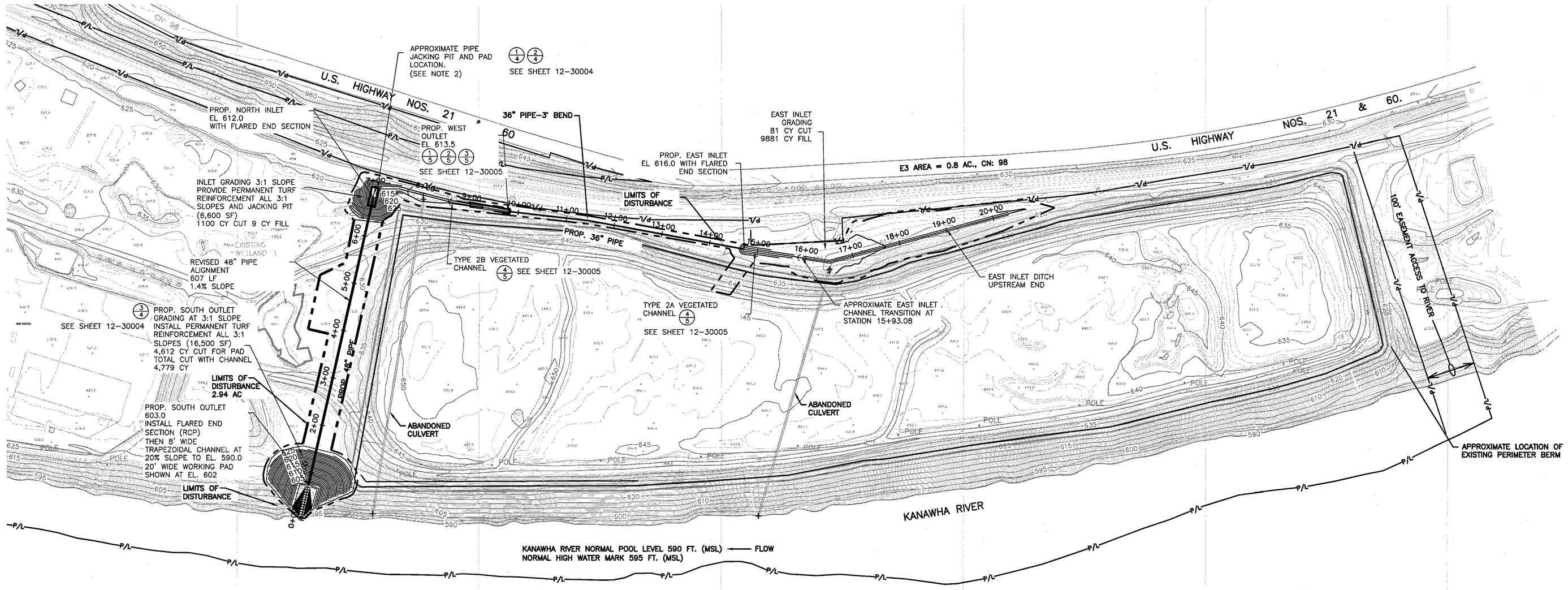
JOHN W. HOLM
REGISTERED
17419
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER

ARCADIS

ARCADIS U.S., INC.

IGS1092

DWG. NO. 12-30002-1



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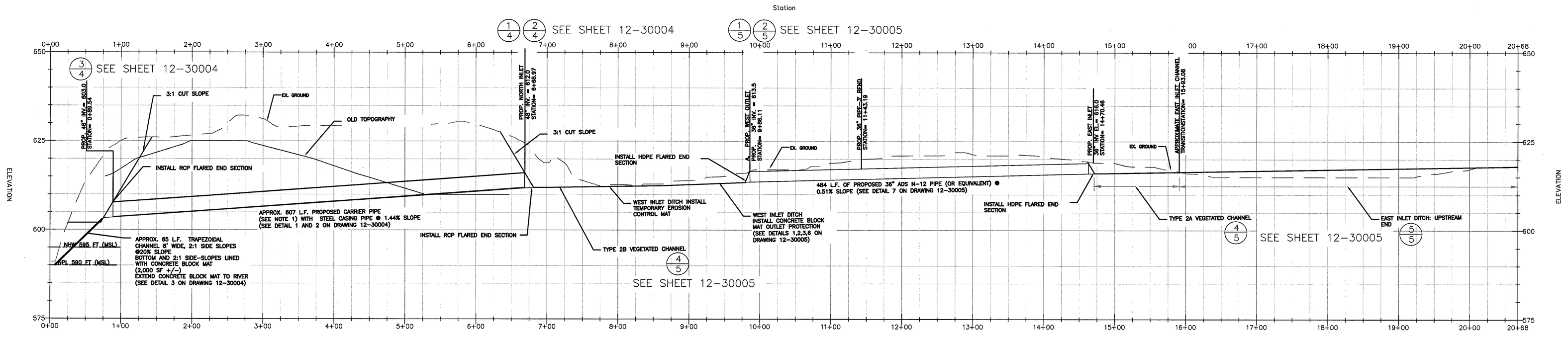
100' 0' 100' 200'
SCALE: 1"=100' CONTOUR INTERVAL: 1'

LEGEND

- EXISTING CONTOUR (720)
- EXISTING SPOT ELEVATION (690.9)
- EXISTING TREES
- EXISTING STREAM OR POND EDGE
- EXISTING OCCUPIED STRUCTURE
- EXISTING FENCE
- EXISTING UTILITY POLE
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING PROPERTY LINE
- LIMITS OF DISTURBANCE

PRELIMINARY STAKING

STRUCTURE	NORTHING	EASTING
EAST INLET	439176.8	1849059.9
36" PIPE-3' BEND	439157.8	1849226.2
WEST OUTLET	439099.6	1849546.2
NORTH INLET	439205.3	1848781.0
SOUTH OUTLET	439613.2	1848647.4



NOTES:
1. REFER TO DRAWING 12-30001 FOR BASEMAP INFORMATION
2. LOCATION AND SIZE OF THE PIPE JACKING PIT AND PAD ARE APPROXIMATE AND MAY BE ALTERED SLIGHTLY BASED ON FIELD CONDITIONS. SEE DETAIL 1 AND 2 ON DRAWING 12-30004 FOR ADDITIONAL INFORMATION.
3. CASING WILL BE A JACKED AND BORE 48" STEEL PIPE. CARRIER WILL BE EITHER A 42" HDPE PIPE OR A SLIP LINER (OR EQUIVALENT).

DATE	NO.	DESCRIPTION	APPD.
6-24	1	REVISED STORMWATER PIPE INSTALLATION	
5-1	0	ISSUED FOR CONSTRUCTION	

REVISIONS

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APPALACHIAN POWER COMPANY

KANAWHA RIVER PLANT

GLASGOW WEST VIRGINIA

STORM WATER DIVERSION CONSTRUCTION DRAWINGS

PROPOSED STORM WATER PLAN

DWG. NO. 12-30002-1

SCALE: | CIVIL ENGINEERING DIVISION

DR: LNC | CH: | ENGR. | PROJ. ENGR. | DATE: | APPROVED BY

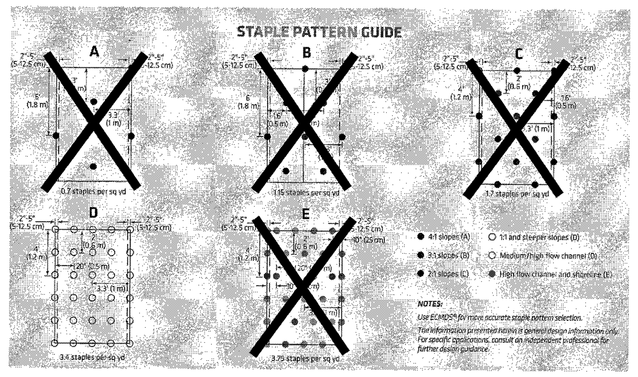
AEP AMERICAN ELECTRIC POWER

1 RIVERSIDE PLAZA COLUMBUS, OH 43215

ARCADIS Project No. HA100250.0000.00000
Date 06-24-2015
ARCADIS 4665 CORNELL ROAD SUITE 350 CINCINNATI, OHIO 45241 TEL. 513.860.8700
Professional Engineer's Name: JOHN HOLM
Professional Engineer's No.
State | Date Signed | Project Mgr.: RJK
Designed by | Drawn by: LNC | Checked by: JWH
JOHN W. HOLM REGISTERED 17419 STATE OF OHIO PROFESSIONAL ENGINEER
ARCADIS
ARCADIS U.S., INC.

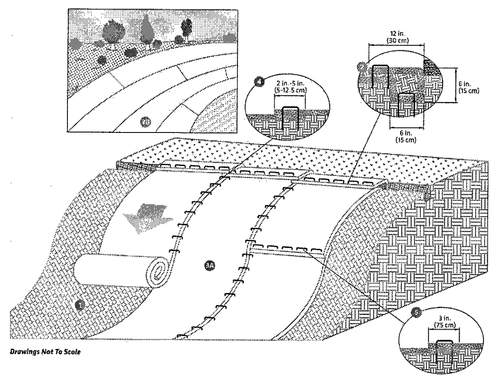
IGS1092

DWG. NO. 12-30003-1



Slope Installation

The following slope guide outlines our general recommendations for installing Tensar's RollMax™ temporary and/or permanent RECPs on sloping applications. Consult the staple pattern guide (Figure 1) for fastener spacing recommendations based on the slope severity.



Drawings Not To Scale

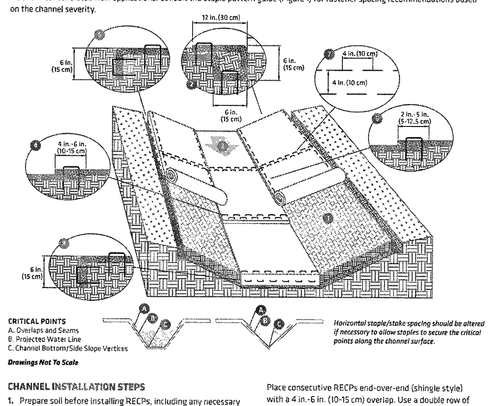
SLOPE INSTALLATION STEPS

1. Prepare soil before installing RECPs, including any necessary application of lime, fertilizer and seed. See page 7 for special requirements when soil filling a woven TRM.
2. Begin at the top of the slope by anchoring the RECPs in a 6 in. (15 cm) deep x 6 in. (15 cm) wide trench with approximately 12 in. (30 cm) of RECPs extended beyond the upslope portion of the trench. Anchor the RECPs with a row of staples/stakes approximately 12 in. (30 cm) apart in the bottom of the trench. Backfill and compact the trench after stapling. Apply seed to the compacted soil and fold the remaining 12 in. (30 cm) portion of RECPs back over the seed and compacted soil. Secure RECPs over compacted soil with a row of staples/stakes spaced approximately 12 in. (30 cm) apart across the width of the RECPs.
3. Roll the RECPs (3A) down or (3B) horizontally across the slope. RECPs will unroll with appropriate side against the soil surface. All RECPs must be securely fastened to soil surface by placing staples/stakes in appropriate locations as shown in the staple pattern guide.
4. The edges of parallel RECPs must be stapled with approximately 2 in.-5 in. (5-12.5 cm) overlap depending on the RECP type.
5. Consecutive RECPs spliced down the slope must be end-over-end (shingle style) with an approximate 3 in. (7.5 cm) overlap. Staple through overlapped area, approximately 12 in. (30 cm) apart across entire RECPs width.*

*NOTE: *In adverse soil conditions longer staples/stakes or earth anchors may be necessary to properly secure the RECPs.*

Channel Installation

The following channel guide outlines our general recommendations for installing Tensar's RollMax™ temporary and/or permanent RECPs in concentrated flow applications. Consult the staple pattern guide (Figure 1) for fastener spacing recommendations based on the channel severity.



CRITICAL POINTS
A. Diversion and Seams
B. Projected Water Line
C. Channel Bottom/Side Slope Vertices

Horizontal staple/stake spacing should be altered if necessary to allow rosettes to secure the critical points along the channel surface.

Drawings Not To Scale

CHANNEL INSTALLATION STEPS

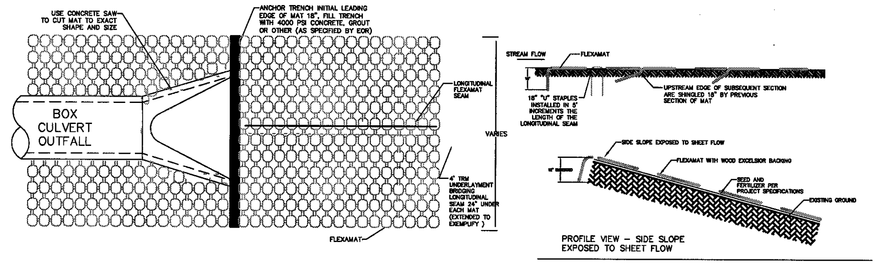
1. Prepare soil before installing RECPs, including any necessary application of lime, fertilizer and seed. See page 7 for special requirements when soil filling a woven TRM.
2. Begin at the top of the channel by anchoring the RECPs in a 6 in. (15 cm) deep x 6 in. (15 cm) wide trench with approximately 12 in. (30 cm) of RECPs extended beyond the upslope portion of the trench. Use ShoreMax® mat at the channel/culvert outlet as supplemental scour protection as needed. Anchor the RECPs with a row of staples/stakes approximately 12 in. (30 cm) apart in the bottom of the trench. Backfill and compact the trench after stapling. Apply seed to the compacted soil and fold the remaining 12 in. (30 cm) portion of RECPs back over the seed and compacted soil. Secure RECPs over compacted soil with a row of staples/stakes spaced approximately 12 in. (30 cm) apart across the width of the RECPs.
3. Roll woven RECPs in direction of water flow in bottom of channel. RECPs will unroll with appropriate side against the soil surface. All RECPs must be securely fastened to soil surface by placing staples/stakes in appropriate locations as shown in the staple pattern guide.

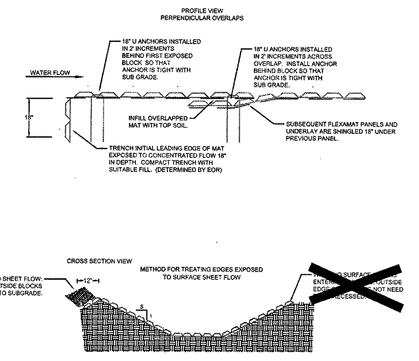
Place consecutive RECPs end-over-end (shingle style) with 4 in.-6 in. (10-15 cm) overlap. Use a double row of staples staggered 4 in. (10 cm) apart and 4 in. (10 cm) on center to secure RECPs.

4. Full-length edge of RECPs at top of side slopes must be anchored with a row of staples/stakes approximately 12 in. (30 cm) apart in a 6 in. (15 cm) deep x 6 in. (15 cm) wide trench. Backfill and compact the trench after stapling.
5. Adjacent RECPs must be overlapped approximately 2 in.-5 in. (5-12.5 cm) (depending on RECP type) and stapled.*
6. In high flow channel applications a staple check slot is recommended at 30 to 40 ft (9-12 m) intervals. Use a double row of staples staggered 4 in. (10 cm) apart and 4 in. (10 cm) on center over entire width of the channel.
7. The terminal end of the RECPs must be anchored with a row of staples/stakes approximate 12 in. (30 cm) apart in a 6 in. (15 cm) deep x 6 in. (15 cm) wide trench. Backfill and compact the trench after stapling.

*NOTE: *In adverse soil conditions longer staples/stakes or earth anchors may be necessary to properly secure the RECPs.*

1/3 PERMANENT TURF REINFORCEMENT AND TEMPORARY EROSION CONTROL MAT DETAILS
NOT TO SCALE







CONSTRUCTION NOTES:

1. GRADE A TRAPEZOIDAL CHANNEL SO THAT WATER WILL FLOW DOWN THE CENTER OF THE CHANNEL AND BE CONTAINED TO THE CHANNEL. ALL SUBGRADE SURFACES PREPARED FOR PLACEMENT OF MATS SHALL BE SMOOTH AND FREE OF ALL ROCKS, STICKS, ROOTS, OTHER PROTRUSIONS, OR DEBRIS OF ANY KIND. THE PREPARED SURFACE SHALL PROVIDE A FIRM UNYIELDING FOUNDATION FOR THE MATS WITH NO SHARP OR ABRUPT CHANGES IN GRADE.
2. APPLY SEED DIRECTLY TO THE PREPARED SOIL PRIOR TO FLEXAMAT INSTALLATION. USE SEED PER PROJECT SPECIFICATIONS.
3. INSTALL FLEXAMAT ROLLS. AVAILABLE WIDTHS ARE 8.5', 6', 10', 12', & 16' AVAILABLE IN CUSTOM LENGTHS. FOR WIDER WIDTHS, INSTALL MATS ADJACENT TO EACH OTHER. BRIDGE LONGITUDINAL SEAM WITH 4" TRM. 24" OF TRM SHALL BE UNDER EACH MAT. A CONCRETE SAW SHALL BE USED TO CUT THE MAT TO EXACT SIZE AND SHAPE TO FIT AROUND CULVERT. INSTALL 18" "U" ANCHORS IN 5' INCREMENTS THE LENGTH OF THE LONGITUDINAL SEAM, WITH HALF THE ANCHOR IN BOTH MATS.
4. THE INITIAL LEADING EDGE OF FLEXAMAT AT THE OUTLET SHALL BE EMBEDDED 18" VERTICALLY INTO THE GROUND TO SERVE AS AN ANCHOR TRENCH. THE TRENCH SHALL BE FILLED WITH 4000 PSI CONCRETE, GROUT, OR OTHER (AS SPECIFIED BY EOR). MAT SHOULD BE ONE CONTINUOUS SECTION, IF ADDITIONAL SECTIONS ARE REQUIRED, OVERLAP THE DOWNSTREAM SECTION 18" WITH PREVIOUS SECTION OF MAT. ANY OTHER EDGE OF MAT THAT IS EXPOSED TO SHEET FLOW SHALL BE ANCHOR TRENCHED 12".
5. FOR ADDITIONAL SECTIONS OF MAT, OVERLAP THE DOWNSTREAM SECTION 18" WITH UPSTREAM SECTION OF MAT. PRIOR TO INSTALLING OVERLAP, FLIP UPSTREAM MAT BACK 24". EXCAVATE 2.25" OF SOIL 18" FROM THE END OF THE MAT AND 6" WIDE TO FORM A LOW TRENCH. INSTALL 1" EXPOSED TOPSOIL OVER INITIAL EDGE. FLIP END OF UPSTREAM MAT OVER THE SOIL COVERED INITIAL LEADING EDGE OF DOWNSTREAM MAT.
6. INSTALL 18" "U" ANCHORS IN 2' INCREMENTS ACROSS THE OVERLAP. INSTALL ANCHORS DIRECTLY BEHIND BLOCKS. "U" ANCHORS CONSIST OF #2 REBAR "U" ANCHOR WITH 18" LEGS.

2/3 CONCRETE BLOCK MAT (FLEXAMAT OR EQUIVALENT) INSTALLATION DETAILS
NOT TO SCALE

DATE	NO.	DESCRIPTION	APPD.
6-24	1	REVISED STORMWATER PIPE INSTALLATION	
5-1	0	ISSUED FOR CONSTRUCTION	

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APPALACHIAN POWER COMPANY

KANAWHA RIVER PLANT

GLASGOW WEST VIRGINIA

STORM WATER DIVERSION CONSTRUCTION DRAWINGS
PROPOSED STORM WATER DIVERSION DETAILS 1

DWG. NO. 12-30003-1

SCALE: CIVIL ENGINEERING DIVISION

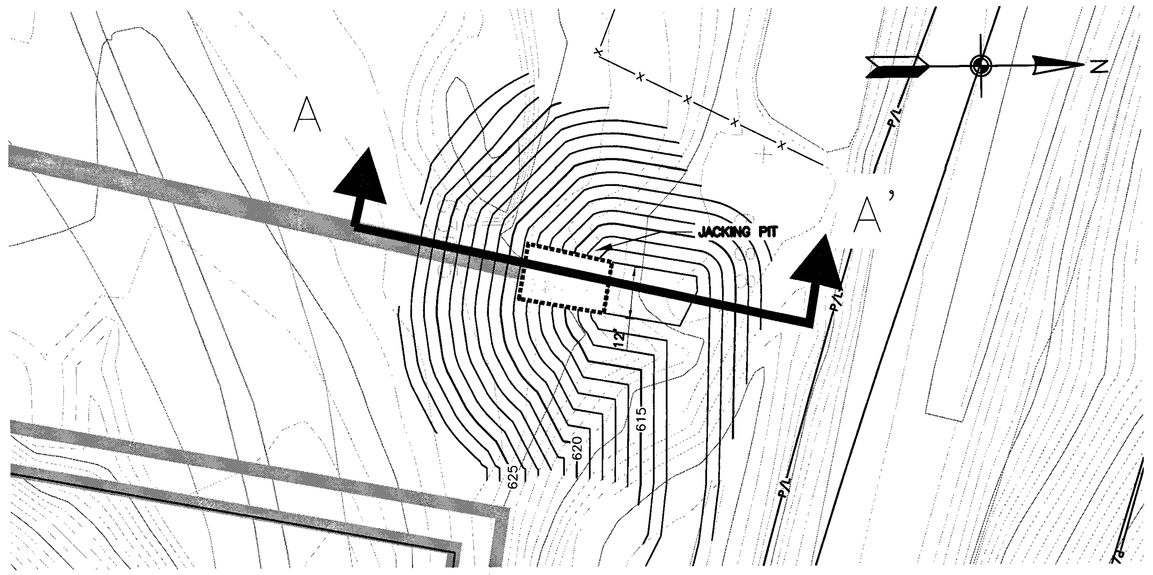
DR: LHC
CH:
ENGR.
PROJ. ENGR.
DATE:
APPROVED BY

ARCADIS Project No. HA100250.0000.00000
Date 06-24-2015
ARCADIS 4665 CORNELL ROAD SUITE 350 CINCINNATI, OHIO 45241 TEL. 513.860.8700
Professional Engineer's Name JOHN HOLM
Professional Engineer's No.
State | Date Signed | Project Mgr. RJK
Designed by | Drawn by MJC | Checked by JWH
JOHN W. HOLM REGISTERED PROFESSIONAL ENGINEER 17419 STATE OF WEST VIRGINIA
ARCADIS
ARCADIS U.S., INC.

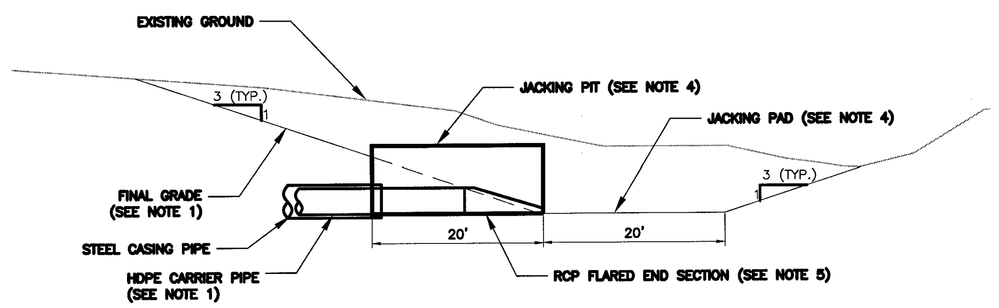
AEP AMERICAN ELECTRIC POWER
1 RIVERSIDE PLAZA COLUMBUS, OH 43215

IGS1092

DWG. NO. 12-30004-1

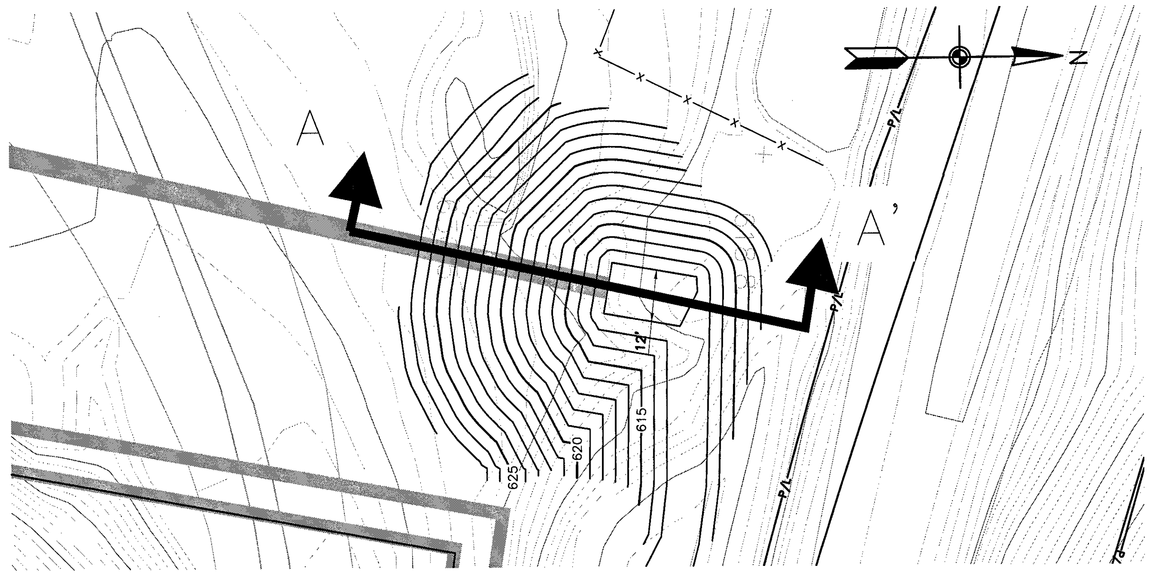


PLAN

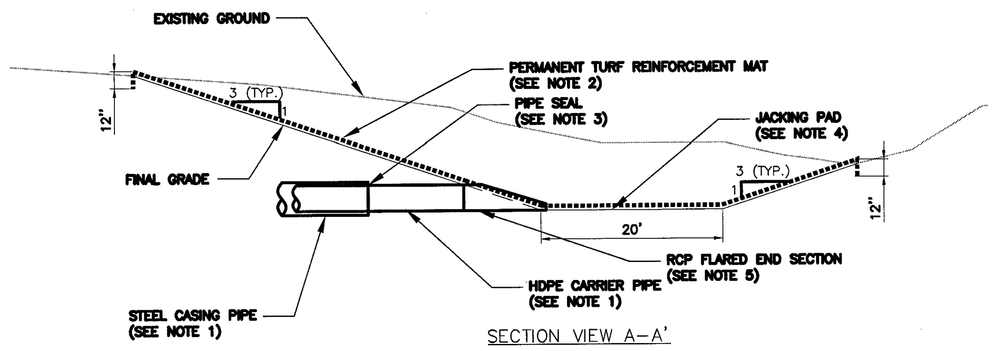


SECTION VIEW A-A'

1/4 INTERIM NORTH INLET WITH JACKING PIT
NOT TO SCALE



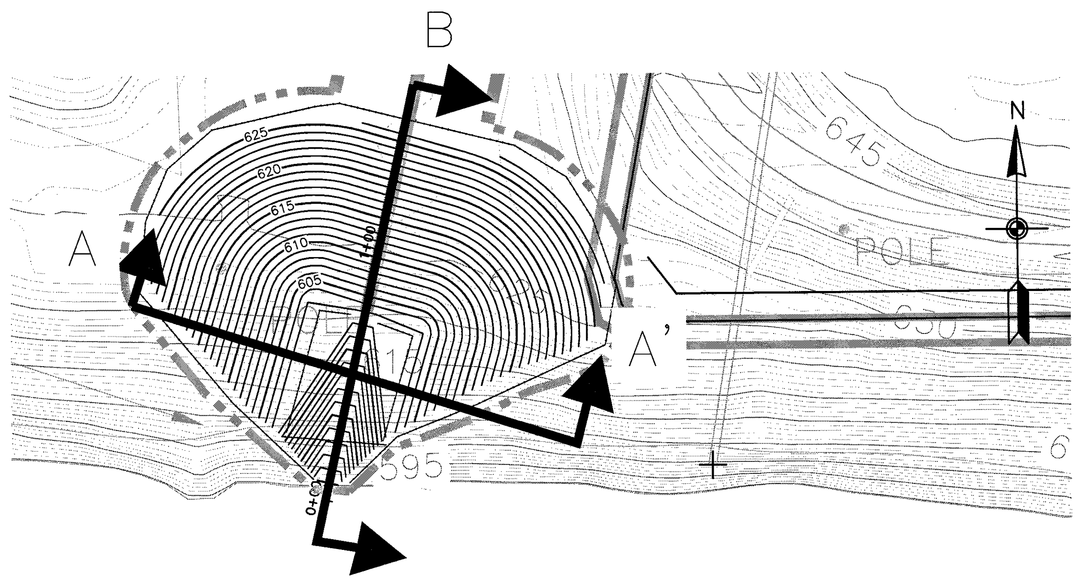
PLAN



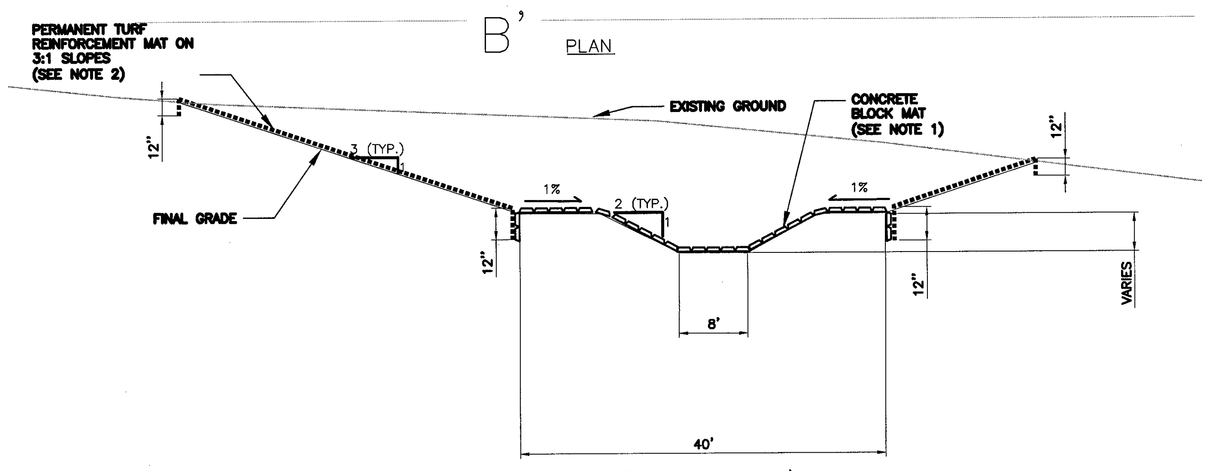
SECTION VIEW A-A'

2/4 NORTH INLET WITH FINISHED GRADE
NOT TO SCALE

NOTES:
1. CASING WILL BE A JACKED AND BORE 48" STEEL PIPE. CARRIER WILL BE EITHER A 42" HDPE PIPE OR A SLIP LINER (OR EQUIVALENT)
2. CONTRACTOR TO PROVIDE PROPOSED PIPE SEAL DETAIL AND SPECIFICATION FOR ENGINEER'S REVIEW PRIOR TO START OF WORK. SPECIFICATIONS SHALL INCLUDE PRODUCT CUT SHEETS FOR ALL PROPOSED MATERIALS AND PROPOSED INSTALLATION PROCEDURES, AT A MINIMUM.
3. LOCATION AND SIZE OF THE PIPE JACKING PIT AND PAD ARE APPROXIMATE AND MAY BE ALTERED SLIGHTLY BASED ON FIELD CONDITIONS.
4. THE REINFORCED CONCRETE PIPE (RCP) FLARED END SECTION SHALL BE OLDCASTLE PRECAST 48" PIPE DIAMETER FLARED END SECTION OR EQUIVALENT. CONTRACTOR TO PROVIDE DETAIL AND SPECIFICATIONS FOR CONNECTION OF CARRIER PIPE TO FLARED END SECTIONS FOR ENGINEER'S REVIEW PRIOR TO START OF WORK. SPECIFICATIONS SHALL INCLUDE PRODUCT CUT SHEETS FOR ALL PROPOSED MATERIALS AND PROPOSED INSTALLATION PROCEDURES, AT A MINIMUM.
5. CONCRETE BLOCK MAT (CBM) AT THE SOUTH OUTLET SHALL BE FLEXAMAT PLUS OR EQUIVALENT. REFER TO DETAIL 2 ON DRAWING 12-30003 FOR ADDITIONAL INFORMATION ON CBM INSTALLATION.
6. THE INITIAL EDGE OF THE CBM AT THE OUTLET SHALL BE EMBEDDED 18 INCHES VERTICALLY INTO AN ANCHOR TRENCH THAT IS 18 INCHES DEEP AND 4 INCHES WIDE. THE TRENCH SHALL BE FILLED WITH 4,000 PSI CONCRETE OR EQUIVALENT GROUT MATERIAL. ANY OTHER EDGE OF THE CBM THAT IS EXPOSED TO SHEET FLOW SHALL BE EMBEDDED 12 INCHES INTO THE GROUND.
7. EXTEND THE CBM 5 FEET INTO THE KANAWHA RIVER.
8. INSTALL 'U' ANCHORS AT 2 FOOT INCREMENTS ACROSS WIDTH OF CHANNEL APPROXIMATELY 1 FOOT FROM EDGE OF WATER. REFER TO DETAIL 2 ON DRAWING 12-30003 FOR ADDITIONAL INFORMATION ON 'U' ANCHOR INSTALLATION.

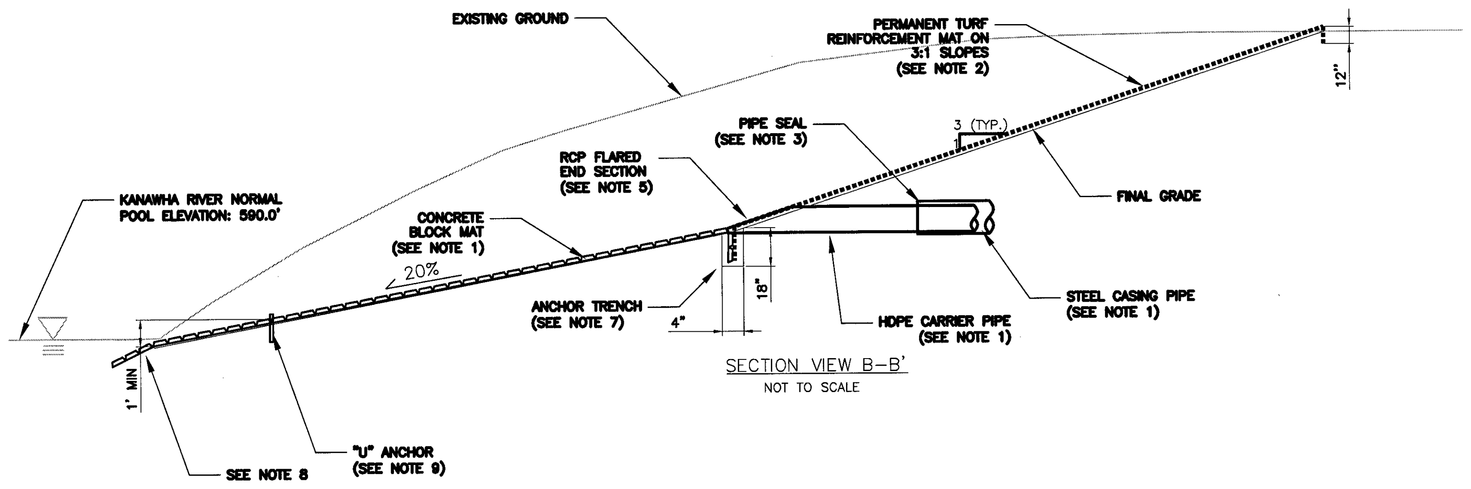


PLAN



SECTION VIEW A-A'

3/4 SOUTH OUTLET CHANNEL SECTION
NOT TO SCALE



SECTION VIEW B-B'
NOT TO SCALE

DATE	NO.	DESCRIPTION	APPD.
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5-1	0	ISSUED FOR CONSTRUCTION	

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APPALACHIAN POWER COMPANY

KANAWHA RIVER PLANT

GLASGOW WEST VIRGINIA

STORM WATER DIVERSION CONSTRUCTION DRAWINGS PROPOSED STORM WATER DETAILS 2

DWG. NO. 12-30004-1

SCALE:

DR: LNC

CH:

ENGR.

PROJ. ENGR.

DATE:

APPROVED

CIVIL ENGINEERING DIVISION

ARCADIS Project No. HA100250.0000.00000
Date 6-24-2015
ARCADIS
4665 CORNELL ROAD
SUITE 350
CINCINNATI, OHIO 45241
TEL 513.860.8700

Professional Engineer's Name: JOHN HOLM
Professional Engineer's No.:
State | Date Signed | Project Mgr.: RJK
Designed by: LNC | Drawn by | Checked by: JWH

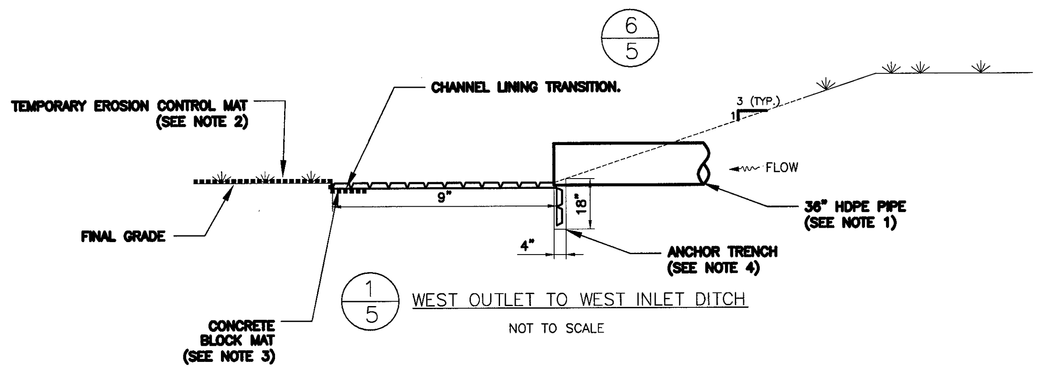
JOHN W. HOLM REGISTERED 17419 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

ARCADIS
ARCADIS U.S., INC.

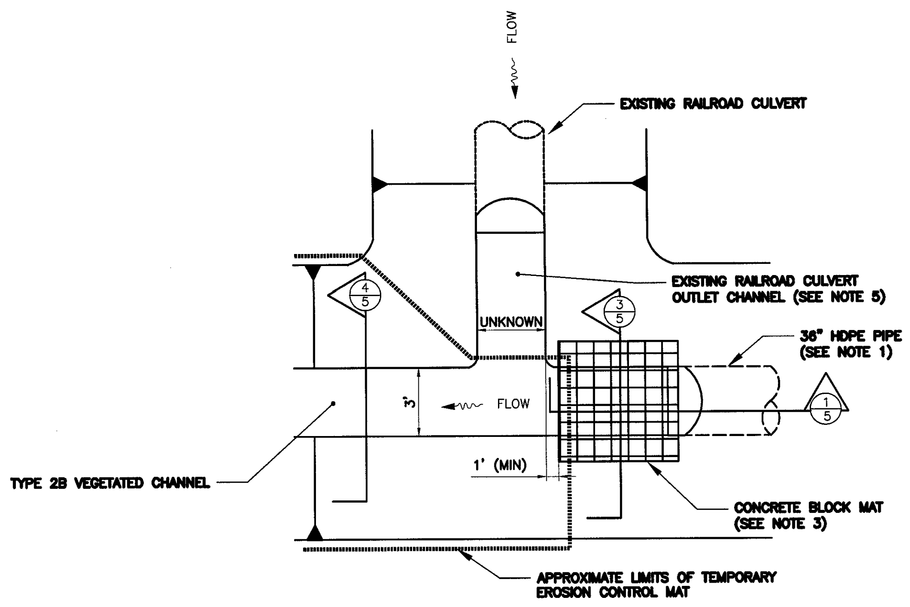
AEP AMERICAN ELECTRIC POWER
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

IGS1092

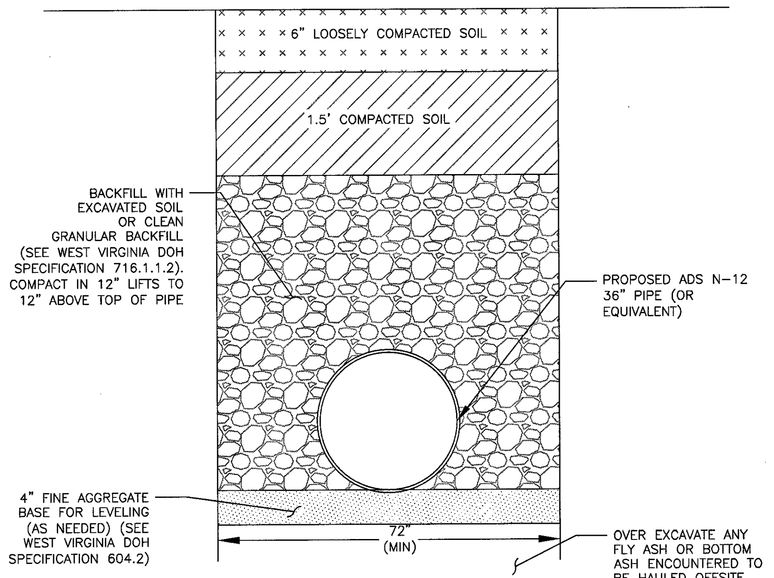
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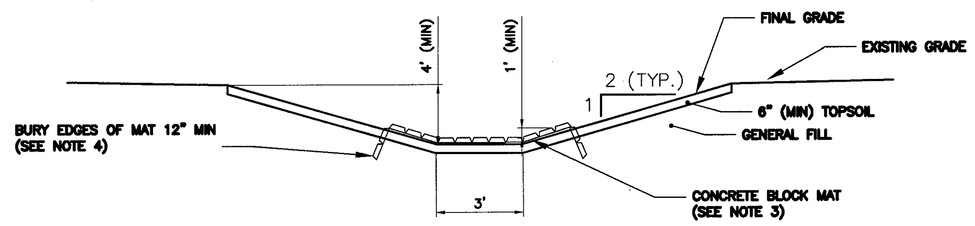
6/5
1/5 WEST OUTLET TO WEST INLET DITCH
NOT TO SCALE



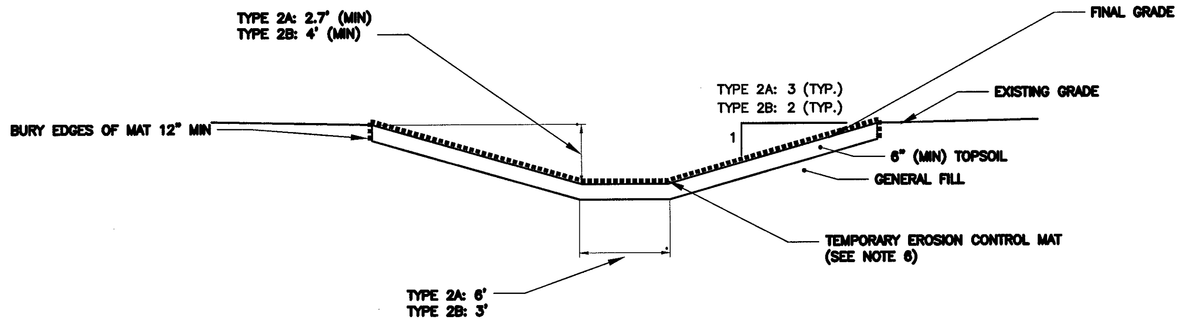
2/5 TRANSITION: WEST OUTLET TO WEST INLET DITCH
NOT TO SCALE



7/5 STORM DRAIN TRENCH DETAIL
NOT TO SCALE



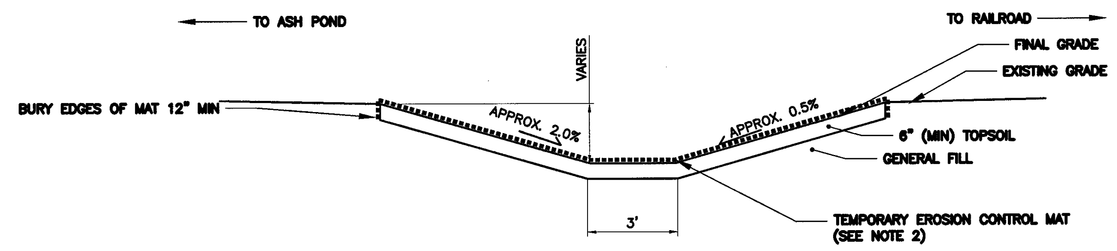
3/5 PIPE OUTLET PROTECTION: WEST OUTLET
NOT TO SCALE



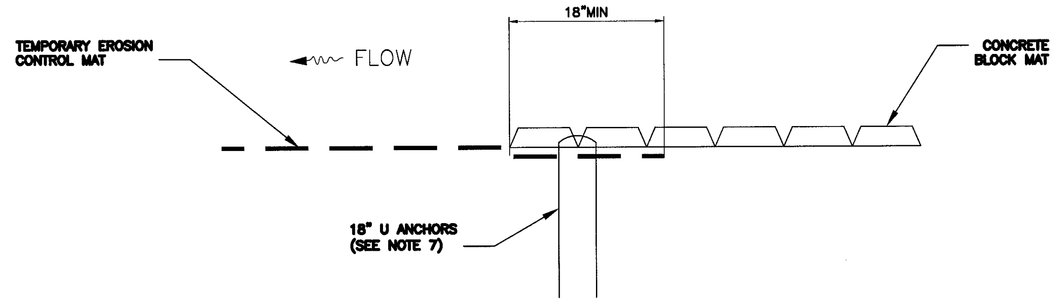
4/5 TYPE 2A/2B VEGETATED CHANNEL
NOT TO SCALE

NOTES:

1. THE 36-INCH HDPE PIPE SHALL BE ADS N-12 PIPE OR EQUIVALENT.
2. TEMPORARY EROSION CONTROL MAT SHALL BE NORTH AMERICAN GREEN SC150 OR EQUIVALENT. REFER TO DETAIL 1 ON DRAWING 12-30003 FOR ADDITIONAL INFORMATION ON EROSION CONTROL MAT INSTALLATION.
3. CONCRETE BLOCK MAT (CBM) AT THE WEST OUTLET SHALL BE STANDARD FLEXAMAT OR EQUIVALENT. REFER TO DETAIL 2 ON DRAWING 12-30003 FOR ADDITIONAL INFORMATION ON CBM INSTALLATION.
4. THE INITIAL EDGE OF THE CBM AT THE OUTLET SHALL BE EMBEDDED 18 INCHES VERTICALLY INTO AN ANCHOR TRENCH THAT IS 18 INCHES DEEP AND 4 INCHES WIDE. THE TRENCH SHALL BE FILLED WITH 4,000 PSI CONCRETE OR EQUIVALENT GROUT MATERIAL. ANY OTHER EDGE OF THE CBM THAT IS EXPOSED TO SHEET FLOW SHALL BE EMBEDDED 12 INCHES INTO THE GROUND.
5. AREAS WITHIN THE EXISTING RAILROAD CULVERT OUTLET CHANNEL DISTURBED DURING CONSTRUCTION OPERATIONS SHALL BE RESTORED IN A MANNER SIMILAR TO OTHER DISTURBED CHANNEL AREAS (I.E., USING A TEMPORARY EROSION CONTROL MAT AND SEEDING).
6. REFER TO DETAIL 6 ON THIS DRAWING FOR DETAILS ON THE TRANSITION BETWEEN THE CONCRETE BLOCK MAT AND TEMPORARY EROSION CONTROL MAT
7. REFER TO DETAIL 2 ON DRAWING 12-30003 FOR ADDITIONAL INFORMATION ON "U" ANCHOR INSTALLATION.



5/5 EAST INLET DITCH: UPSTREAM END
NOT TO SCALE



6/5 CHANNEL LINING TRANSITION
NOT TO SCALE

DATE	NO.	DESCRIPTION	APPD.
6-24	1	REVISED STORMWATER PIPE INSTALLATION	
5-1	0	ISSUED FOR CONSTRUCTION	

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APPALACHIAN POWER COMPANY
KANAWHA RIVER PLANT
GLASGOW WEST VIRGINIA

STORM WATER DIVERSION CONSTRUCTION DRAWINGS
PROPOSED STORM WATER DIVERSION DETAILS 3

DWG. NO. 12-30005-1

SCALE:
DR: LNC
CH:
ENGR.
PROJ. ENGR.
DATE:
APPROVED BY:

CIVIL ENGINEERING DIVISION

AEP AMERICAN ELECTRIC POWER
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

ARCADIS Project No.
HA100250.0000.00000
Date
06-24-2015
ARCADIS
4665 CORNELL ROAD
SUITE 350
CINCINNATI, OHIO 45241
TEL 513.860.8700

Professional Engineer's Name
JOHN HOLM
Professional Engineer's No.

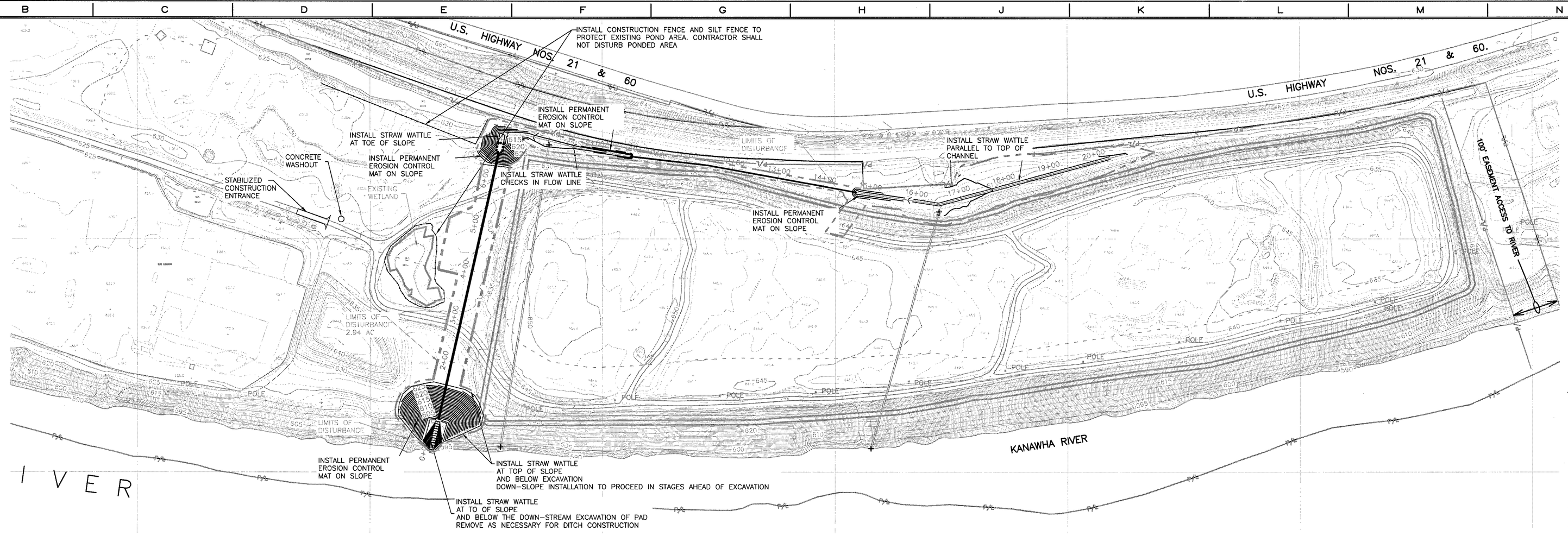
State	Date Signed	Project Mgr.
		RJK
Designed by	Drawn by	Checked by
	MJC	JWH

JOHN W. HOLM REGISTERED 17419 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

ARCADIS
ARCADIS U.S., INC.

IGS1092

DWG. NO. 12-30006-1



N

100' 0' 100' 200'
SCALE: 1"=100' CONTOUR INTERVAL: 1'

720 EXISTING CONTOUR
690.9 EXISTING SPOT ELEVATION
EXISTING TREES
EXISTING STREAM OR POND EDGE
EXISTING OCCUPIED STRUCTURE
EXISTING FENCE
EXISTING UTILITY POLE
EXISTING PAVED ROAD
EXISTING UNPAVED ROAD
EXISTING PROPERTY LINE
CONSTRUCTION FENCE
STRAW WATTLE

VERTICAL DATUM: NAVD88
HORIZONTAL DATUM: NAD83 WVA SOUTH

CONCRETE WASHOUT - For any project on which concrete will be poured or otherwise formed on site, a suitable washout facility must be provided for the cleaning of chutes, mixers, and hoppers of the delivery vehicles unless such a facility will be used at the source of the concrete. Under no circumstances may wash water from these vehicles be allowed to enter any surface waters. Make sure that proper signage is provided to drivers so that they are aware of the presence of washout facilities.

Washout facilities should not be placed within 50 feet of storm drains, open ditches or surface waters. They should be in a convenient location for the trucks, preferably near the place where the concrete is being poured, but far enough from other vehicular traffic to minimize the potential for accidental damage or spills. Wherever possible, they should be located on slopes not exceeding a 2% grade. Additional information on washouts may be obtained from EPA's stormwater website at: http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=117&minmeasure=4.

Compost Sock Washout

Wherever compost sock washouts are used, a suitable impervious geomembrane should be placed at the location of the washout. Compost socks should be staked in the manner recommended by the manufacturer around perimeter of the geomembrane so as to form a ring with the ends of the sock located at the upslope corner (Figure 3.18). Care should be taken to ensure continuous contact of the sock with the geomembrane at all locations. Where necessary, socks may be stacked and staked so as to form a triangular cross-section.

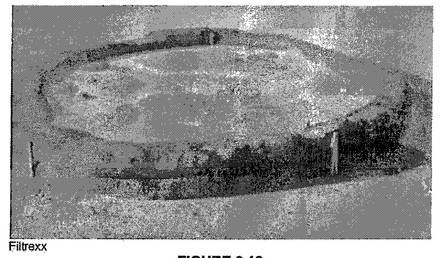
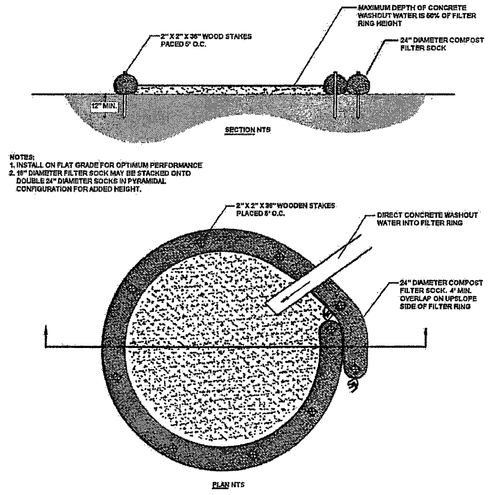

Filtrexx

FIGURE 3.18
Typical Compost Sock Washout Installation



A suitable impervious geomembrane shall be placed at the location of the washout prior to installing the socks.
Adapted from Filtrexx

NOTE:
CONTRACTOR MAY PROPOSE ALTERNATE CONCRETE WASHOUT.

3.02 - STABILIZED CONSTRUCTION ENTRANCE

Introduction Large quantities of mud can be tracked onto public and private roads causing dangerous driving conditions and muddy runoff when it rains. Construction entrances are stabilized to reduce the amount of sediment transported onto paved roads by vehicles or equipment by constructing a stabilized pad of stone at entrances to construction sites.

Conditions Where Practice Applies Stabilized Construction Entrances shall be installed wherever construction traffic enters and leaves a site.

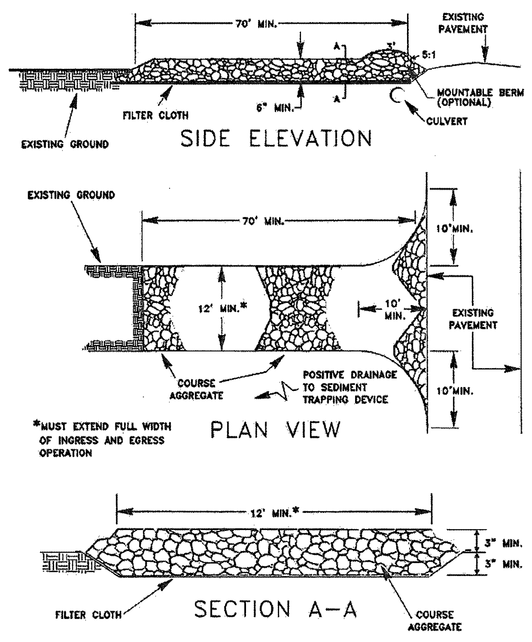
Design Criteria
1. Use 2-4 inch stone for low volume entrances, larger stone (4-6 inch) for heavy use or material delivery entrances.
2. Length is as required, but not less than 70 feet (except on a single residence lot where a 30 foot minimum length would apply).
3. Thickness should be not less than 6 inches.
4. The width shall be a minimum of 10 feet, but not less than the full width at points where ingress or egress occurs.
5. Geotextile fabric shall be placed over the entire area prior to the placing of stone.
6. All surface water flowing or diverted toward construction entrances shall be piped across the entrance. If a culvert is impractical, a mountable berm with 5:1 slopes shall be used.
7. If necessary, divert any water running down access road to a sediment trap located on either side of the Stabilized Construction Entrance.

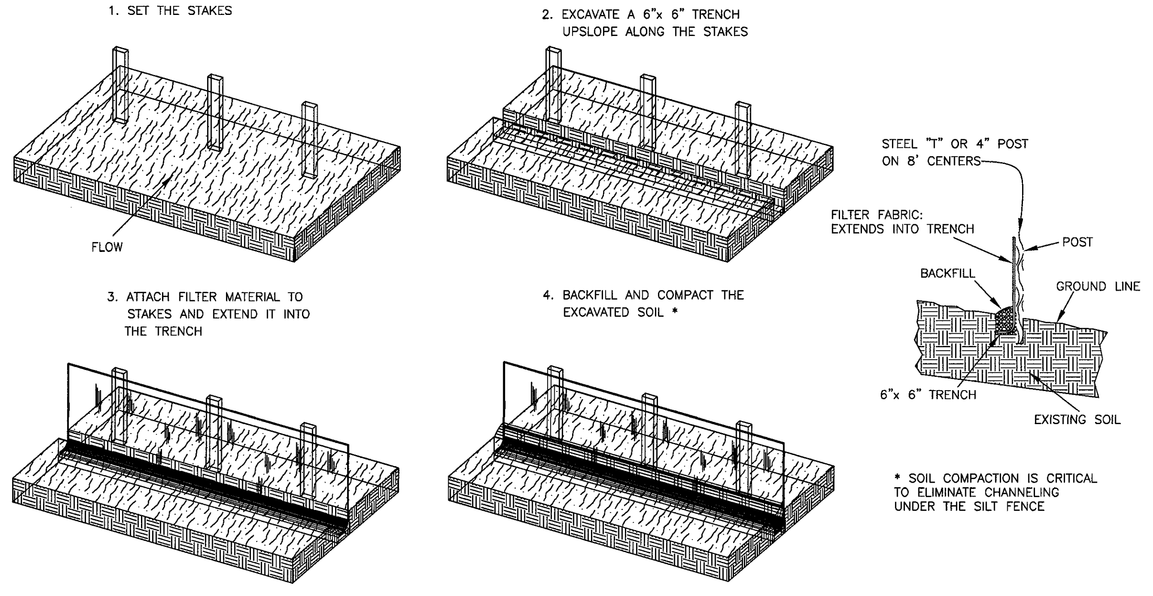
Maintenance The entrance shall be maintained in a condition that will prevent tracking or flowing of sediment onto public rights-of-way. This may require periodic top dressing with additional stone as conditions demand and repair and/or cleanout of any measures used to trap sediment. All sediment spilled, dropped, washed or tracked onto public rights-of-way must be removed immediately.

Wheels on all vehicles shall be cleaned to remove sediment prior to entrance onto public rights-of-way. If washing is required, it shall be done on an area stabilized with stone and which drains into approved sediment trapping device. If the street is washed precautions must be taken to prevent muddy water from running into waterways or storm sewers.

Inspection and needed maintenance should be provided daily but at a minimum every seven days and after every rain of 0.5 inch or greater.

STABILIZED CONSTRUCTION ENTRANCE



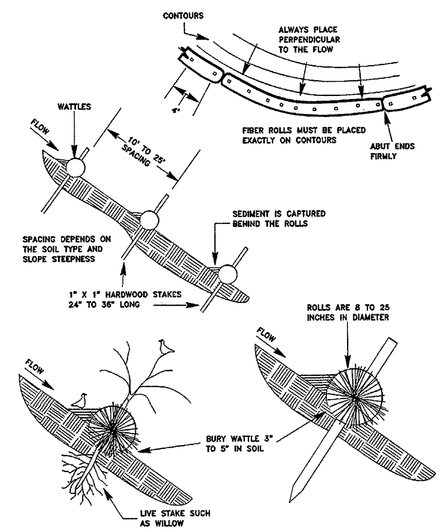


SILT FENCE INSTALLATION DETAIL
NOT TO SCALE

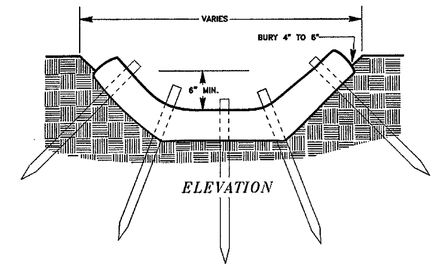
SEDIMENT AND EROSION CONTROL GENERAL NOTES:

1. ACTIONS MUST BE TAKEN TO MINIMIZE THE TRACKING OF MUD AND SOIL FROM CONSTRUCTION AREAS ONTO PUBLIC ROADWAYS AND PLANT ACCESS DRIVES. SOIL TRACKED ONTO THE ROADWAY SHALL BE REMOVED DAILY.
2. SOIL STOCKPILES SHALL BE LOCATED AWAY FROM STREAMS, PONDS, SWALES, AND CATCH BASINS. STOCKPILES SHALL BE SEEDED, MULCHED, AND ADEQUATELY CONTAINED THROUGH THE USE OF SILT FENCE.
3. SEDIMENT-LADEN GROUNDWATER ENCOUNTERED DURING TRENCHING, BORING, OR OTHER EXCAVATION ACTIVITIES, AND SEDIMENT-LADEN WATER FROM STREAM CROSSING PUMP AROUNDS, SHALL BE PUMPED TO A SEDIMENT TRAPPING DEVICE PRIOR TO BEING DISCHARGED INTO A STREAM, POND, SWALE, OR CATCH BASIN.
4. WHERE CONSTRUCTION OR LAND DISTURBING ACTIVITY WILL OR HAS TEMPORARILY CEASED ON ANY PORTION OF A SITE, TEMPORARY SITE STABILIZATION MEASURES SHALL BE REQUIRED AS SOON AS PRACTICABLE, BUT NO LATER THAN 14 CALENDAR DAYS AFTER THE ACTIVITY HAS CEASED.
5. CONTROL DEVICES (SUCH AS STRAW WATTLES, SILT FENCE, AND OTHER CONTROLS INSTALLED) SHALL BE INSPECTED AT LEAST EVERY SEVEN (7) CALENDAR DAYS AND WITHIN 24-HOURS AFTER EACH RAINFALL EVENT THAT PRODUCES 1/2-INCHES OR MORE OF PRECIPITATION. CHECK FOR AREAS WHERE RUNOFF HAS ERODED A CHANNEL BENEATH THE DEVICE, OR WHERE THE DEVICE HAS BEEN OVERTOPPED AND/OR COLLAPSED.
6. IF THE CONTROL DEVICE BECOMES INEFFECTIVE DUE TO WEATHERING, DECOMPOSING, OR DAMAGE, REPLACE THE AFFECTED SECTION IMMEDIATELY.
7. SEDIMENT MUST BE REMOVED WHEN IT REACHES APPROXIMATELY 1/2 THE HEIGHT OF THE SILT FENCE OR CHECK DAM, ESPECIALLY IF HEAVY RAINS ARE EXPECTED.
8. ADDITIONAL BMP'S AND ESC MEASURES MAY BE REQUIRED BY THE CONTRACTOR TO MINIMIZE SEDIMENT FROM LEAVING THE CONSTRUCTION ZONE.
9. CONTRACTOR SHALL PERFORM ALL ACTIVITIES PER THE MOST RECENT LOCAL, STATE AND FEDERAL STORM WATER MANAGEMENT PROGRAM RULES AND REGULATIONS.
10. COMPOST SOCKS ARE AN ACCEPTABLE ALTERNATIVE TO STRAW WATTLES.

WATTLES



STRAW WATTLE DITCH CHECK



STRAW WATTLE DETAIL
NOT TO SCALE

DATE	NO.	DESCRIPTION	APPD.
6-24	1	REVISED STORMWATER PIPE INSTALLATION	
5-1	0	ISSUED FOR CONSTRUCTION	

REVISIONS

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APPALACHIAN POWER COMPANY
KANAWHA RIVER PLANT
GLASGOW WEST VIRGINIA

STORM WATER DIVERSION CONSTRUCTION DRAWINGS
EROSION AND SEDIMENT CONTROL PLAN AND DETAILS

DWG. NO. 12-30006-1

SCALE:
DR: LNC
CH:
ENGR.
PROJ.
ENGR.
DATE:
APPROVED BY
CIVIL ENGINEERING DIVISION

AEP AMERICAN ELECTRIC POWER
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

ARCADIS Project No. HA100250.0000.00000
Date 06-24-2015
ARCADIS
4665 CORNELL ROAD
SUITE 350
CINCINNATI, OHIO 45241
TEL. 513.860.8700

Professional Engineer's Name: JOHN HOLM
Professional Engineer's No.:
State | Date Signed | Project Mgr.: RJK
Designed by | Drawn by: LNC | Checked by: JWH

JOHN W. HOLM REGISTERED 17419 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

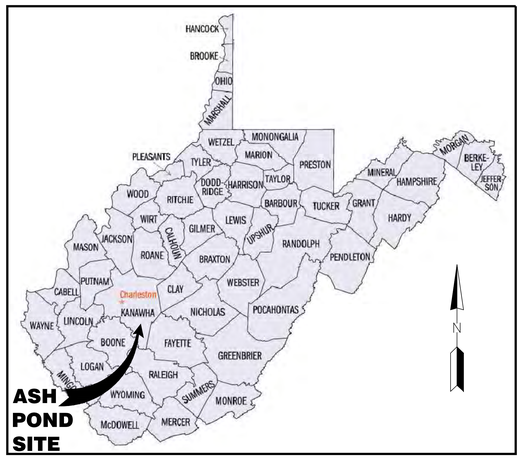
ARCADIS
ARCADIS U.S., INC.

IGS1092

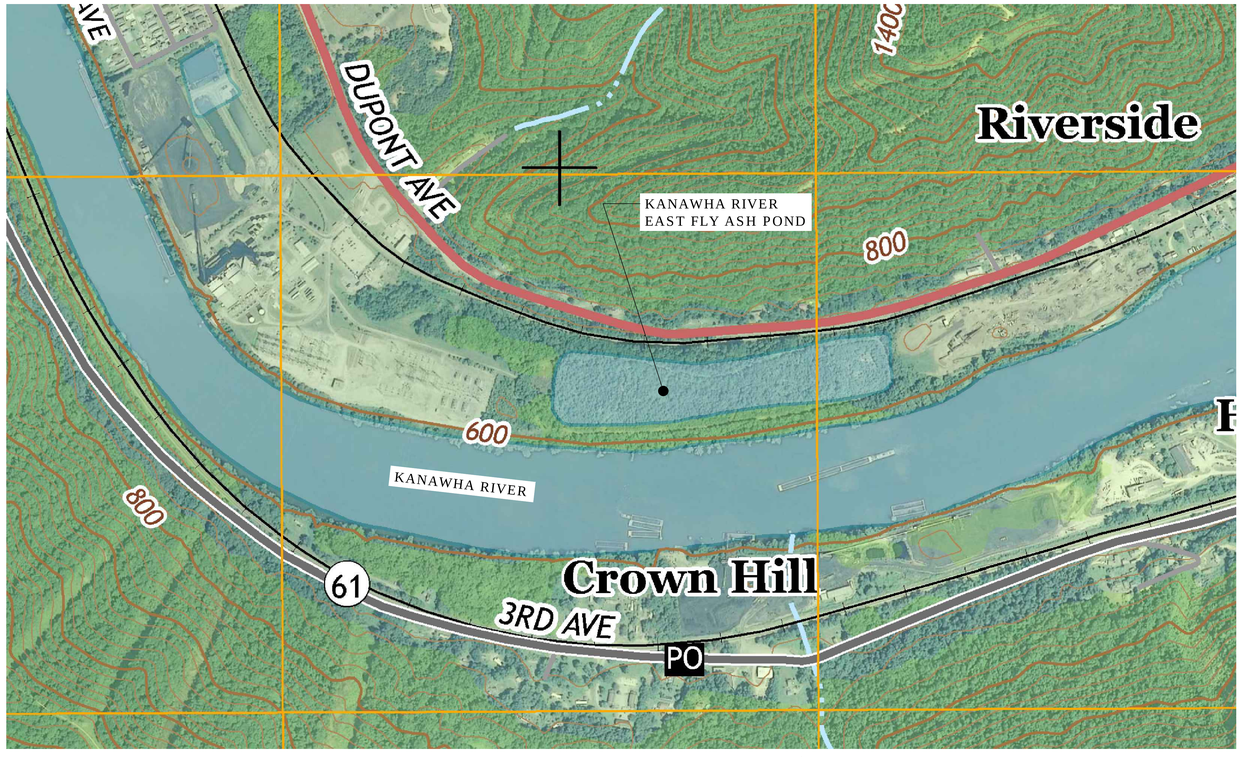
DWG. NO. 12-30010-1

APPALACHIAN POWER COMPANY

ASH POND CLOSURE
AS-BUILT DRAWINGS



LOCATION MAP
(NOT TO SCALE)



SITE LOCATION MAP DEVELOPED FROM THE CEDAR GROVE WEST VIRGINIA 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP, DATED 2014

SITE LOCATION MAP

N

INDEX TO DRAWINGS

12-30010-1	COVER SHEET
12-30012-1	TOP OF SUB-GRADE / BASE OF FINAL COVER AND GEOMEMBRANE LAYOUT
12-30013-1	TOP OF FINAL COVER
12-30014-1	PROFILES
12-30015-1	CAP DETAILS

OWNER/OPERATOR: APPALACHIAN POWER COMPANY
KANAWHA RIVER PLANT
US ROUTE 60
GLASGOW, WV 25086

PREPARED BY: ARCADIS U.S., INC.
4665 CORNELL ROAD
SUITE 350
CINCINNATI, OHIO 45241

DATE	NO.	DESCRIPTION	APPD.
7/27/17	1	AS-BUILT	JWH
2/10/16	0	ISSUED FOR CONSTRUCTION	JWH

REVISIONS

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APPALACHIAN POWER COMPANY
KANAWHA RIVER PLANT
GLASGOW WEST VIRGINIA

ASH POND CLOSURE AS-BUILT
COVER SHEET

DWG. NO. 12-30010-1

SCALE:
DR:
CH:
ENGR.
PROJ. ENGR.
DATE:
APPROVED BY

CIVIL ENGINEERING DIVISION

AEP AMERICAN ELECTRIC POWER
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

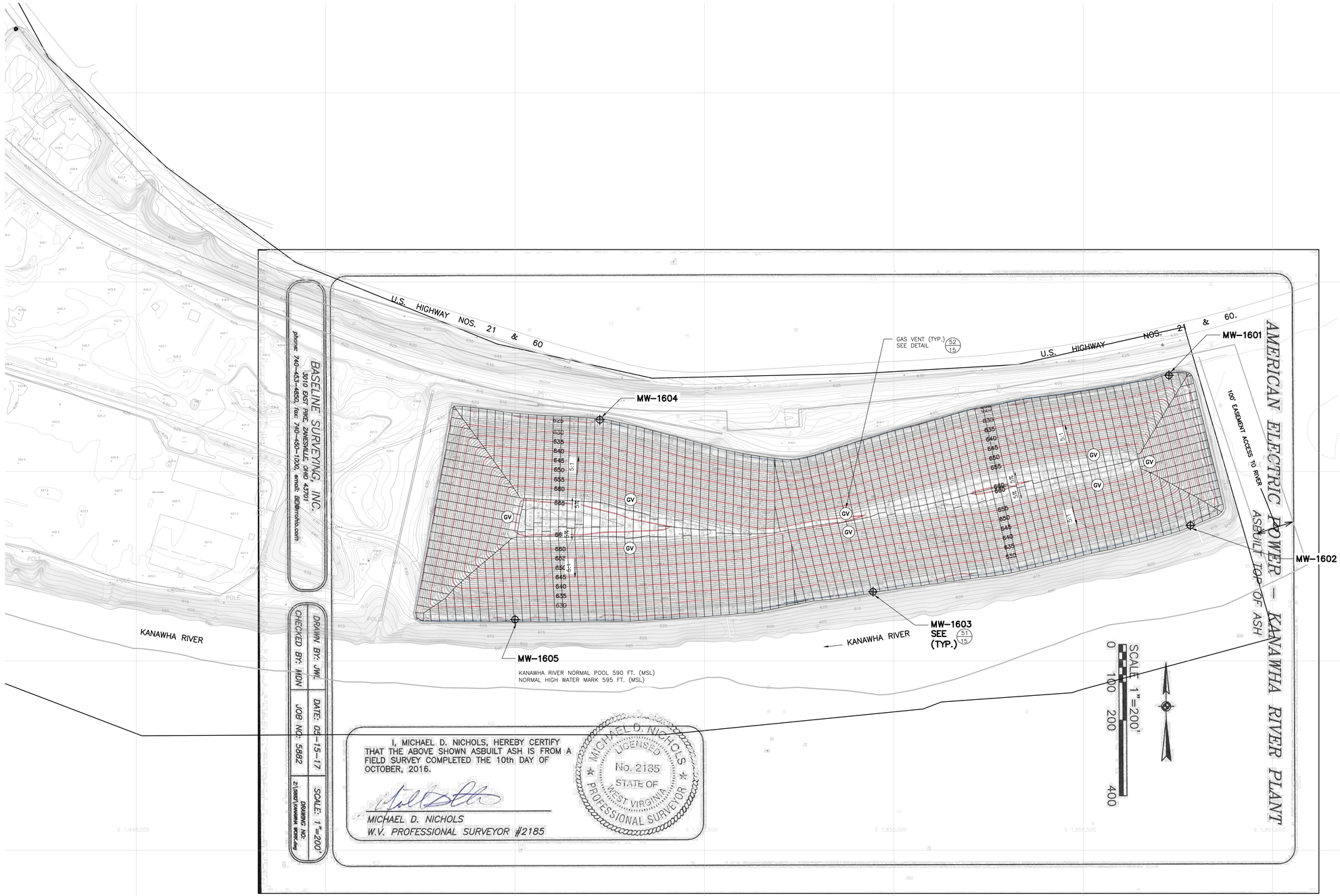
ARCADIS Project No. HA100250.0000.00000	Professional Engineer's Name: JOHN HOLM		
Date: 11-5-2015	Professional Engineer's No.		
ARCADIS 4665 CORNELL ROAD SUITE 350 CINCINNATI, OHIO 45241 TEL. 513.860.8700	State	Date Signed	Project Mgr. RJK
	Designed by	Drawn by JLF	Checked by JWH

JOHN W. HOLM — LAC 17419 — STATE OF WEST VIRGINIA — PROFESSIONAL ENGINEER

ARCADIS
ARCADIS U.S., INC.

IGS1092

DWG. NO. 12-30012-1



N

100' 0' 100' 200'
SCALE: 1"=100' CONTOUR INTERVAL: 2'

LEGEND

- EXISTING CONTOUR
- EXISTING SPOT ELEVATION
- EXISTING TREES
- EXISTING STREAM OR POND EDGE
- EXISTING OCCUPIED STRUCTURE
- EXISTING FENCE
- EXISTING UTILITY POLE
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING PROPERTY LINE
- TOP OF ASH/BASE OF CAP CONTOUR
- STORM DRAIN
- MONITORING WELL
- GAS VENT
- GEOMEMBRANE PANEL LINE

BASELINE SURVEYING, INC.
3310 EAST PIKE, ZANESVILLE, OHIO 43701
phone: 740-453-4850, fax: 740-450-1200, email: BSI@frontier.com

DRAWN BY: JWL
CHECKED BY: MDN
DATE: 05-15-17
JOB NO: 5882
SCALE: 1"=200'
DRAWING NO: 21\5882\WAW#4 WORK.dwg

I, MICHAEL D. NICHOLS, HEREBY CERTIFY THAT THE ABOVE SHOWN ASBUILT ASH IS FROM A FIELD SURVEY COMPLETED THE 10th DAY OF OCTOBER, 2016.

MICHAEL D. NICHOLS
W.V. PROFESSIONAL SURVEYOR #2185

MICHAEL D. NICHOLS LICENSED No. 2185 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

VERTICAL DATUM: NAVD88
HORIZONTAL DATUM: NAD83 WVA SOUTH

NOTES:

AS-BUILT GRADE SURVEY PROVIDED BY BASELINE SURVEYING.

AS-BUILT GEOMEMBRANE LAYOUT PROVIDED BY TRIAD ENGINEERING, INC.

DATE	NO.	DESCRIPTION	APPD.
7/27/17	1	AS-BUILT	JWH
2/10/16	0	ISSUED FOR CONSTRUCTION	JWH

REVISIONS

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APPALACHIAN POWER COMPANY

KANAWHA RIVER PLANT

GLASGOW WEST VIRGINIA

ASH POND CLOSURE AS-BUILT
TOP OF SUBGRADE /
BASE OF FINAL COVER
AND GEOMEMBRANE LAYOUT

DWG. NO. 12-30012-1

SCALE:
DR: LNC
CH:
ENGR.
PROJ. ENGR.
DATE:

CIVIL ENGINEERING DIVISION

APPROVED BY

AEP AMERICAN ELECTRIC POWER
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

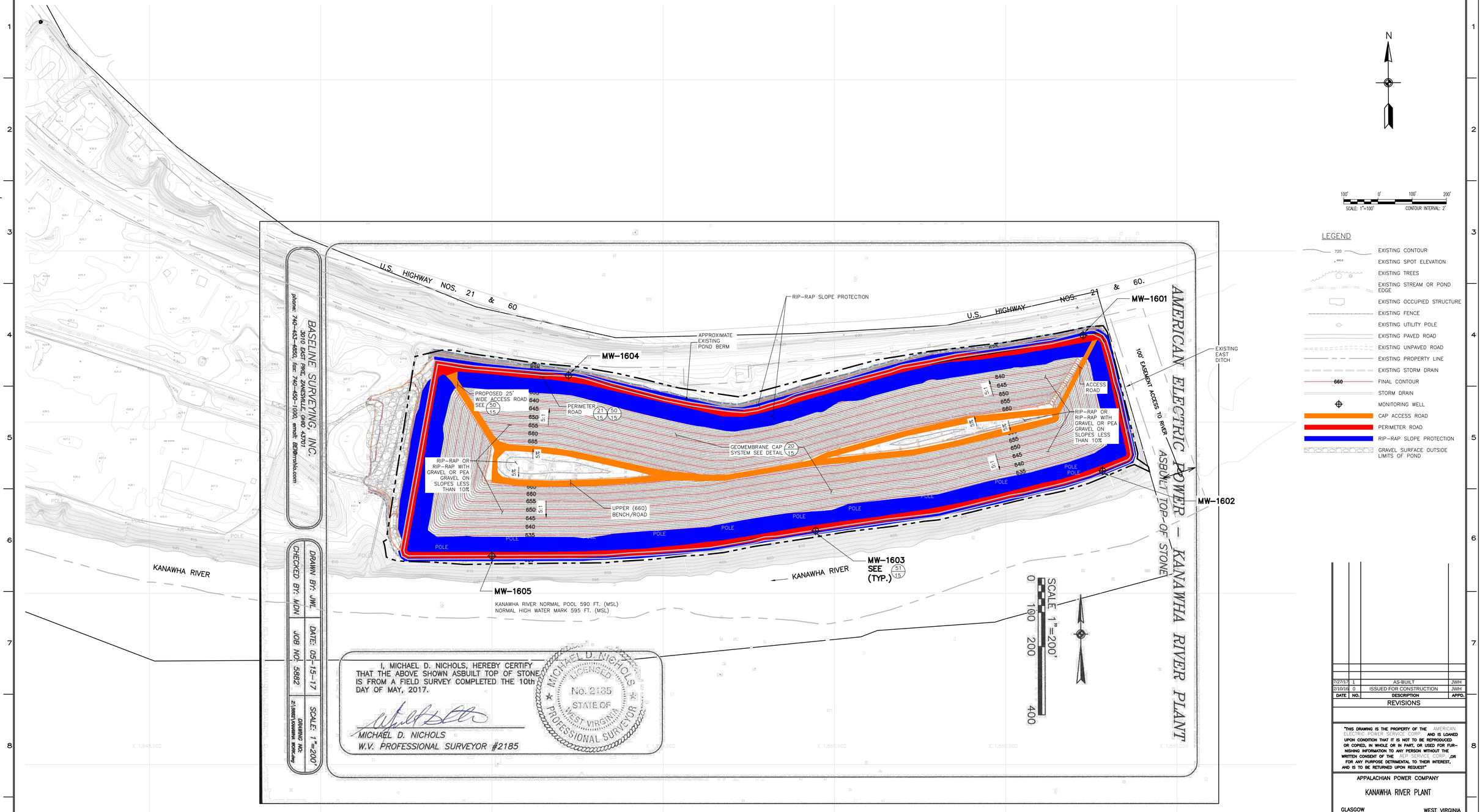
ARCADIS Project No. HA100250.0000.00000	Professional Engineer's Name JOHN HOLM		
Date 07-10-2015	Professional Engineer's No.		
ARCADIS 4665 CORNELL ROAD SUITE 350 CINCINNATI, OHIO 45241 TEL. 513.860.8700	State	Date Signed	Project Mgr. RJK
	Designed by	Drawn by LNC	Checked by JWH

JOHN W. HOLM LICENSED PROFESSIONAL ENGINEER No. 17419 STATE OF WEST VIRGINIA

ARCADIS
ARCADIS U.S., INC.

IGS1092

DWG. NO. 12-30013-1



LEGEND

- EXISTING CONTOUR
- EXISTING SPOT ELEVATION
- EXISTING TREES
- EXISTING STREAM OR POND EDGE
- EXISTING OCCUPIED STRUCTURE
- EXISTING FENCE
- EXISTING UTILITY POLE
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING PROPERTY LINE
- EXISTING STORM DRAIN
- FINAL CONTOUR
- STORM DRAIN
- MONITORING WELL
- CAP ACCESS ROAD
- PERIMETER ROAD
- RIP-RAP SLOPE PROTECTION
- GRAVEL SURFACE OUTSIDE LIMITS OF POND

BASELINE SURVEYING, INC.
3010 EAST PIKE, ZANESVILLE OHIO 43701
phone: 740-453-4880, fax: 740-450-1090, email: BSI@mindspring.com

DRAWN BY: JWL
CHECKED BY: MDN
JOB NO: 5882
DATE: 05-15-17
SCALE: 1"=200'
DRAWING NO: 2\5882\KANAWHA WORK.dwg

I, MICHAEL D. NICHOLS, HEREBY CERTIFY THAT THE ABOVE SHOWN ASBUILT TOP OF STONE IS FROM A FIELD SURVEY COMPLETED THE 10th DAY OF MAY, 2017.

MICHAEL D. NICHOLS
W.V. PROFESSIONAL SURVEYOR #2185

MICHAEL D. NICHOLS LICENSED No. 2185 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

VERTICAL DATUM: NAVD88
HORIZONTAL DATUM: NAD83 WVA SOUTH

NOTE: FINAL GRADE SURVEY PROVIDED BY BASELINE SURVEYING

DATE	NO.	DESCRIPTION	APPD.
7/27/17	1	AS-BUILT	JWH
2/10/16	0	ISSUED FOR CONSTRUCTION	JWH

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APPALACHIAN POWER COMPANY

KANAWHA RIVER PLANT

GLASGOW WEST VIRGINIA

ASH POND CLOSURE AS-BUILT TOP OF FINAL COVER

DWG. NO. 12-30013-1

SCALE:
DR: LNC
CH:
ENGR.
PROJ. ENGR.
DATE:

CIVIL ENGINEERING DIVISION

AEP GROUP

AMERICAN ELECTRIC POWER

1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

ARCADIS Project No. HA100250.0000.00000	Professional Engineer's Name JOHN HOLM		
Date 07-10-2015	Professional Engineer's No.		
ARCADIS 4665 CORNELL ROAD SUITE 350 CINCINNATI, OHIO 45241 TEL. 513.860.8700	State	Date Signed	Project Mgr. RJK
	Designed by	Drawn by LNC	Checked by JWH

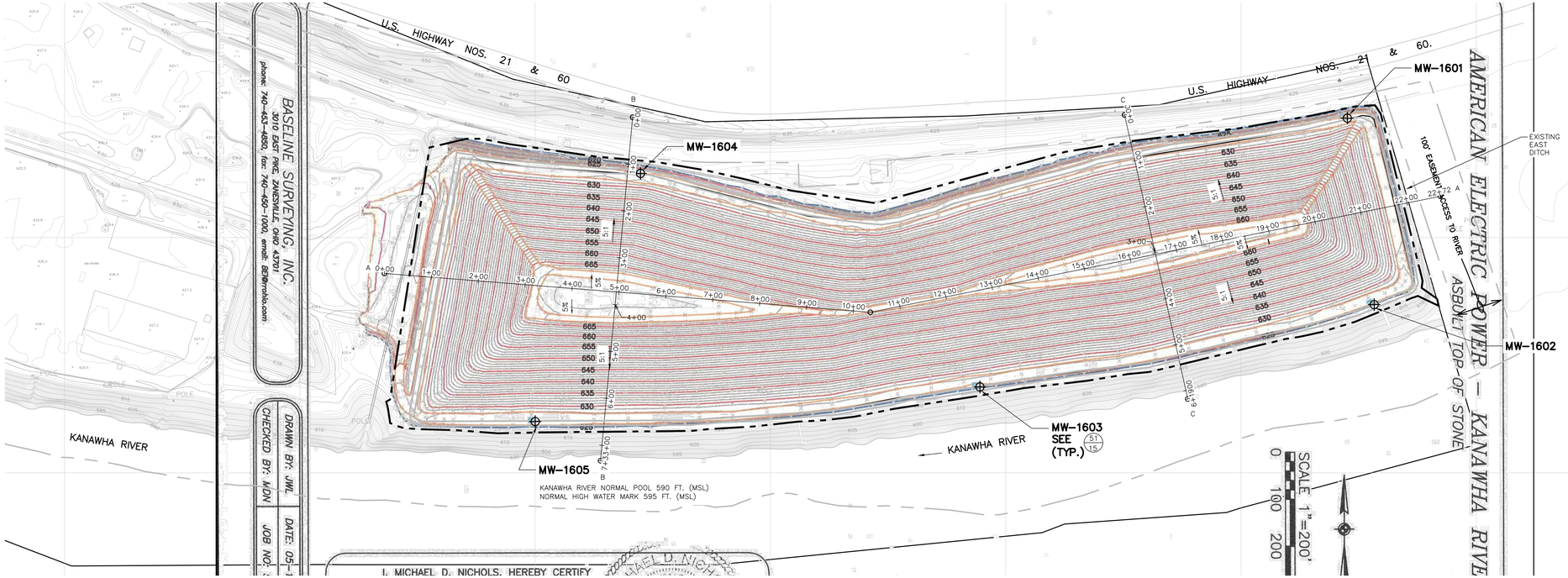
JOHN W. HOLM LPE 17419 STATE OF OHIO PROFESSIONAL ENGINEER

ARCADIS

ARCADIS U.S., INC.

IGS1092

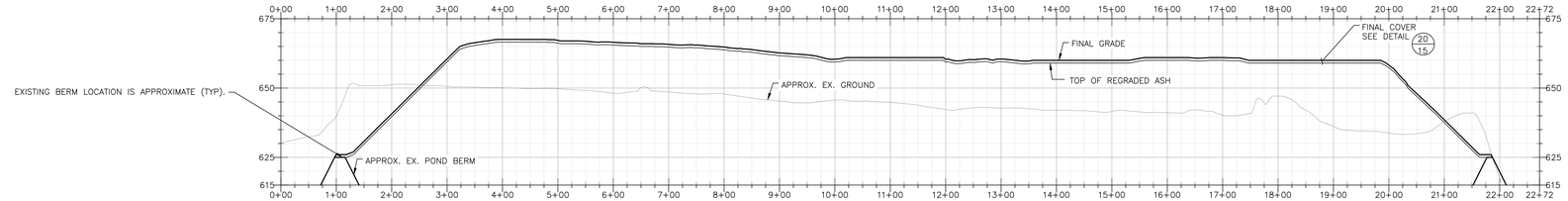
DWG. NO. 12-30014-1



BASELINE SURVEYING, INC.
1033 GAY ST., PHASE 2 SUITE E, KNOXVILLE, TN 37916
phone: 740-453-4850, fax: 740-450-1009, email: BSI@mobo.com

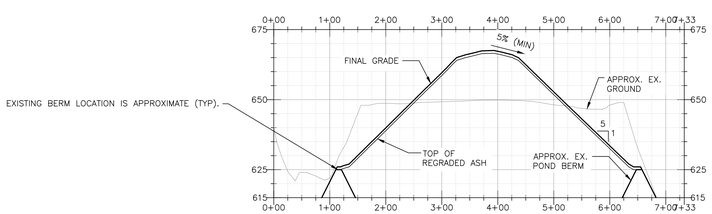
I, MICHAEL D. NICHOLS, HEREBY CERTIFY

DRAWN BY: JWL
CHECKED BY: MDN
DATE: 05-1
JOB NO:

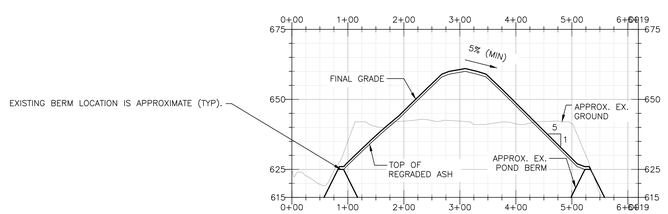


SECTION A–A

PROFILE SCALES
100' 0' 100' 200'
HORIZONTAL SCALE: 1"=100'
20' 0' 20' 40'
VERTICAL SCALE: 1"=20'



SECTION B–B



SECTION C–C

NOTE: FINAL GRADE SURVEY PROVIDED BY BASELINE SURVEYING

DATE	NO.	DESCRIPTION	APPD.
7/27/17	1	AS-BUILT	JWH
2/10/16	0	ISSUED FOR CONSTRUCTION	JWH

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APPALACHIAN POWER COMPANY

KANAWHA RIVER PLANT

GLASGOW WEST VIRGINIA

ASH POND CLOSURE AS-BUILT PROFILES

DWG. NO. 12-30014-1

SCALE:
DR: LNC
CH:
ENGR.
PROJ. ENGR.
DATE:

CIVIL ENGINEERING DIVISION

APPROVED

AEP AMERICAN ELECTRIC POWER
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

ARCADIS Project No. HA100250.0000.00000	Professional Engineer's Name: JOHN HOLM
Date: 07-10-2015	Professional Engineer's No.
ARCADIS 4665 CORNELL ROAD SUITE 350 CINCINNATI, OHIO 45241 TEL. 513.860.8700	State; Date Signed; Project Mgr.: RJK; Designed by; Drawn by: LNC; Checked by: JWH

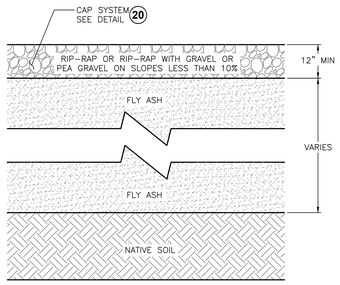
JOHN W. HOLM — No. 17419 — STATE OF WEST VIRGINIA — PROFESSIONAL ENGINEER

ARCADIS
ARCADIS U.S., INC.

IGS1092

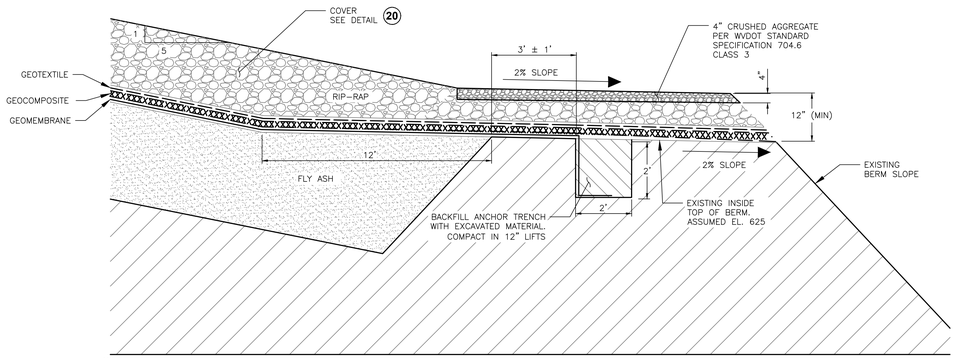
DWG. NO. 12-30015-1

Series	Description
10s	General Details
20s	Cap Details
50s	Miscellaneous Details
60s	Stormwater Details



TYPICAL ASH POND SECTION DETAIL 1

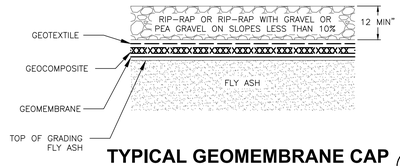
NOT TO SCALE



NOTE:
TOP OF BERM ASSUMED TO BE AT EL. 625. IF ACTUAL TOP OF BERM IS LOWER THAN 625 THEN STRUCTURAL FILL MAY BE ADDED TO RAISE THE BERM. IF ACTUAL TOP OF BERM IS HIGHER THAN EL. 625 THE TOP OF BERM MAY BE LOWERED.

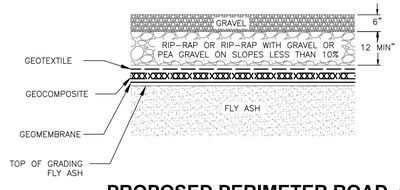
TYPICAL GEOMEMBRANE CAP SYSTEM TERMINATION DETAIL 21

NOT TO SCALE



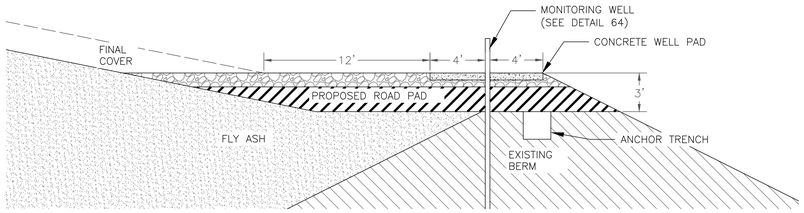
TYPICAL GEOMEMBRANE CAP SYSTEM DETAIL 20

NOT TO SCALE



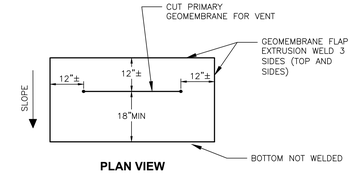
PROPOSED PERIMETER ROAD AND ACCESS ROAD 50

NOT TO SCALE



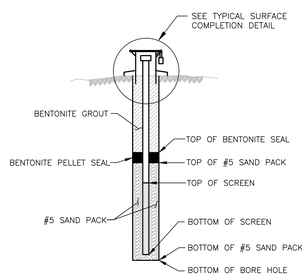
MONITORING WELL INSTALLATION DETAIL 51

NOT TO SCALE

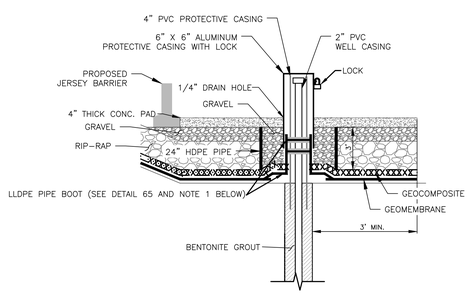


GAS VENT DETAIL 52

NOT TO SCALE



TYPICAL WELL DETAIL



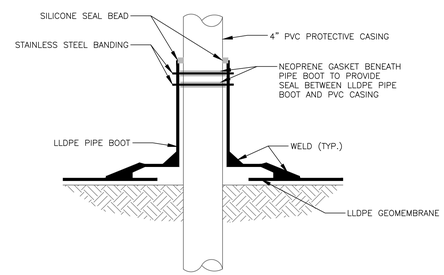
TYPICAL SURFACE COMPLETION DETAIL

NOTE:

1. THE GEOMEMBRANE LINER AND BOOT WILL PREVENT SURFACE WATER INFILTRATION. THEREFORE, THIS IS A FUNCTIONAL ENGINEERED EQUIVALENT TO THE TYPICAL REQUIREMENT THAT THE CONCRETE PAD IS CONTIGUOUS TO CEMENT GROUT IN THE UPPER PORTION OF THE BORE HOLE.

TYPICAL MONITORING WELL DETAIL 64

NOT TO SCALE



TYPICAL VERTICAL PIPE PENETRATION DETAIL 65

NOT TO SCALE

NOTE:
GEOSYNTHETICS EXAGGERATED FOR CLARITY

ARCADIS Project No. HA100250.0000.00000	Professional Engineer's Name: JOHN HOLM		
Date: 07-10-2015	Professional Engineer's No.		
ARCADIS 4665 CORNELL ROAD SUITE 350 CINCINNATI, OHIO 45241 TEL. 513.860.8700	State	Date Signed	Project Mgr.: RJK
	Designed by	Drawn by: MJC	Checked by: JWH

JOHN W. HOLM LAO 17419 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

ARCADIS U.S., INC.

DATE	NO.	DESCRIPTION	APPD.
7/27/17	1	AS-BUILT	JWH
2/10/16	0	ISSUED FOR CONSTRUCTION	JWH

REVISIONS

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APPALACHIAN POWER COMPANY

KANAWHA RIVER PLANT

GLASGOW WEST VIRGINIA

ASH POND CLOSURE AS-BUILT CAP DETAILS

DWG. NO. 12-30015-1

SCALE:

DR: LNC

CH:

ENGR.

PROJ. ENGR.

DATE:

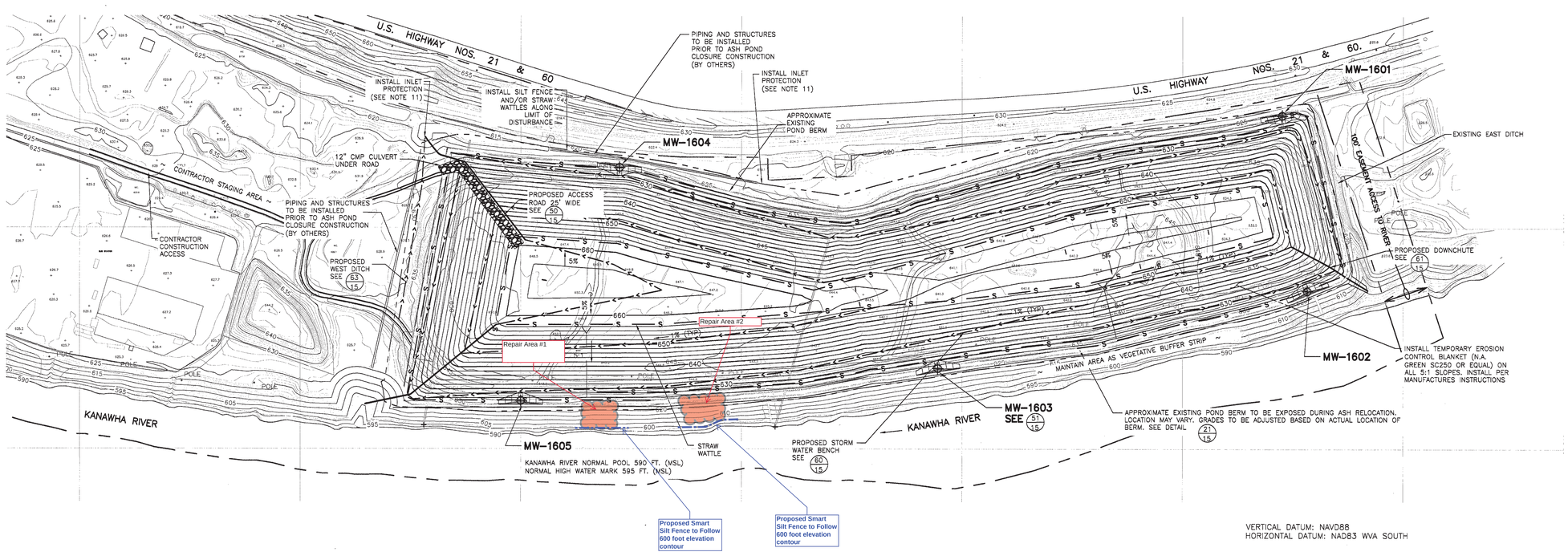
CIVIL ENGINEERING DIVISION

AEP AMERICAN ELECTRIC POWER

1 RIVERSIDE PLAZA COLUMBUS, OH 43215

IGS1092

DWG. NO. 12-30016-A



N

100' 0' 100' 200'
SCALE: 1"=100' CONTOUR INTERVAL: 1'

LEGEND

- EXISTING CONTOUR
- EXISTING SPOT ELEVATION
- EXISTING TREES
- EXISTING STREAM OR POND EDGE
- EXISTING OCCUPIED STRUCTURE
- EXISTING FENCE
- EXISTING UTILITY POLE
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING PROPERTY LINE
- PROPOSED LOCATION OF STRAW WATTLE
- SILT FENCE
- EXISTING STORM DRAIN
- PROPOSED FINAL CONTOUR
- PROPOSED STORM WATER BENCH
- PROPOSED DOWNCHUTE
- PROPOSED STORM DRAIN
- PROPOSED STRUCTURE
- LIMIT OF DISTURBANCE AND STRAW WATTLE
- PROPOSED MONITORING WELL

VERTICAL DATUM: NAVD88
HORIZONTAL DATUM: NAD83 WVA SOUTH

Note: Contour lines shown on this drawing do not reflect the vertical features or scarp features on the river bank that will be repaired.

2020 Riprap Revetment Project Sketch

DATE	NO.	DESCRIPTION	APPD.
7/10/15	A	ISSUED FOR PERMIT	JWH

REVISIONS

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APPALACHIAN POWER COMPANY

KANAWHA RIVER PLANT

GLASGOW WEST VIRGINIA

ASH POND CLOSURE DESIGN
EROSION AND SEDIMENT CONTROL PLAN

DWG. NO. 12-30016-A

SCALE:
DR: LNC
CH:
ENGR.
PROJ. ENGR.
DATE:
APPROVED BY

CIVIL ENGINEERING DIVISION

AEP AMERICAN ELECTRIC POWER
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

ARCADIS Project No.
HA100250.0000.00000
Date
07-10-2015
ARCADIS
4665 CORNELL ROAD
SUITE 350
CINCINNATI, OHIO 45241
TEL. 513.860.8700

Professional Engineer's Name
JOHN HOLM
Professional Engineer's No.

State	Date Signed	Project Mgr.
		RJK
Designed by	Drawn by	Checked by
	LNC	JWH

JOHN W. HOLM REGISTERED 17419 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

ARCADIS
ARCADIS U.S., INC.

IGS1092

DRAWING NUMBER: SSK-KRP-AMS-1.17.2025

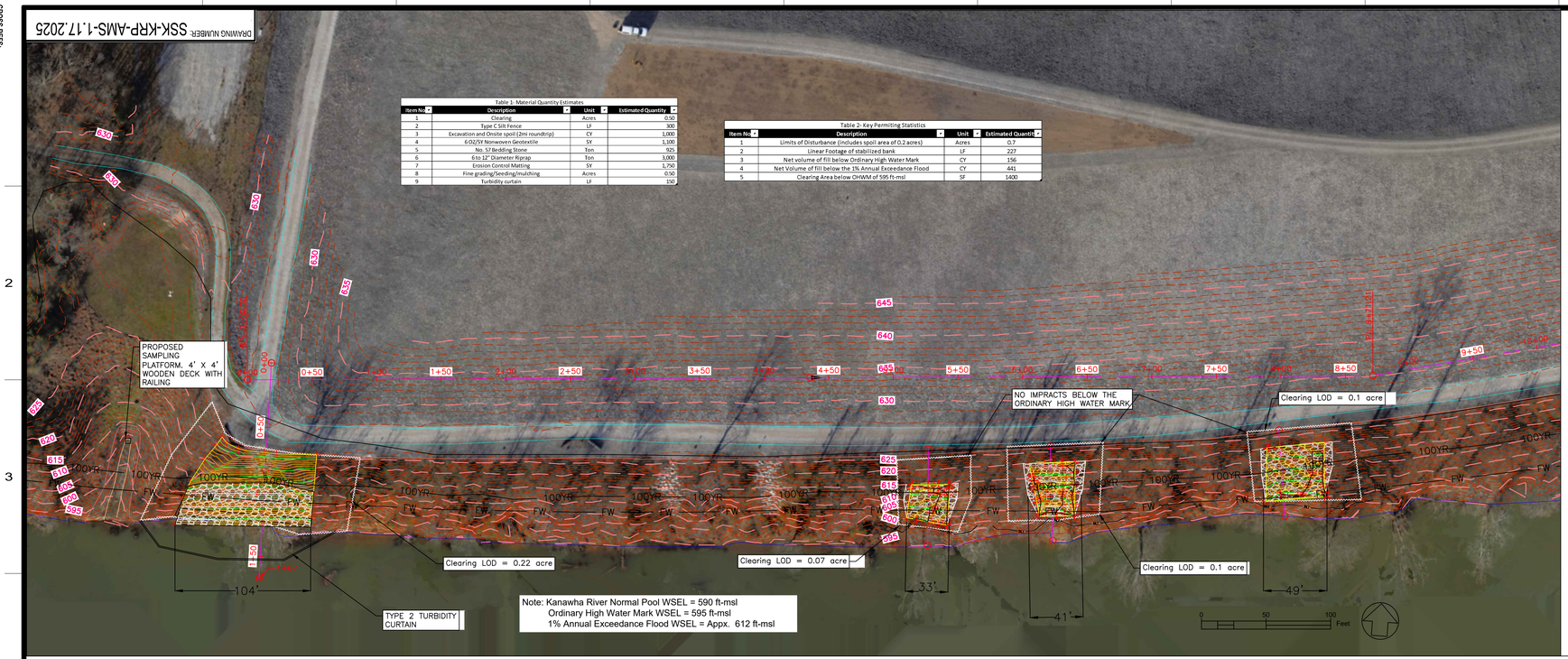
XREFS:

Table 1- Material Quantity Estimates

Item No.	Description	Unit	Estimated Quantity
1	Clearing	Acres	0.50
2	Type C Silt Fence	LF	300
3	Excavation and Onsite spoil (2mi roundtrip)	CY	1,000
4	6 OZ/SY Nonwoven Geotextile	SY	1,100
5	No. 57 Bedding Stone	Ton	925
6	6 to 12" Diameter Riprap	Ton	3,000
7	Erosion Control Matting	SY	1,750
8	Fine grading/Seeding/mulching	Acres	0.50
9	Turbidity curtain	LF	150

Table 2- Key Permitting Statistics

Item No.	Description	Unit	Estimated Quantity
1	Limits of Disturbance (includes spoil area of 0.2 acres)	Acres	0.7
2	Linear Footage of stabilized bank	LF	227
3	Net volume of fill below Ordinary High Water Mark	CY	156
4	Net Volume of fill below the 1% Annual Exceedance Flood	CY	441
5	Clearing Area below OHWM of 595 ft-msl	SF	1400

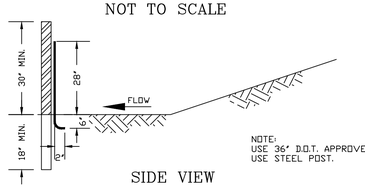


Note: Kanawha River Normal Pool WSEL = 590 ft-msl
Ordinary High Water Mark WSEL = 595 ft-msl
1% Annual Exceedance Flood WSEL = Appx. 612 ft-msl

NOTES:

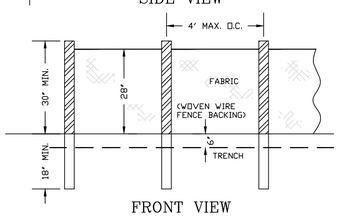
1. TOPOGRAPHY WAS PROVIDED BY A SURVEY FROM SURVEYING AND MAPPING DATED DECEMBER 27, 2024. VERTICAL DATUM NAVD 88 GEOID 18 (CONUS) HORIZONTAL DATUM: NAD83 (2011) STATE PLANE COORDINATE SYSTEM: WEST VIRGINIA SOUTH (4702)
2. TREES TO BE CUT DOWN BY OTHERS AHEAD OF THE INDIANA BAT DEADLINE, MARCH 31ST.
3. EXCESS SOIL WILL BE DISPOSED OFF AT AN ONSITE SPOIL PILE LOCATION IN THE FORMER COAL PILE AREA LOCATED 1 MILE AWAY FROM THE PROJECT LOCATION.
4. ALL DISTURBED AREAS WILL BE SEEDED AND MULCHED. AN EROSION CONTORL MATTING SHALL BE PLACED ON THE DISTURBED SLOPES OF THE DIKE THAT DO NOT HAVE RIPRAP ARMORING.
5. CONTRACTOR IS REQUIRED TO SEQUENCE WORK SUCH THAT EACH AREA IS STABILIZED BEFORE DISTURBING SOIL IN OTHER AREAS TO BE REPAIRED.
6. EXISTING RIPRAP NEAR 0+10 REPAIR AREA MAY BE REUSED IF ACCEPTABLE TO THE OWNERS CONSTRUCTION REPRESENTATIVE.

TYPICAL SILT FENCE DETAIL
NOT TO SCALE



NOTE:
USE 36" D.O.T. APPROVED FABRIC
USE STEEL POST.

SIDE VIEW



FRONT VIEW

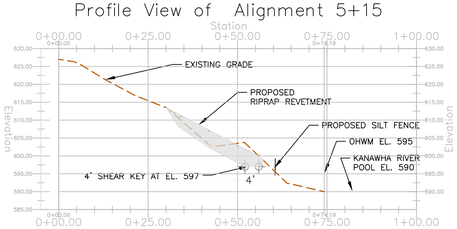
TYPE C FABRIC (36")

USE: WHERE FILL SLOPES EXCEED A VERTICAL HEIGHT OF 20 FEET AND THE SLOPE GRADIENT IS STEEPER THAN 3:1.

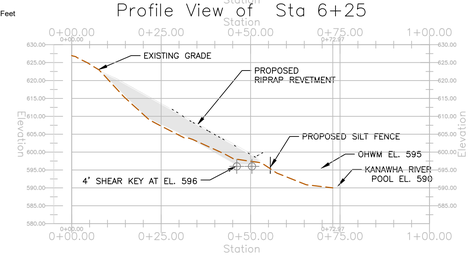
NOTE: FILTER FABRIC MAY ALSO BE ATTACHED TO THE POST BY WIRE, CORD, AND POCKETS.

POST SIZE		
MIN. LENGTH	TYPE OF POST	SIZE OF POST
4'	STEEL	1.3 LB./FT. MIN.

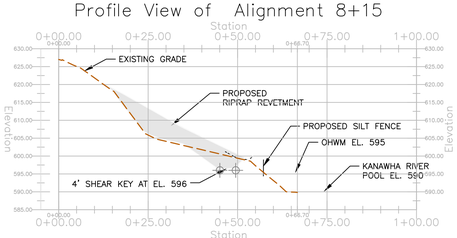
Profile View of Alignment 5+15



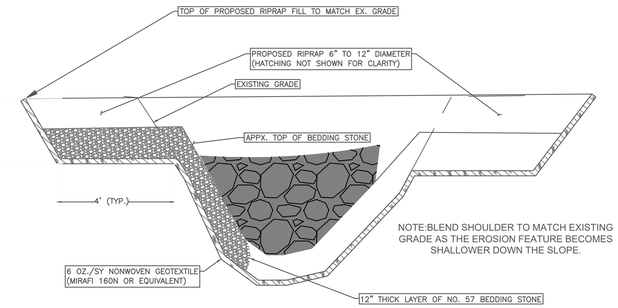
Profile View of Sta 6+25



Profile View of Alignment 8+15



0 20 40 Feet

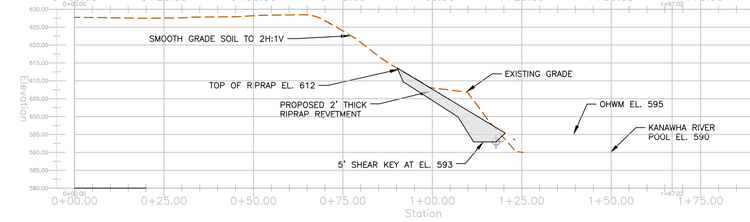


NOTE:BLEND SHOULDER TO MATCH EXISTING GRADE AS THE EROSION FEATURE BECOMES SHALLOWER DOWN THE SLOPE.

TYPICAL PROFILE OF RIPRAP REPAIR
SHOULDER DETAIL
NOT-TO-SCALE

0 20 40 Feet

Profile View of 0+10 Alignment



DATE	NO.	DESCRIPTION	APPD.
5/1/2025	2	ISSUED FOR CONSTRUCTION	
2/14/2025	1	ISSUED FOR BID/PERMIT	

REVISIONS

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AEP CONFIDENTIAL

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APPALACHIAN POWER COMPANY

KANAWHA RIVER PLANT

GLASGOW WEST VIRGINIA

EAST FLY ASH POND DIKE REPAIRS
PLOT PLAN, CROSS SECTION AND DETAILS

UNIT:	DRAWING NUMBER:	REV:
	SSK-KRP-AMS-1.17.2025	

SCALE: AS NOTED
DR: D MURPHY
CH:
SUP:
ENG: D MURPHY
DATE: 1/17/2025
APPROVED BY

AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

PLOT DATE: DDMMMYYYY
PLOT TIME: HOUR:MINUTE
PLOTTED BY:
CROSS REFS:

D (22"X34")